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An overview of *latte* period archaeology

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Abstract—Studies of megalithic ruins called *latte* and other related material traces potentially offer insights into an associated *latte* period, approximately A.D. 900 through 1700, quite distinctive from preceding cultural periods that began as early at 1500 B.C. in the Mariana Islands. Vastly more is known of this *latte* period than any other in Marianas regional archaeology, yet numerous basic questions continue to be considered and debated. The present work aims to summarize current data and thinking about *latte* research.

Introduction

The theme "archaeological studies of the *latte* period" was chosen for this volume of *Micronesica* to embrace the plentiful ways archaeologists and others conceptualize these megalithic ruins and their significance toward indigenous cultural history and heritage in the Mariana Islands (Figure 1). Today, *latte* stones vibrantly symbolize native Chamorro cultural identity (Figure 2), and they embody a material link to an ancestral society prior to the last few centuries of foreign colonial rule and evolving globalized context of the Chamorro people. During the last several decades of archaeological study, *latte* sites and their multiple associations have proven to be quite complex, deserving equally complex modes of study. Interpretive models are even more complicated in attempts to comprehend or explain the functions of *latte* stones and the evolution of native Chamorro society associated with these ancient sites.

In common usage, the word *latte* refers to sets of megalithic pillars (*haligi*) and "caps" or capitals (*tasa*) that at one time presumably supported wooden superstructures (Figure 3). According to Hornbostel (n.d.): "The Chamorro word *latte* is pronounced *latt-te*, the last syllable being very short and hardly noticeable." The oldest dates for archaeological examples appear to be around A.D. 900–1000, and the most recent dating is constrained by large-scale site abandonment around 1700 due to Spanish colonial activity. *Latte* stones often can be connected with other less obvious material manifestations, such as broken pottery fragments, discarded food remains, and other aspects of material culture.

According to documentary records, oral histories, and most archaeological evidence, *latte* stones once supported house structures, although the specific house functions likely varied as residential, communal, storage, ceremonial, or

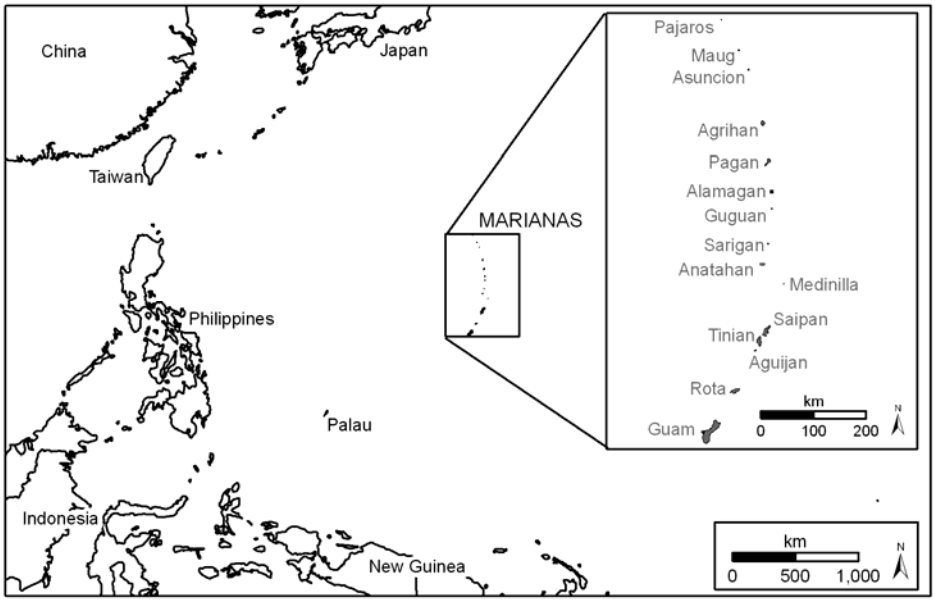

Figure 1. Mariana Islands in the western Pacific region.

Figure 2. Photograph of the "*Latte* of Freedom," about 100 m tall concrete structure in Guam.

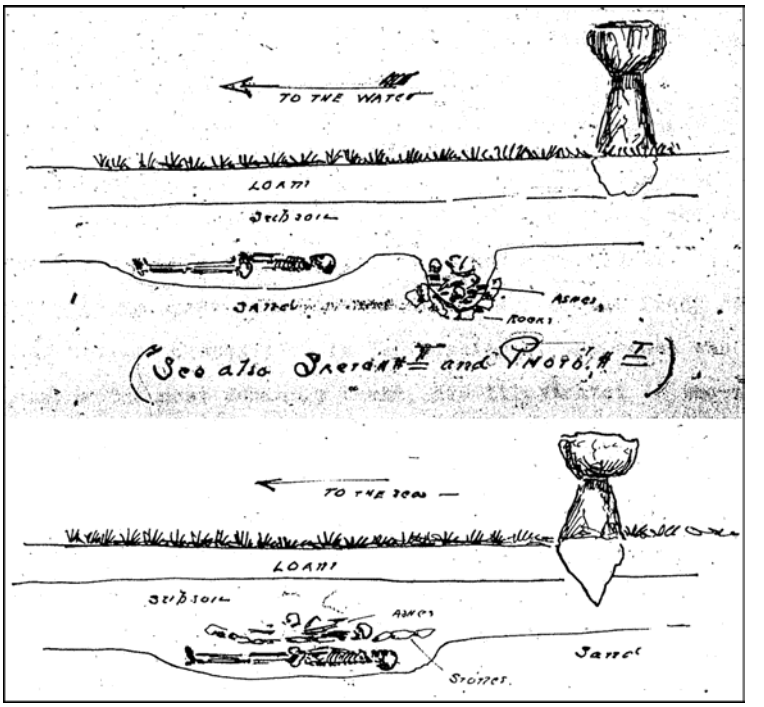

Figure 3. Sketches of *latte* site studies, recorded by Hans Hornbostel (n.d).

otherwise (Thompson 1940; see also Craib 1986; Graves 1986; Yawata 1945, 1963). A number of functional sub-categories may be proposed, for example related to social ranking or hierarchy, but the relevant supporting archaeological evidence often has been lacking or ambiguous.

Compared to the full scope of Marianas archaeology beginning around 1500 B.C., the *latte* period A.D. 900–1700 represents the most recent in a series of cultural history periods. The material remains of this period dominate the regional record, easily accessible in surface-visible and near-surface contexts. More than 90% of Marianas archaeology has involved the *latte* period.

Reviewing the history of archaeological research in the Marianas region (Carson, this volume), questions about *latte* have dominated the field. The types of questions being asked, modes of acquiring data, and manners of testing hypotheses all have changed over time in some ways. Also, a number of assumptions and knowledge-claims can be exposed as not necessarily justified, so in fact more research may be warranted than some may be willing to accept.

Interpretive concepts about *latte* stones, *latte* sites, and the larger *latte* period have been abundant, and understandably a number of disagreements as well as

outright misconceptions may be noted. Common points of contention include the relation of the *latte* period to preceding times, the cultural functions of *latte* stones and of *latte* sites, and the extent of geographic diversity and chronological change within the *latte* period.

Beyond its significance for archaeological research, the *latte* period generally is perceived as the last indigenous Chamorro cultural era, prior to large-scale transformations during the Spanish colonial era. In the wake of a few decades of violent conflict throughout the Mariana Islands beginning in the late 1600s, the survivors of a massively depopulated native culture were forcibly re-located into a small number of more easily controlled villages in Guam. By A.D. 1700, *latte* sites were effectively abandoned. Now more than three centuries later, the lifestyles associated with the *latte* period are virtually lost.

Archaeological research has become one means to provide a link with the native Chamorro past, and in many ways it is probably the most informative line of evidence. A rather striking discontinuity is evident between the native Chamorro past and modern life, wherein fragmentary but important knowledge is recoverable through history, language, and cultural practice. The total number of native Chamorro people was massively reduced during the Spanish *reduccion* program of the late 1600s, so the surviving cultural knowledge has been accordingly reduced in terms of both strength and diversity. Following two centuries of intensive and large-scale borrowing of Spanish language and food, as well as of Christianity and related religious beliefs, the last century involved continued colonial influence by German, Japanese, and American entities. In addition, immigrant populations from other parts of Micronesia and from the Philippines have maintained their own cultural traditions, in some ways integrated with Chamorro traditions.

At present, knowledge about the native Chamorro past is in high demand, and this search for knowledge is virtually synonymous with research of the *latte* period. Issues of cultural heritage and identity have been increasingly important for individual people, artistic expression, public education, and political movements. Somewhat related, local government laws have greatly strengthened over the last few decades regarding archaeological sites as resources requiring preservation-oriented management. Nonetheless, private land developments and local government infrastructure projects routinely have destroyed numerous archaeological sites each year, so the ability to learn about the Chamorro past has been dwindling rapidly. Meanwhile, U.S. government interests have intensified in the Marianas region, and the next few decades potentially will involve an amazing increase in local population size and demands on resources, inevitably altering the role of native Chamorro cultural history in the near future.

Despite the abundance of *latte* research and the increasing demand for scientific data, surprisingly little has entered the scholarly literature, and even less information has been available to the general public. The present volume

therefore aims to fulfill a perceived need for a standard reference. Authors were asked to contribute their most recent works related to the overall theme of *latte* period archaeology. The resulting collection hopefully will serve as a valuable resource for some years yet to come.

This introductory chapter offers a comprehensive narrative summary of current data and thinking of *latte* research. Several inter-related topics are highlighted. Where relevant, the other contributing chapters of this volume are noted.

Site Definitions

Table 1 lists simple definitions regarding *latte* stones, elements, sets, sites, features, and period. These terms refer to various units and scales of analysis, although they are closely inter-related.

"*Latte* stones" generally are conceived as pillars (*haligi*) and capitals (*tasa*), arranged in paired rows to form a "set." Each "*latte* set" therefore includes a number of "*latte* stones." Where the state of decay disallows clear identification of pillars and capitals or the arrangement of pieces forming a recognizable "*latte* set," then the probable pieces and fragments often are described as "*latte* elements."

These definitions obviate that *latte* stones do not occur in isolation. Each pillar can be linked to a capital. Pillars and capitals must occur in multiple numbers in order to create a formal set.

Wherever a *latte* set occurs, typically other sets can be found within close proximity, thus forming a larger "*latte* site." Most often, a site boundary is defined by the more or less continuous distribution of findings. For example, if three *latte* sets are found each within a certain measured proximity of each other, and a fourth is found at a greater distance, then this fourth occurrence may be attributed to a different "site" due to its isolation relative to the other findings.

A "site" may include a number of "features." In archaeological jargon, a "feature" refers to a generally non-portable entity, unlikely to have moved accidentally from one context to another. For example, *latte* stones may have fallen or decayed, but they can be found approximately in their original locations. Similarly, concentrations of pottery fragments generally are within their original areas of discard, although the individual pieces have shifted to a degree. Concentrations of artifacts and food remains often are surface-visible, and they also often are incorporated into sedimentary layers, in both cases forming effective features. Within these layers, other features or "sub-features" may include hearths, post molds, remnants of cobble-pebble pavings, and other possibilities.

The "*latte* period" began around A.D. 900–1000, and it ended around A.D. 1700. During this span of 700–800 years, some degree of cultural change almost

Table 1. Basic definitions related to *latte*.

Analytic Term	Definition
Latte stone	Recognizable pillar (*haligi*) or capital (*tasa*)
Latte element	Probable *latte* stone or fragment of stone, but not clearly identified as a pillar or capital
Latte set	Set of *latte* stones representing a singular shared unit or arrangement
Feature	Immovable object or occurrence of related components, implying singular function and time period; could include a *latte* set as one example
Latte site	Collection of features, including at least one *latte* set
Latte period	Minimum and maximum age range when *latte* sites were used, approximately A.D. 900 through 1700; refers to all sites within this age range, whether or not actually including specific *latte* sets

certainly occurred. Most sites were occupied during a somewhat shorter duration within the larger potential range.

Sites within the range of A.D. 900–1700 are considered part of the general "*latte* period," even if they do not contain actual "*latte* stones." For example, concentrations pottery fragments often are found in isolation, and their distinctive characteristics can be linked to the general range of the "*latte* period."

Defining a site minimally involves identification of its location and boundary, generally following the distribution of the constituent features. The spatial distribution of features often is more informative about the types of activity that occurred and the relative intensities of these activities across the landscape. For these reasons, a "siteless" paradigm or "distributional" approach sometimes is preferred (Dunnell 1992; Ebert 1992). However, mapping of site boundaries is a practical matter for resource management, and the notion of a "site" in this sense must persist. Meanwhile, researchers are free to work with data however needed for creating their own analytic units for research purposes, for example examining individual features within a site or group of sites.

The function of a site of feature is not directly observable, but rather it is interpreted based on the available evidence. Each feature can be described in terms of physical form and observable material characteristics (Hommon 1970a, 1970b), then assessed in terms of probable function and age. Multiplicity of function and age also can be considered (Carson 2005a).

Location and boundary are indispensible both for research and for resource management. The setting can be analyzed in terms of surrounding environment, viewshed, relations with other sites or features, and other considerations. The

boundary is critical for practical management of resources, for example when planning construction of a roadway, utility trench, or housing project.

Description of physical form is also essential, more for research than for resource management. Based on clear and unbiased recording of material observations, interpretations can proceed for example concerning the past function and age of a site or feature. Assessment of past function is entirely a conceptual exercise. Age can be measured by radiocarbon dating or other means, but the measurement needs to be associated with a clearly described material reality that in turn can be related to the site or feature being dated.

Based on what is described of several sites or features, results can be compared for more meaningful interpretation than can be the case for any occurrence in isolation. By comparing multiple sites or features of the same or similar age, more can be learned of a particular window in time. By comparing multiple sites or features of different ages, more can be learned of change over extended time. In this view, development of a larger research program requires reliable baseline site recording, and also some awareness of potential research can affect the way sites are recorded (Carson 2005b).

Depending on the research question being asked, the unit and scale of analysis can be adjusted accordingly. Some sites include more features, cover more spatial extent, or extend over longer temporal duration than others. Whole sites therefore are usually not comparable with one another, but instead individual features can be more reasonable for comparison, at a minimum beginning with baseline aspects of location, form, function, and age.

Deficiencies in research interpretations and errors in resource management can occur when sites or features are recorded incompletely or unevenly, as well as when units and scales of analysis are employed inappropriately. In some cases, proposed research conclusions may be flawed. In other cases, sites or portions of sites can be unknowingly destroyed.

Potential Significance

Collectively, *latte* stones and other tangible materials can be connected with abstract notions and concepts of social organization, politics, subsistence economy, trading and other networks, aesthetic values, and other aspects of ancient Chamorro life during a bygone era in the Marianas region. Potentially, physical archaeological evidence can contribute to these lines of inquiry, and hard data can prove or disprove a range of hypotheses about the ancient social life of the *latte* period.

The archaeological evidence of the *latte* period is abundant, diverse, and widespread throughout the Mariana Islands, accordingly known to many people and bearing various potential meanings. Beyond their archaeological significance, *latte* today are regarded as important cultural symbols. Kurashina et al. (1999:268) note:

> Replicas of *latte* stones are found as the prominent architectural motif of many public buildings, businesses, schools, and in a variety of settings elsewhere in the Mariana Islands.

Kurashina et al. (1999:269) also note:

> Some *latte* representations may appear very large in size, for example, in situ as the original archaeological remains of the House of Taga on Tinian and at As Nieves archaeological site on Rota. Other *latte* are very small, such as *latte*-shaped key chains prepared for the contemporary tourist industry. *Latte* motifs appear on T-shirts and baseball caps. They are seen as design motifs on gold and silver jewelry including pendants, earrings, and rings made locally. They can be observed in wood, as wall decorations, clocks, and door stoppers and the like. At least one local publication is called "Latte." The *latte* motif is prominently displayed on the national flag of the Commonwealth of the Northern Mariana Islands.

Part of the modern perception of *latte* sites includes the fact that they have become decayed and overgrown to a certain degree (Figure 4), yet they retain undeniable evidence of ancient Chamorro habitation in the form of *latte* stone remains. These types of settings are perceived as the homes or haunts of *taotaomona* (ancestral spirits). As Kurashina et al. (1999:269) noted:

> According to many Chamorros, the *taotaomona* ("the Ancient Ones," i.e., the People of Long Ago) have never departed, but remain close to their places of origin, in order to keep an eye on their descendants and on their properties. *Taotaomona* might reside near banyan trees, or even in the vicinity of ancient villages, where the presence of *latte* stones may be the only above-ground sign of a village of long ago. If one goes hiking in the jungle, *taotaomona* might pinch the tresspasser's skin, leaving bruises to warn of their displeasure at being disturbed. *Taotaomona* are felt to be very real by many of today's inhabitants of the Mariana Islands.

At least part of the significance of any *latte* site depends on its context or environment, situated today most often within uninhabited forest but at one time involved in an active landscape of social life with its own context and history. According to this view, archaeologists can study the physical environmental settings and the cultural contexts once associated with individual *latte* sets. For example, the physical setting may involve a coastal plain situated near a productive reef, a low ridgetop adjacent to a stream drainage, or a forested limestone plateau terrace. The cultural setting may involve a formal residence, a small-scale campsite, a garden, a community meeting hall, or a variety of additional possibilities related to other co-existing site settings.

Figure 4. Photograph of *latte* set in overgrown vegetation, after partial clearing in Tinian.

Significance can be understood in many ways, but professional archaeologists generally recognize significance as the ability to generate new substantive or theoretical knowledge (W. Butler 1987). American archaeologists mostly follow U.S. government regulations, issued by National Park Service (NPS) within the Department of the Interior (DOI), designed for evaluating site significance in terms of eligibility for the National Register of Historic Places (NRHP).

According to National Register Bulletin 15, site significance requires first that the site retains integrity, then the ability to demonstrate an association with a topic of significance in history or archaeology:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> B. That are associated with the lives of significant persons in or past; or
>
> C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and

distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in history or prehistory.

The aspect of "integrity" often is misunderstood, and sometimes it is ignored entirely. For archaeological sites, a state of ruin is almost always the case, so integrity can be considered in these terms. Integrity in this sense is either retained or not retained. It is not to be mistaken as a value of variable degree. Without possessing integrity relevant for one of the specific categories of significance, a site cannot be considered to convey this claimed significance.

As outlined above, for archaeological ruins retaining integrity, by far the most common category of significance is "D," referring to the ability to yield important information. Categories of "A" and "B" are rare when considering the evaluation criteria at a U.S. national level. Category "C" sometimes is proposed for certain rare *latte* sites in very good condition and exhibiting extraordinarily special qualities informative of architectural design or of their time period generally, but this category is not appropriate for most *latte* ruins found today in the Marianas.

Proposing multiple categories (A through D) does not make a site more significant than proposing a single category (typically category D). Level of application may be local, regional, or national; however, the significance itself is either present or absent, not greater or lesser. The division of categories (A through D) is intended to assist in the evaluation process and in management and preservation planning.

Most local governments (such as in Guam and in the Commonwealth of the Northern Mariana Islands) follow the above-noted regulations. For U.S. government-funded or sponsored projects, the U.S. laws are followed. For other undertakings, local government laws are applied, typically following the U.S. government example but with the ability to consider significance at a local rather than national level.

In addition to their potential research significance, archaeological sites also are recognized as resources with other potential values for a variety of stakeholders (Carson 2007; Carver 1996; Darvill 1995; Mathers et al. 2004). The consideration of archaeological research significance often is deemed of less importance (if any) when compared to the economic value of a real estate property, the perceived cultural heritage of a site, and other potential values. Echoing Darvill (1995:43–48), Carson (2007:82) proposed to "find new ways to make archaeological research not only acceptable but also desirable, particularly in relation to other value systems."

A partnership of archaeology with tourism seems to be potentially productive for increasing perceived values of sites and of archaeology generally.

This potential is especially encouraging when considering the appeal of *latte* sites and their environs (Kurashina et al. 1999), but this potential has not been embraced seriously in the Marianas region. Meanwhile, cultural tourism and eco-tourism seem to be developing rapidly in many parts of the world.

If an archaeological site is preserved by the local government or in some way adopted for protection or "saving" by local community groups, then this kind of action is in realistic practice not due to archaeological research value. Rather, it is due to perceived notions of cultural heritage value. In these cases, the goal is to preserve a site for what is known or thought to be known about it, not necessarily questioning any potential flaws in the knowledge-claims. Meanwhile, the goal of pure archaeological research is to learn something new. Archaeological knowledge potentially can be important toward developing cultural heritage and identity, but it often is misunderstood or too poorly developed to be of much direct application. Such appears to be the case for archaeological study of *latte* sites and of the *latte* period generally. In this way, cultural heritage preservation and archaeological research are quite different, although they potentially can intersect on rare occasion.

Today, much of what is perceived as significant about *latte* sites is not due to archaeological research, but rather it is taken from local folklore, family histories, and scarce mentions in historical documents. Generally speaking, *latte* sites correctly are viewed as links with the Chamorro past prior to Spanish colonial transformations. Knowing the exact location, boundary, age, and functional workings of a particular site or feature are essential for evaluating archaeological research significance, but these factors are not at all necessary for the general perception of cultural heritage significance. Archaeologists may pursue various research topics, but the cultural heritage value of a *latte* site will remain unchanged.

In recognition of cultural practice and perception having their own set of values not always coinciding with archaeological research, the notion of Traditional Cultural Property (TCP) has been developed (King 2003). The core idea is for sites associated with traditional cultural practice, beliefs, and perception to be eligible as significant sites in their own right. In some cases, cultural practice and perception can suggest that an archaeological site is valuable as a TCP. In other cases, a TCP value may be proposed, but no material archaeological site is evident.

TCP studies are rarely attempted in resource management, but such a study was undertaken by the U.S. Naval Facilities Engineering Command, Pacific Division (NAVFAC-Pacific) in preparation for military build-up activities in the Marianas region (Griffin et al. 2010). The results suggested that numerous *latte* sites and especially high-density occurrences with reasonably intact natural environs are good examples of archaeological sites that also may be eligible as TCP. A number of other potential TCP were identified as areas of gathering

plants and other resources, areas associated with folklore and legend, and landmarks of general cultural geographic reference.

In practice, poor understanding of archaeological significance contributes to loss of sites and research opportunities in the wake of land developments supposedly regulated by local government authorities. Very often, baseline fundamental site recording is mistaken as sufficient for documenting the significance of a site. This kind of basic recording may be appropriate in some cases, such as small concentrations of broken pottery fragments, but the findings and their contexts need to be recorded in sufficient detail that sadly is often not the case in reality. When archaeological field efforts are conducted by unqualified contractors and reviewed by unqualified government agency workers, the role of archaeological significance inevitably is mishandled. As Carson (2007:81) noted: "By mistaking minimal and superficial data for significant research, the overall value of true archaeological research is diminished."

Lines of Evidence

Research about *latte* sites and generally about the *latte* period has by no means been exclusively the work of archaeologists. Typically in the Pacific Islands, language and ethnohistory are essential lines of evidence for a fuller picture than archaeology alone (Kirch and Green 2001). In addition, archaeological research sometimes involves integration of multiple lines of evidence, such as from geology, geography, climate study, folklore, astronomy, and architectural engineering.

Specifically regarding social aspects of *latte* research, valuable information potentially can be learned from language and from history. The native Chamorro language may be examined for clues about pre-Spanish cultural practice of relevance to the *latte* period. Meanwhile, historical documents offer at least some reflection of native Chamorro life prior to Spanish colonial alterations, of special relevance to the ending portion of the *latte* period.

For various reasons, a truly integrated study of archaeology, language, and history has not yet been undertaken for *latte* research or generally in the Marianas region. Instead, different researchers have tended to work independently, borrowing information from one another but not necessarily in the most appropriate manner. At a minimum, some level of critical thinking is required when evaluating information across disciplines. Also, different lines of evidence are not equal, and they cannot be mistaken as having the ability to fill data gaps for one another directly.

Language

Linguistic study potentially can reveal much about the cultural history of a language community. In the case of the native Chamorro language of the Mariana

Islands, intensive and large-scale borrowing from Spanish reflects the colonial legacy of the region (Topping et al. 1975). In a larger-scale and longer-term view, however, comparison of Chamorro with other languages may offer insights into more ancient aspects of society.

Chamorro is considered of Proto-Malayo-Polynesian (PMP) ancestry, related to the many languages spoken by communities in Indonesia and the Philippines and ultimately part of the very large Austronesian language family (Figure 5). The closest living language relatives of Chamorro appear to be in the Philippines (Blust 2000; Reid 2002; Zobel 2002), but other similarities may have existed in the more distant past.

The PMP affinity of Chamorro indicates a sharing of language and presumably of other cultural practices generally throughout the region where PMP-speaking communities once lived. This ancestry presumably can be traced to the first settlement of the Mariana Islands around 1500 B.C. (Carson 2008, 2010a), of note associated with distinctive pottery style found only in the Marianas and the Philippines (Hung 2008). The dating of this pottery in the Philippines is older, about 2000 B.C., indicating this area as the proximal origin point (Hung et al. 2011).

Based on the linguistic model with the addition of archaeologically derived dating, a PMP-speaking community is inferred to have arrived in the Marianas region around 1500 B.C., with immediate origins in the Philippines extending as early as 2000 B.C. Following successful island settlement 1500 B.C., the language in the Marianas began to diverge from its PMP ancestry, developing a number of local innovations not shared by the other language communities, as well as not necessarily acquiring the new innovations developed elsewhere in the PMP-speaking world. However, at least some degree of continued contact with other language groups occurred over the next several centuries, so the resulting Chamorro language history was more complicated than would be the case for a language developing in total isolation from its homeland region.

Exactly how the Chamorro language history relates to *latte* research is somewhat ambiguous at present. The initial language group around 1500 B.C. did not construct *latte* sites, but rather *latte* sites and associated society developed more than 2000 years later around A.D. 900–1000 and continuing through A.D. 1700. Also, presumably the Chamorro language had changed considerably by this time. Moreover, the development of *latte* architectural design and by extension of societal organization at this time likely occurred in the context of contacts and communication with external communities.

Some of the Chamorro words related to *latte* and to houses appear to have some parallels in other related languages (Table 2). The generic word for a "house" is *guma* in Chamorro, a cognate of the Proto Malayo-Polynesian (PMP) *Rumaq. The word for "house post" is *haligi* in Chamorro, also applied to the pillar piece of a *latte*, and this word is a cognate of the PMP *HadiRi. The

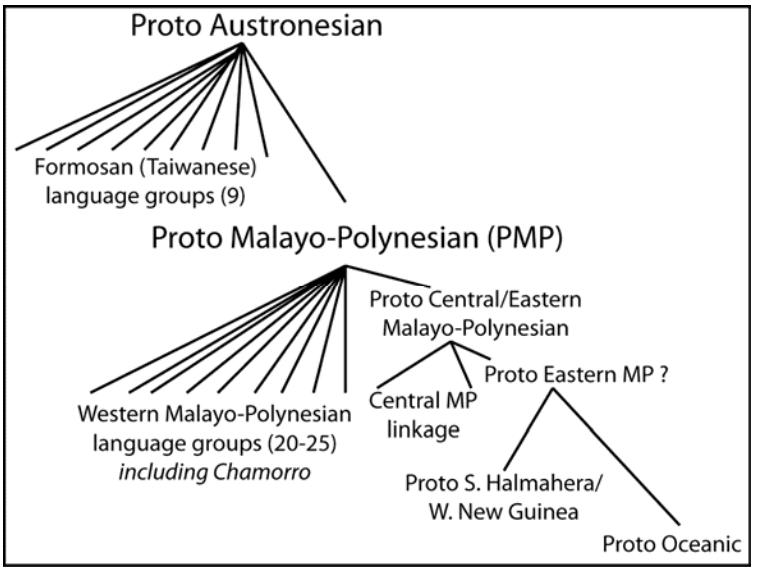

Figure 5. Position of Chamorro language relative to other Austronesian language groupings, after Pawley (2007).

Chamorro word *tasa* for the *latte* capital appears to be derived from a Spanish borrowing, referring to the "cup-like" shape of the capital. Rather mundanely, this overall patterning seems congruent with a PMP-speaking group describing components of a house structure.

The word *latte* itself seems to be a locally specific innovation. Perhaps it was retained in the case of Chamorro while abandoned elsewhere, or perhaps a more ancient word or some transformation of it came to be applied in a unique way in the Marianas yet not elsewhere. Either such speculation seems plausible, given that the site design is unique within the PMP-speaking realm. Some external parallels may yet be found at least superficially in a few cases, such as *rati* in Sumba and *rante* in Sulawesi (Laguana et al. this volume), but the meanings of these words are not the same as *latte* in the Marianas. Additional research will be needed to explore the origins of the words *latte*, *rati*, and *rante* as genetically related or not.

Exploring more closely within the Chamorro language itself, Leonard Iriarte (personal communication, 2011) suggested that the word *latte* could be the result of combining two words, *la* (an "augmentation" of something) and *atte* (a "stratagem"), following the Topping et al. (1975) dictionary. One interpretation could be that *latte* refers to an "augmented stratagem," wherein the "stratagem" of house-design or house-building somehow was "augmented" in the form of *latte* structures. Further interpretations could involve the use of stone pillars

Table 2. Chamorro with Proto-Malayo-Polynesian house-related terminology.

House-related Term	Chamorro*	Proto-Malayo-Polynesian**
Vertical support post	haligi	*HadiRi
Capital	tasa	-
House, generic	guma	*Rumaq
Ridgepole	pupong	*bubuŋ
Rafter	barkilan	*kasaw

* Chamorro words follow Topping et al. (1975)
** Proto-Malayo-Polynesian (PMP) words follow Pawley (2007)

replacing and older system of wooden posts, the use of specialist engineers or designers, and other possible ways that *latte* structures represent a form of augmented stratagem.

Linguistics studies potentially may allow insights into other aspects of ancient Chamorro society, for example identifying local-specific innovations versus PMP-shared inheritance of terms for parts of sailing craft, pottery manufacture, cooking practice, kinship relations, and other aspects of culture. Intensive Spanish borrowing has obscured the picture for Chamorro, but this problem can be overcome partially by recognizing Spanish loan-words yet unable to identify whatever words may have been lost. The ancient vocabulary can be presumed of pre-Spanish origin, but it is nearly impossible to specify the context as the *latte* period versus any other period extending as early as 1500 B.C. Within these limits, linguistic research potentially can be quite productive in collaboration with archaeology, yet it so far has not been attempted in this manner in the Marianas region.

Historical Records

Written accounts of the Marianas technically began in 1521 with Magellan's voyage, but very little useful information has survived of relevance to *latte* research and general archaeological topics. Perhaps the most useful early accounts were by Legaspi in 1565 (Plaza 1973) and by Juan Pobre in 1602 (Driver 1993), based on first-hand observations and interactions at a time prior to massive cultural transformation in the late 1600s. Later recordings offer some insights into Chamorro culture during the most intensive Jesuit missionary efforts and the Spanish government *reduccion* program, such as a history of the Jesuit mission 1667–1673 by Peter Coomans (1997) and a history of the life of San Vitores in the Marianas 1668–1681 by Francisco Garcia (2004). Another very important resource was a history written at a critical time by Charles le Gobien,

based on late 1600s Jesuit records and augmented by additional observations (le Gobien 1700). Several later accounts of the 1700s and 1800s each must be evaluated and interpreted for their relevance to the more distant past.

Russell (1998) provides a comprehensive review of historical references and a thorough outline of ancient Chamorro culture in this perspective. Laguana et al. (this volume) review many of the key historical references as noted above, specifically as pertinent to *latte* research. For example, historical descriptions of native houses were rare but valuable. Other times, social matters and cultural behaviors were noted, not always understood clearly by the people making the historical recordings but certainly valuable for modern research with some effort at interpretation of the original sources.

In brief, the historical documents dating around 1700 and earlier appear most useful for learning about native Chamorro culture prior to major Spanish colonial transformations, and generally this information can be applied to the later portion of the *latte* period. However, these records must be understood as bearing at least some bias of the original recorders, as well as limited to the time and place of the recording, not necessarily applicable to the *latte* period as a whole or to the Marianas region as a whole.

Research Questions

Of course numerous research questions may be posed concerning *latte* sites and the *latte* period generally. Some questions may not be answerable, but rather the most productive research program will involve development of topics that can be linked logically with real material data. Accordingly, Carson (2005b) outlined a general four-step approach for building archaeological knowledge, applicable in the case of *latte* research just as much as in any other case:

Task 1. Collect and document baseline data to describe fundamentally what happened (site function) at different points in time (site chronology) in a given unit of space.

Task 2. Compare the site–specific results at a larger scale to generate descriptions of land use or settlement pattern and chronological sequences.

Task 3. Propose hypothetical explanations of detected spatial and temporal patterns.

Task 4. Devise and implement independent tests of the hypothesized explanatory models.

The remainder of this introductory text considers potential archaeological research topics pertinent to *latte*. Naturally, additional topics will be identified in the future. Potentially significant topics are identified and discussed in general terms, noting what is known versus what is yet to be examined more carefully.

Construction

The unique character of *latte* appears to be the use of quarried stone to construct paired rows of pillars and capitals. Outside the Marianas region, similar types of stilt-raised construction are made of wooden timbers but not of stone. Also, stone-pillar houses in other cases are not connected to "caps" or capitals.

Latte sets include paired rows of upright slab-like pillars or *haligi*, arranged in rectangular plans. Owing to the paired rows, intact sets always include even numbers of pillars. Eight-pillar *latte* sets tend to be the most common, composed of four parallel pairs. The pillars vary mostly in the range of 80–200 cm high, and they mostly are separated 250–350 cm apart from one another. These parameters occur in most cases, but considerable variation is evident as may be expected in the vast number of *latte* sets of the Marianas. Variation can be expected according to geography, chronology, and function.

A capital or *tasa* originally would have been atop each pillar, but these stones generally have fallen from their original positions after the wooden superstructures have decayed. Today, many of the pillars also are found in fallen or broken condition, due to earthquakes, tree-root disturbance, and other factors of weathering and decay.

The pillars typically were anchored some depth below the ground, held in place by bracing stones, sometimes within a layer of pebble and cobble paving (Figures 6 and 7). Larger pillars presumably required anchoring at greater depth. In some cases, though, the pillars were positioned directly on bedrock in very shallow sediments (Figure 8), so some other option of stabilizing must have been available for these cases.

In the southern islands, *latte* stones were quarried from limestone exposures. Different limestone formations offered variable physical properties, aesthetic appeal, and perhaps sense of magic or historical renown. Carving the outlines of the shapes proceeded downward into the rock (Figures 9 through 11).

In the northern volcanic islands, boulders of various size were taken from beaches (Figure 12), and sometimes tuffaceous material was quarried (Figure 13). The local availability of material therefore constrained to some degree the potential size and engineering qualities of individual stones, in some cases requiring pillars less than 30 cm length.

In the cases of the known limestone *latte* quarries, carving presumably was accomplished with stone and durable shell tools (April 2004; Lizama et al. 1981). The same probably was the case for volcanic tuff quarries in the northern islands.

The next step of removing the partly shaped rock may have been possible by inserting water-soaked and expanding wood, by heat-treating to soften the stone, or by other means not yet known.

Final steps of transporting and erecting the stones have been unclear. Future experiments or cross-regional comparisons may yet prove insightful.

Figure 6. Photograph of *latte* pillar braced in a pebble and cobble foundation in Pagan.

Figure 7. Photograph of detail of *latte* pillar braced in a pebble and cobble foundation in Pagan.

Figure 8. Photograph of *latte* pillar emplaced directly over limestone bedrock.

Figure 9. Photograph of the *latte* stone quarry at As Nieves, Rota. These stones would have made the largest known *latte* structure, but these stones had not been removed for the final stages of construction.

Figure 10. Photograph of *latte* pillar quarrying at As Nieves Site, Rota.

Figure 11. Photograph of *latte* capital quarrying at As Nieves Site, Rota.

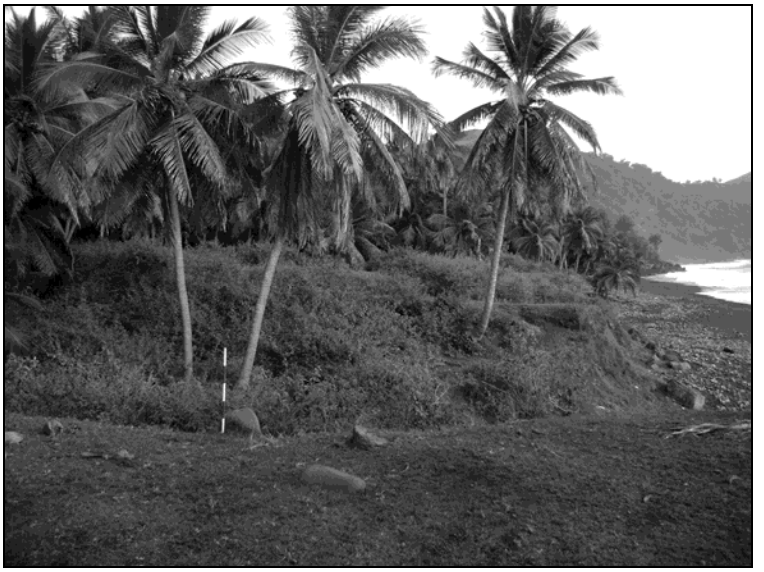

Figure 12. Photograph of volcanic cobble and boulder *latte* stones in Pagan.

Figure 13. Photograph of quarried volcanic tuff *latte* stones in Pagan.

Controlled experiments may be appropriate for learning about effective versus non-effective approaches in quarrying, transportation, and erection of *latte* stones, but this scope of research has not yet been undertaken. A number of potential scenarios have been proposed by historians and others, but of course none have witnessed the ancient processes in action. Other experiments may be designed to test the ability of different models to withstand typhoons and earthquakes. Again, this kind of experimental research has not yet been undertaken, but it potentially can contribute significant new information of general interest.

Within the natural physical constraints of the limestone and volcanic stone building materials, a surprising diversity is found in the shapes of pillars and capitals (Figures 14 through 16). The structural relationship between pillar and capital seems most important for engineering design, and it also may have functioned aesthetically. Choosing a particular stone source may have involved other reasoning as well, such as historical or mythical association.

Using knowledge of architectural engineering design, Morgan (1989) proposed several possibilities of how *latte* houses may have been built (Figure 17). Laguana et al. (this volume) provide more update and details, also drawing on comparative ethnographic field research in the Philippines and Indonesia. Previously, at least superficial similarities have been noted between wooden pillar-raised structures in the Philippines and the *latte* of the Mariana Islands (Bodner 1997; Kurashina et al. 1999).

Spatial Analysis

Spatial analysis can be considered at varying scales, exploring patterns within and around individual *latte* sets, comparing multiple features within a site complex, or examining larger landscapes relative to patterns of settlement and land use. A body of theory addressing the "built environment," largely borrowed from architectural studies, can be appropriate for analysis of space within individual *latte* sets or at a complex of related features in a larger site. At larger scales comparing multiple sites across a landscape, theory and method are quite well established for "settlement pattern" studies and more recently for "landscape" approaches.

The "built environment" became popular in archaeological theory during the early 1990s, based on a concept of cultural creation of environments through architecture and other means (Rapoport 1994). In this view, people created comfortable settings in which to live, and successive generations continued to interact with and modify these environments. Sites containing architectural ruins are especially suitable for these studies, particularly when layouts of villages can be discerned with clearly identifiable households, workshops, pathways, agricultural fields, and other such zones. This approach has not yet been applied

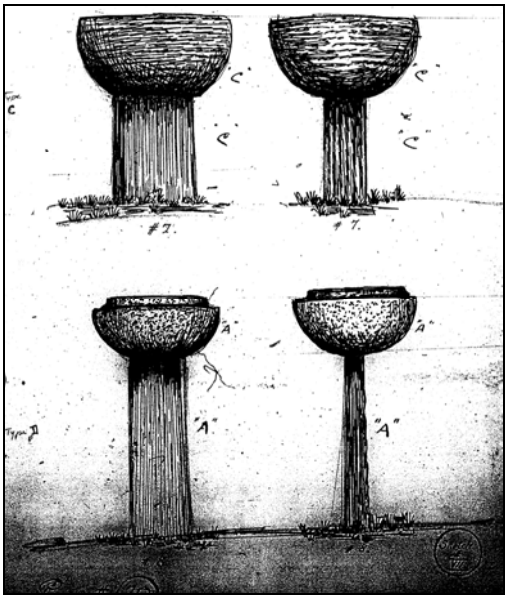

Figure 14. Sketch of *latte* pillar and capital type, recorded by Hornbostel (n.d.).

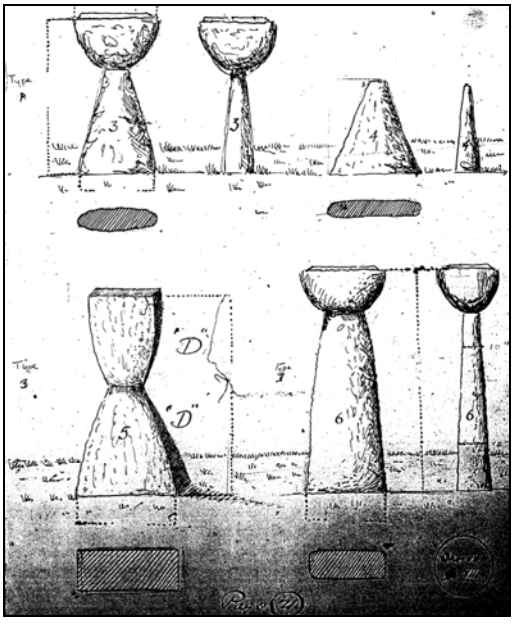

Figure 15. Sketch of *latte* pillar and capital type, recorded by Hornbostel (n.d.).

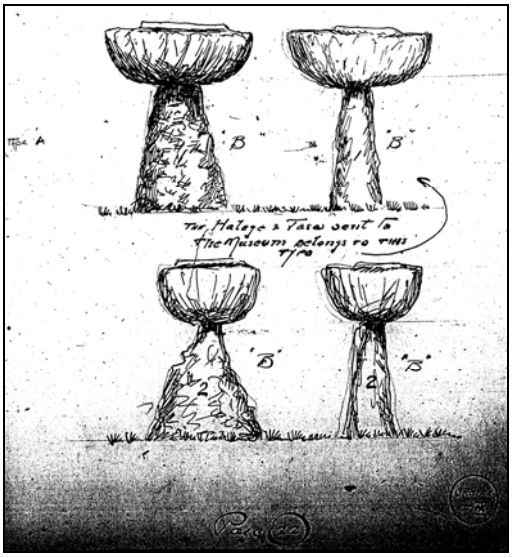

Figure 16. Sketch of *latte* pillar and capital type, recorded by Hornbostel (n.d.).

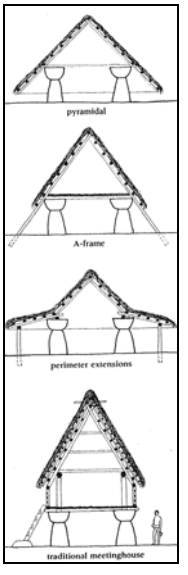

Figure 17. Artistic renderings of *latte* sets with possible wooden superstructures, by Morgan (1989).

explicitly in the case of *latte* research, but much of the general body of theory seems potentially useful if the various activity areas can be inferred with in a *latte* period habitation complex.

"Settlement pattern" study has been very well established in archaeology for some decades (Chang 1968; Rouse 1972). The core notion is to examine past activity areas across a wide section of land, noting what kinds of activities occurred in each place and how these related to one another. Most important is to identify comparable entities, not only in terms of contemporaneous age but also in terms of equal scale such as individual features. This approach was successful in several Pacific Islands cases, and it continues to be a standard practice today, particularly in Polynesia (Carson 2003; Cordy 1985; Green 1967, 1970; Weisler and Kirch 1985). Island-wide surveys of *latte* sites have been undertaken several times in Guam, and several large-scale surveys have been accomplished throughout the Mariana Islands. However, an explicit use of settlement pattern theory and method so far has not been attempted.

"Landscape" approaches are diverse in archaeology, with multiple possible interpretations and nuances (Anschuetz et al. 2001; Gosden and Head 1994). The central theme involves broadening of perspective to encompass more than just site ruins across the terrain, instead examining past activities and perceptions that may not have contributed to physical material remains detectable today. Often, traditional archaeological research is integrated with palaeo-environmental study, cultural geography, folklore, and other lines of inquiry. This approach has gained at least some popularity in Pacific Islands research, albeit with numerous differing interpretations, none yet applied in the Marianas.

Spatial analysis most basically involves observing the distribution of materials over a unit of space, identifying different types of activities and degree of intensity of each activity (Carr 1984, 1985, 1991; Hodder and Orton 1976). This kind of study may be applied within a single *latte* set, at the scale of a larger complex of multiple features, or otherwise. Many patterns may seem intuitively obvious as represented on a map, but others may require some amount of statistical manipulations for detecting patterning within complex sets of data.

Use of Space within *Latte* Sets and Sites

Based on consistent observations at multiple *latte* sets, Hornbostel (n.d.) concluded a generic pattern of activity (Figure 18). In this model, the space between *latte* stones and especially on the downslope (usually seaward) side was reserved for grave features, typically in shallow pits. The area beyond this zone and extending around the sides of the *latte* was associated with a "midden zone," comprised of concentrations of artifacts and food remains. The confined area of the *latte* stones by default was associated with whatever function might be attributed to them.

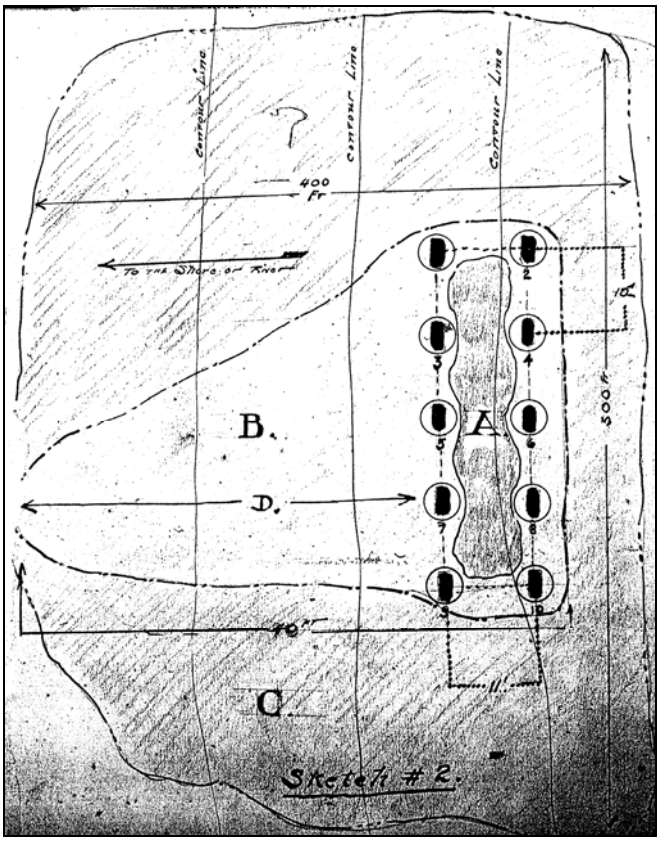

Figure 18. Generic model of use of space at *latte* set, by Hans Hornbostel (n.d.).

Hornbostel (n.d.) also noted that the downslope side of a *latte* set by virtue of its physical setting faced either an ocean shoreline or a stream drainage. The long axis of almost every *latte* set therefore was parallel with a nearby water feature, as well as following the long axis of the available level landform terrain such as a sandy beach terrace or a hill-top ridge.

Presuming that the downslope side of a *latte* set was the front or entrance, then the distribution of activity areas relative to this "front" may be interpreted more meaningfully. For example, the front may be expected to show the public face of the house, where greetings occurred and where the most frequent interactions took place. According to this logic, the sides and back were associated with less visible activities, likely undertaken by the inhabitants of the house as mundane daily routines. The interior of the house likely was most appropriate for private matters or for whatever was not suitable for public knowledge, however these concepts may have been perceived.

The notion of a "front" of a *latte* set additionally can offer some insight into the placement of grave features most often on this side. This correlation may imply that mortuary practice involved a degree of public participation and display. Rather than relegate graves to the back of a house or some other out-of-sight or removed zone, the front was chosen. In the cases of *latte* period graves found not at *latte* sets but rather at formal cemetery-like zones, a much different context is evident, and a different belief system and social perception of mortuary practice must be considered.

As appealing and intuitive as it may seem, the notion of the downslope side as the front or entrance of a *latte* set deserves at least some level of critical thinking or scientific testing. Physical evidence of an entryway is not at all clear in the material archaeological record, because the primary indicators from the wooden superstructure are no longer visible. Some other form of evidence must be considered.

Perhaps some part of the architectural design of a *latte* set can reveal the entrance, such as a formalized opening or other such construction. For instance, a "porch landing" may be suggested in cases of *latte* sets on hill-top ridges in southern Guam, where flat-sided boulders are positioned along the center of one side (Figure 19). This arrangement may reflect the location of a "porch landing," where a notched log or other staircase-like apparatus connected upward to the above-ground superstructure. However, other interpretations are possible, and the case for the *latte* design in the southern Guam mountains may have differed from other settings.

A set of logical connections may be based on notions of public view and perception of the "front" of a *latte* set, versus more private activities taking place at the interior of buildings or otherwise protected from public view. If the public versus private activity areas truly differed, then the material archaeological results may reflect this same difference. Conceivably, controlled archaeological recovery of artifacts and other material traces can offer a means to test hypotheses about the spatial patterning expected of public versus private activity areas. However, the degree of privacy in *latte* period society is unknown, and the types of material signatures of public versus private space also are unknown. Moreover, notions of privacy today probably are quite different from those of the *latte* period, and very likely all members of a community were very well aware of the activities of their neighbors at all times. For this avenue of research, multiple hypotheses will need to be examined and evaluated.

Similar to the outline of examining possible public versus private spaces, several other possibilities can be considered, all based on the same logic of formulating a list of expected material archaeological patterns and then collecting appropriate data to confirm or deny the expected patterning. Some logical connections are more reasonable than others, and some material patterns are easier to detect than others.

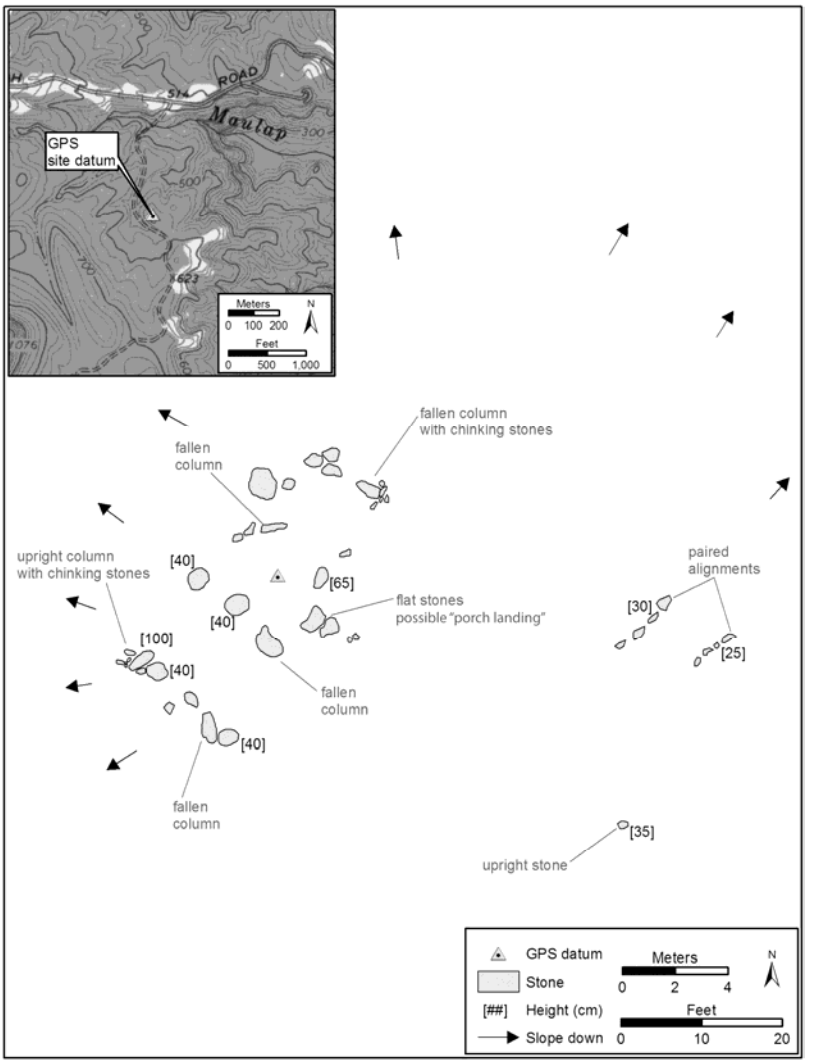

Figure 19. Possible "porch landing" and other components at a *latte* set in southern Guam, recorded by Carson (2006).

The above-described hypothesis-testing approach seems manageable, but it has not been undertaken in *latte* research. Instead, researchers have observed existing patterns and then attempted to explain the evidence in some meaningful way. The difference is primarily intellectual, in the first case developing a hypothesis and then testing it, versus the second case of observing patterns and then interpreting them. Both approaches are valid, and ideally some degree of feedback can create a more productive outcome than for either approach alone.

Regardless of different hypotheses and intellectual models, some amount of spatial patterning must be evident wherever artifacts and other materials exist, to some extent depending on the nature of the materials themselves. Pottery fragments are most numerous, due to the durability of the raw material and also the use of multiple large vessels at most *latte* period sites. Stone tools also preserve well due to their physical durability, but usually only a limited number is found at each site except in cases of specialized manufacture or re-working. Food remains (e.g., bone and shell) tend to degrade quickly in exposed surface contexts and in acidic clay deposits of many *latte* sites, but they are abundant in places of good preservation such as in sandy beaches and sheltered caves.

A "typical" pattern at *latte* sites may be envisioned for understanding the general parameters within which spatial analysis potentially can proceed in most cases. The typical patterning includes a general broadcast of pottery fragments, especially dense in a few spots. Where other types of artifacts (e.g., stone or shell tools) are present, they tend to be in fewer numbers and thereby confined to more restricted spatial patterns than is the case for the considerably more abundant pottery fragments. In sediments with good preservation of food remains, the spatial patterning usually is broadly dispersed, with a few high-concentration areas but not necessarily the same as the high-density areas of pottery fragments.

At the Pagat *latte* site in eastern Guam, Craib (1986) performed a break-through spatial analysis, based on intensive surface collections with limited test excavation, in total covering 4200 sq m surface area, estimated 20% of the total site. The results of this study verified that the most abundant debris was found at *latte* sets, whereas lower frequencies of materials were found in the areas removed from *latte* sets. Within single *latte* sets, no definite repeated patterning was evident from one case to another, possibly suggesting a different use of space at each *latte* set.

At another *latte* site in Tinian, Dixon et al. (2006) demonstrated how dispersed shovel tests expediently can recover useful information about spatial patterning at a typical site with a shallow near-surface cultural deposit. As expected, the results showed relative densities of different material types, interpreted to reflect function-specific activity areas, such as tool manufacture, cooking and eating, and storage.

Similar to the Dixon et al. (2006) study, several resource management projects since the 1980s have involved systematic transects of shovel testing or other forms of test excavations, especially productive in settings of shallow (less than 50 cm) sediments overlaying bedrock. The primary objective of these efforts has been to identify site boundaries with internal zones of approximate high, medium, and low densities of archaeological remains. The results typically show densest materials near *latte* sets but not necessarily within the architectural "footprint" of the *latte* stones, plus sometimes high-density concentrations removed some distance from the *latte* stones (Figure 20).

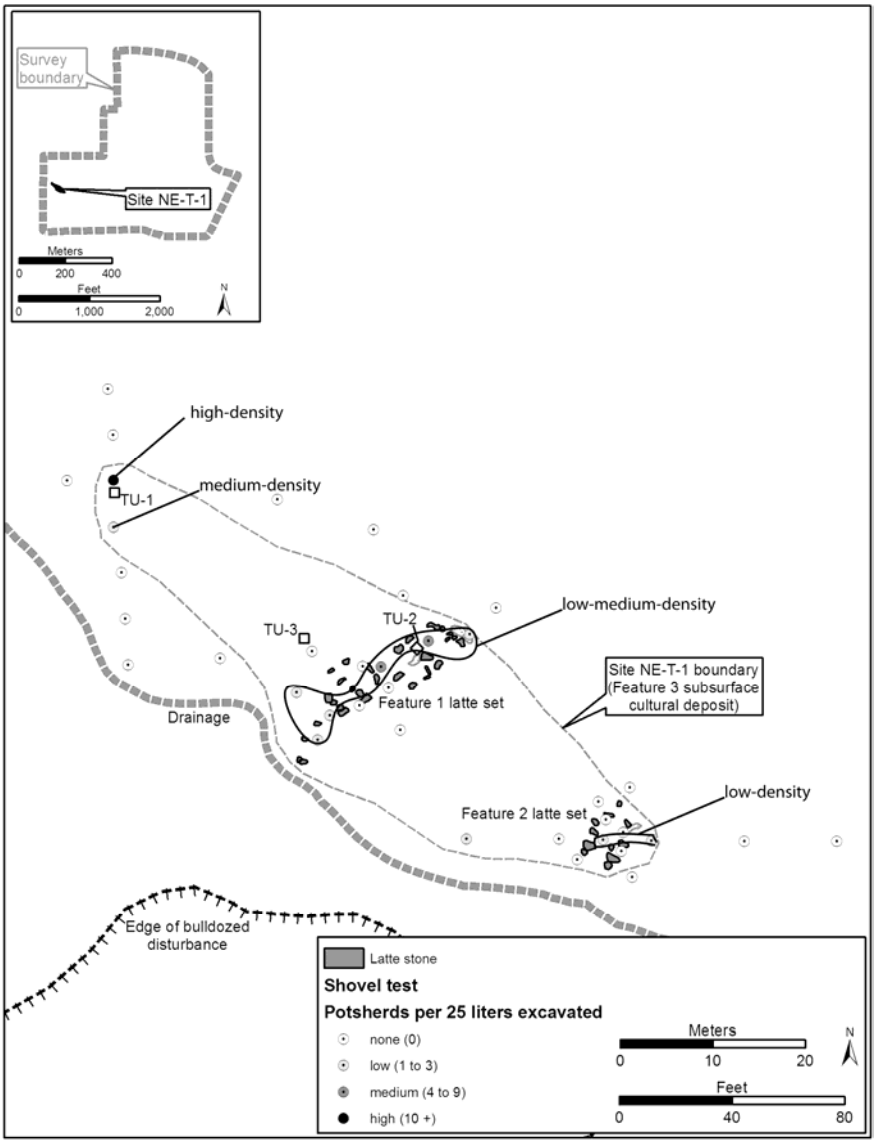

Figure 20. Map of density distribution of pottery fragments at a *latte* site in southern Guam, reported by Carson (2010b). Location of survey area is intentionally ambiguous here in order to protect the site in question.

Contiguous areas of controlled excavation ideally can offer more detailed information than is possible through dispersed shovel test pits, but large-area

excavations have been rare at *latte* sites. Mostly in Pacific Islands archaeology, excavations are just small samples of sites, in order to preserve at least some portion intact or else to minimize or avoid a costly large-scale operation. Typical test pits are just 1 by 1 m.

A few larger-scale excavations maximized the recovery of artifacts and other materials from *latte* sites, and the goal was not necessarily to support a spatial analysis. The results have been important for defining the material culture contents of *latte* sites at Regosa in Pagan (Egami and Saito 1973) and at Mochong in Rota (Takayama and Intoh 1976).

A new effort at the Ritidian site in northern Guam involved 16 sq m excavation blocks at each of two adjacent and contemporaneous *latte* sets (Bayman et al. this volume). The results show definite areas of specialized activities, such as for food preparation, tool manufacture, and craft production. Extending this approach for additional *latte* sets undoubtedly will prove very productive for spatial analysis.

Spatial patterns may be interpreted in a variety of ways. A beginning point is to distinguish between homogeneous versus differential use of space. Homogeneity of patterning likely reflects similarity of site function in each case. Differential use of space instead most likely reflects multiple different types of activities at separate sites. At least some degree of differential use of space can be presumed for most study areas.

Evident spatial patterns potentially can be helpful for addressing several significant research topics. Researchers may examine not only the range of activities that occurred in separate loci but also how these patterns might relate to overall social organization, political structure, and other social functioning within individual *latte* sets or across complex sites. Craib's (1986) study at the Pagat site in Guam offered some insights along these lines, but additional efforts such as accomplished by Bayman et al. (this volume) will be necessary for larger understanding at multiple sites.

Some *latte* sets very obviously are larger and more impressive than others, prompting notions of social ranking or political ordering (Graves 1986). If the size categories match differential patterning of artifacts and other remains, then a number of useful inferences can be supported. For example, if rare and esteemed food remains, highly decorative personal ornaments, and other probable high-status objects are found only at the largest *latte* sets, then this correlated size range may be interpreted as related to high-status or ritualized activity. This kind of material correlation has not yet been tested with real data.

Regardless of social ranking and other such concepts, a variety of logical arguments may be proposed for differential patterning of cooking refuse, tool-making debris, community feast discard, food storage, or other possibilities each associated with separate functional categories of *latte* sets. Once again, this scope of work has not yet been undertaken.

Land Use and Settlement Pattern

At a larger scale than single *latte* sets or sites, studies of land use and settlement pattern can examine the general distribution of all sites across the land during a given period of time. This approach highlights the various types of activities that occurred across a large unit of space, including not only *latte* sites but also the many sites lacking *latte* stones yet bearing pottery or other materials distinctive of the *latte* period. This approach thereby supports a more holistic understanding of large-scale patterns of past land use and how settlement areas related to one another.

Many if not most sites dating to the *latte* period are devoid of actual *latte* stones, but rather they consist of modest concentrations of broken pottery dating at some point within the *latte* period. A settlement pattern or land-use study therefore can take advantage of the widespread nature of pottery concentrations in addition to the formal *latte* sites.

Two important cautions apply to any archaeological study of land use and settlement pattern. First, ethnographers and geographers study living settlement patterns, and archaeologists study only remnants of settlement patterns (Rouse 1972). Second, a remnant settlement pattern must be understood as the result of multiple time periods of past human activities, so that settlement patterns change over time (Dewar and McBride 1992).

The archaeological remnants of a *latte* period settlement pattern are abundant and widespread, but much is awkwardly unknown. Most importantly, basic functional categories of sites are not at all clear for most of what has been recorded of *latte* period archaeology. Cultivation zones are virtually unknown in terms of their material archaeological signatures. Many individual *latte* sets can be attributed a residential function, but others may have been associated with communal activity, cooking sheds, storage areas, or other possible functions. The ubiquitous pottery concentrations in some cases may reflect temporary camping areas, but in other cases they may be parts of residences, food-preparation areas, storage areas, or other associations.

The *latte* period as a whole easily can be attributed to numerous sites, based on the presence of highly visible *latte* stones and very distinctive pottery fragments. The long duration A.D. 900 through 1700 may not be very useful for some types of research questions. Nonetheless, this large-scale time bracket offers at least a practical starting-point. A coarse-scale time unit of a "*latte* period" may be acceptable at least tentatively, but eventually more precision will be necessary for a more meaningful analysis.

Several island-wide surveys of Guam have shown the overall distribution of *latte* sites (Hornbostel n.d.; Obsorne n.d.; Reed 1952; Reinman 1977), and Kurashina (1991) provided an updated synthesis of these prior studies (Figure 21). The overall impression is of *latte* period sites occurring almost everywhere bearing suitable terrain, demonstrating widespread land use and settlement.

Figure 21. Approximate distribution of *latte* period sites in Guam, compiled and reported by Hiro Kurashina (1991).

After plotting the locations of *latte* period sites on a map, the next step in a settlement pattern study is to identify the types of activities represented at each location. Generally, simple functional categories can differentiate residences, temporary camps, workshops, cooking areas, ceremonial areas, cultivation zones, and so on. As noted above, more effort is needed for identifying these kinds of functional associations. Also, basic knowledge about cultivation zones will greatly increase understanding of *latte* period land use.

Ideally, a study of land use and settlement pattern examines individual features such as pottery concentrations, *latte* sets, and other individual occurrences. Each such "feature" can be plotted in space, assigned a probable time period, and attributed to a rudimentary functional category. The resulting spatial distribution thus is composed of comparable units for analysis.

Landscapes

Landscape study takes settlement pattern study a step further, examining the past cultural use and perception of holistic landscapes. The core concept is closely tied to cultural geography but in an archaeological perspective, studying how people once lived in an environment and experienced its various internal components during a given period of time. These internal components are considered landscape features, some but not all of which contain material archaeological traces.

Landscape archaeology can be understood in a variety of ways, and it interfaces well with numerous perspectives such as historical ecology, evolutionary ecology, historical anthropology, environmental archaeology, geoarchaeology, and others. Accordingly, Gosden and Head (1994) called it a "usefully ambiguous concept." In just one definition (Carson 2005b:124), a landscape "consists of the physical environment and the cultural rendering of the physical environment." This definition encompasses material archaeological sites, as well as so-called "off-site" data from palaeoenvironmental studies, plus notions of cultural use and perception of landscapes and seascapes. Carson (2005b:124) further noted that this holistic perspective "directs archaeologists to examine the human activities that occurred within the full ensemble of habitats and ecological zones of a region at different time intervals."

Latte period landscapes may be viewed as consisting of *latte* sets and other activity areas distributed across the landscape of the Mariana Islands, where people lived, worked, and engaged in various other activities but also perceived and experienced their surroundings as somehow connected. Individual sites are therefore understood in a context of the surrounding cultural geography of the associated time period, in this case examining the *latte* period as a whole.

Contextualizing a site involves at least three aspects. First, any single *latte* site can be related to others of the same period. Second, the ruins of older sites, presumably became part of later cultural perception of these surroundings. Third, past site use presumably involved access to resource areas not necessarily having material archaeological traces, such as in a nearby fishing spot, a beach for harvesting crabs, or a forest where timbers, birds, and fruits could be gathered. In this manner, both physical environmental components and cultural notions are combined to create a sense of context within a landscape.

In general terms, Anschuetz et al. (2001:160–161) identified four premises as "the principle foundations for a landscape paradigm":

1) A landscape mediates between nature and culture (Knapp and Ashmore 1999:20), thereby representing an essential component of what Bourdieu (1977) described as *habitus*.
2) A landscape is a cultural product that is "not merely the world we see, it is a construction, a composition of that world" (Cosgrove 1985:13).
3) A landscape is "the arena for all a community's activities" (Anschuetz et al. 2001:161), involving both "within–place" and "between–place" contexts (Binford 1982:5; Deetz 1990:2).
4) A landscape has the potential to change over time, "with each community and each generation imposing its own cognitive map on an anthropogenic world of interconnected morphology, arrangement, and coherent meaning" (Anschuetz et al. 2001:161).

For any landscape study, a richness of physical and cultural settings co-existed and presumably formed part of an interactive complex, so that each component can be examined as an individual phenomenon or as part of the larger system. This larger system may be termed an "inhabited landscape," accounting for the cultural use and perception of the environment in the broadest sense. This notion of an "inhabited landscape" bears a sense of synchronic inter-relations as well as a sense of history built into the evolution of this landscape over time. Site context therefore can be understood in a broad view geographically and chronologically.

The synchronically related geographic context can be understood as the configuration of physical, cultural, and historical setting experienced by the site's inhabitants. In physical terms, the setting may involve a coastal plain near a productive reef, a low ridgetop overlooking a stream drainage, or a forested limestone plateau. In cultural terms, the setting may involve a residence, a campsite, a garden, a managed forest zone, a community meeting hall, a feasting center, or a variety of additional possibilities. In historical terms, most sites actively were used for some duration, but eventually all sites are abandoned and incorporated into later notions of the landscape with new meanings.

The proposal of an "inhabited landscape" contextualizes sites within their physical terrain, cultural geography, and historical reference. The physical and cultural components are viewed as mutually affecting each other or co-evolving. The total configuration of components potentially can be quite dynamic over time historically and variable across space geographically.

This larger perception of *latte* landscapes must acknowledge considerable variability in archaeological sites found throughout the Marianas Archipelago as well as throughout several centuries spanning roughly A.D. 900 through 1700. Given this broad geographic and chronological scope, clearly not all *latte* period

sites can be viewed as the same, but of course they share at least some commonalities enabling them to be categorized as part of a related system, in this case envisioned as a landscape.

The concept of an "inhabited landscape" matches well with a Proto-Malayo-Polynesian (PMP) linguistic reconstruction of **banua*. Blust (1987) defines PMP **banua* as referring to an "inhabited territory, where a community's gardens, houses and other possession are." This concept implies a sense of the natural landscape supporting or accommodating human life, and equally it implies a sense of human social life imbued into the physical landscape. Fox (1993:12) further explored PMP **banua* at inter-related scales of houses, household compounds, villages, and settlement systems (see also Fox 2006:366–369).

Whether or not this concept of **banua* was shared by ancient Chamorro people is unclear, but the Chamorro language was descended from a PMP ancestry. The PMP association contextualizes this concept as shared throughout the Malayo-Polynesian world and presumably originating prior to the break-up and diversification of these language communities at least 3000–3500 years ago. Studies of PMP **banua* may extend beyond the Marianas and throughout much of the Pacific, noting how the concept developed over time in diverse settings.

A study of *latte* period landscape can begin with the same baseline information required for a settlement pattern analysis, involving individual archaeological feature-level documentation. The next challenge will be to gather this scope of information from a sufficiently large unit of space to accommodate a meaningful sense of a landscape with its variable internal components. Results of prior studies and voluminous resource management reports certainly will be useful, but inevitably more details as well as first-hand knowledge will be most desirable.

In terms of relating sites and features to natural landscape terrain, detailed relevant information is available from digital mapping data and from simple field observations, and technical advances with geographic information systems (GIS) now support remarkable potential. One area of special interest is the ability to explore possible correlations between archaeological sites and natural landscape features, such as proximity to water sources, soil types, rainfall patterns, access through reef passages, and other factors. Most GIS software packages also facilitate calculations of transportation effort between any two points, identification of resource zones within walking distance of any site, possible viewsheds from any vantage point, and so on.

In addition to GIS capabilities, a number of studies in the Marianas region have been important for highlighting aspects of past landscapes not ordinarily considered by archaeologists. Perhaps best known have been several palaeoenvironmental coring projects in lake and swamp bottoms, providing direct information about the types of vegetation growing in different parts of the Mariana Islands at specifically dated periods (Athens et al. 2004; Athens and

Ward 1993, 1998, 1999, 2004, 2006; Dega and Cleghorn 2003; Hunter-Anderson et al. 1989; Ward 1994). With some labor invested in examining the available coring records, the past vegetation can be assessed as real components of *latte* period landscapes. Further along these lines, Dixon et al. (this volume) pursue a novel analysis of soil chemistry and other aspects of dark-stained sediments often associated with somewhat enigmatic concentrations of pottery fragments, thereby enabling new understanding of the past context of these landscape features. Bulgrin (2006) examined charcoal-stained mounds that occur at some *latte* period sites yet somehow have been ignored or under-studied. Additional such efforts and new ways of thinking will be necessary for more comprehensive understanding of past landscapes, looking beyond just *latte* stones and pottery fragments.

Another key issue for studying *latte* period landscape relates to the cultural use and perception of landscape features, wherein much of this information is missing or poorly documented in the Marianas region. Even with gathering oral histories and folklore from knowledgeable individuals in a particular place, the information learned today is not necessarily relevant to the *latte* period. In addition, differences of opinion often occur, especially for interpreting aspects of place-names related to historical events, jokes, myth and folklore, and other factors not immediately obvious today. Nonetheless, at least some information is available of relevance to almost any particular study area.

A final point about past landscape study in the Mariana Islands is that tangible physical evidence of traditional resource zones sadly is not as convincing as might be desired. Obvious physical remains of agricultural fields as known in many other Pacific Islands, for example, are lacking in the Marianas.

To some extent, knowing the specific locations of each such zone is not entirely necessary for recapturing a sense of the inhabited landscape. These areas more accurately can be described as “potential” components of the inhabited landscape. New advances in soil chemistry and other techniques may help to resolve some of these issues (Dixon et al., this volume), but for now the notion of potential resource zones will suffice.

Part of the character of managed resource zones is that they do not bear permanent physical site ruins, but rather their culturally managed natural quality constitutes their key definition within the landscape. When the management activity is removed, then the resource zone in time will lose its visible signs of cultural use and instead become largely indistinguishable from any other natural habitat zone. Nonetheless, the potential to re-start a traditional resource-use pattern still remains.

As outlined above, several challenges must be overcome for studying *latte* period landscapes. The current brief overview offers only an initial foray guiding how this research program can be followed with further case studies. However, additional efforts will be needed.

Social Organization

One of the most high-profile yet contentious research topics within *latte* research has involved the past social and political system existing during the *latte* period (Cordy 1983, 1985; Craib 1986; Graves 1986; Graves et al. 1990), especially captivating in general public perception today as a means to link with traditional pre-Spanish social life and cultural identity. A number of notions have been proposed, but clearly more effort will be needed for appropriate testing of these notions. One notion is that the largest and most impressive *latte* sets reflect high social rank or political power, relative to the lower ranking associated with relatively smaller *latte* sets. Another notion is that all *latte* sets were for high-status individuals or families, whereas different housing of pole-and-thatch construction was reserved for lesser-ranked or non-ranked people. Yet another notion is that social or political ranking was differentiated by coastal versus inland setting.

If social or political hierarchy or ranking existed in *latte* period society, then presumably artifacts or other material traces can be found that reflect the same high-ranking versus low-ranking activity areas. For example, items of high esteem and value might be found only in the *latte* sets associated with high status. In principle, a logical argument about the material archaeological correlates can be formulated and tested with real data, but oddly this kind of testing procedure has been extremely limited in the few cases when it was attempted. Instead, researchers have relied more on interpretations of historical sources that mostly are secondary accounts removed from primary observation.

Cordy (1983) and Russell (1998:142) reviewed the social ranking schemes reported in historical documents at different times. At least some awareness of higher versus lower ranking is evident. The extent to which status categories were formalized, however, is uncertain. Also, archaeologists may question the chronology of such ranking in *latte* period society, starting at what time and developing in what way and for what reasons.

The notion of hierarchy or ranking can be understood relative to the notion of heterarchy or equality. Both of these co-exist in varying relative degree, but usually one is expressed more strongly than the other depending on the cultural context. A single population can practice hierarchy in one setting but heterarchy in another. In this perspective, as explored in more detail by Peterson (this volume), *latte* sets in some cases probably expressed social ranking, but such was not always the case for all *latte* sets and almost certainly was not the case throughout all cultural contexts of society during this time.

Regardless of any status perception, most societies agree on some standard roles of men versus women and younger versus older individuals, most visibly when dividing labor tasks. Not all individuals adhere to these normative patterns, and much can be learned from the extent to which they are accepted in the group. The nature of archaeological study, however, emphasizes general patterns.

The extent to which labor organization reflects social organization is intriguing for archaeological study, because potentially the results or by-products of labor are durable in the archaeological record. For example, gathering and cooking of shellfish resulted in piles of discarded shells, and manufacturing stone tools resulted in debitage of flaked stone. If the findings are separated spatially in distinctive areas, then a degree of labor organization can be inferred, also reflecting a portion of the overall social organization of the group recognizing different labor categories. Along these lines, study of "craft specialization" has become well established in archaeological research in general (Costin 1991; Costin and Wright 1998). Bayman et al. (this volume) begin to address some of these issues, otherwise not attempted in the Marianas region.

Identifying differential material patterning simply indicates that the past society recognized separate types of activities as deserving of unique treatment or identity. It does not in itself indicate social ranking, and it likewise does not directly indicate separation of gender and age categories. For these additional arguments, some other logical connection must be formulated and tested. If some materials like shellfish remains, stone tools, or pottery can be shown to relate only to specific groups of people such as high versus low rank or male versus female, then the spatial patterns in archaeological sites can be interpreted to reflect this type of social organization or perhaps political order. Potentially, certain kinds of foods may have been reserved only for specific social groups or sub-groups, or certain types of personal ornaments may have symbolized particular identity categories.

Another useful concept for archaeological study of social organization is based on a distinction between household or domestic-scale activity versus community-scale activity. Some *latte* sets may have functioned for community gatherings, feastings, important meetings or events, entertainment, or other such large-scale activities. Others likely were utilized by individual families or households in a so-called "domestic mode of production" or DMP for daily activities in support of the household. The same distinction may apply to crop growth, tool-making, fishing, and other activities that could be managed by individual households at a domestic level or by larger groups at a community scale.

Both the domestic and community modes operate simultaneously in any society, and material archaeological remains potentially reflect these different contexts. Larger *latte* sets may have related to community-level events, wherein the material remains may indicate large pottery vessels for cooking and presentation, discarded food in unusually large volume or pertaining to specialty meals, and generally larger scale of materials than otherwise expected for a single household. Smaller *latte* sets by comparison may have been components of domestic operations, including dwelling places, cooking sheds, workshops, and other small-scale activity areas with according material signatures.

The notion of distinguishing between household and community features has been most successful in Polynesian archaeology (Green 1967, 1970, 1986, 1993). In the Polynesian case, household features included stonework foundation ruins associated with dwellings, cooking sheds, and other areas supporting a household or extended family. Community-level features included a guest house or meeting hall, a place for storing religious paraphernalia, and either a village gathering place or a religious compound. Finally, a canoe shed could be either at a household or community scale.

A distinction between domestic and community features may be productive for *latte* period archaeology, but it has not yet been attempted. This kind of approach most likely can be successful in conjunction with a settlement pattern study, as Green (1967, 1970) found in his Polynesian work.

Multiple Functionality

The function of *latte* sites has been debated, and just a few possible notions include dwelling houses, community halls, high-status residences, religious sites, burial monuments, territorial markers, and so on. Each of these notions bears some merit, but clearly not all *latte* sets functioned in the same way.

Interpreting past function must account for a degree of variation in at least three ways. First, perhaps different functions were associated with each separate *latte* set within a community complex. Second, perhaps each single *latte* set served multiple functions, some more obviously than others. Third, functioning may have changed over time.

Carson (2005a) proposed seven co-occurring cultural functions including technology, economy, social organization, politics, ideology, aesthetics, and communication. In this view, a rudimentary function can be proposed for a site or feature based on the most obvious technological and economic aspects visible in the material remains, then additional cultural functions can be considered based on the nature of the available evidence. For instance, a *latte* set technologically functioned to support a house structure, and moreover the size and configuration of *latte* stones related to specific technological engineering qualities of the total architecture. The types of artifacts and midden at a *latte* set can reveal preparation and consumption of foods, craft production, possible involvement in external trading, and other aspects of economic life. Other cultural functions, however, require more complicated logical arguments to link theoretical notions with material data, preferably in a testable manner.

Carson's (2005a) generic scheme offers three main advantages. First, it is general enough to be applied to any setting and time period. Second, it may be applied at variable scales of artifacts, features, sites, or landscapes. Third, it can accommodate chronological change in functional operations. Thus, this approach seems promising for the diversity and chronological scope of the *latte* period, as well as for other possible research venues.

Specifically regarding chronological change in cultural functioning, Carson (2005a:43) proposed:

> chronological change or evolution within a cultural system results from the variable ways a group fulfills a function in the context of the actual demands on this function. Increase of population size potentially but not necessarily brings a greater variability of ways to achieve the assorted functions of a group. Numerous social, cognitive, and environmental factors can potentially create greater or lesser demand for any cultural function.

This larger view of functional assessment may seem promising, but it has not yet been attempted in *latte* research. If it ever will be attempted, then the findings at one *latte* site probably will not match those at another site. Rather, a degree of variability may be expected both geographically and chronologically. Explaining this variability certainly will prove intriguing yet complicated.

Horizon Style and Tradition

The broad parameters of the *latte* period archaeological record suggest a "*latte* horizon style" and a "*latte* tradition" (Figure 22). The notion of a "horizon" emphasizes the synchronic relations of co-occurring parts of a *latte* period society. The notion of a "tradition" emphasizes the temporal duration of the *latte* period. Both notions involve a degree of internal variation, evident both geographically and chronologically, although these variations are as yet unclear for *latte* archaeology.

The "horizon style" entails the various components or "markers" categorized as *latte* stones, as well as the pottery forms, stone tools, other artifacts, food remains, and other materials characterizing the same period of time, ideally observable in a physical stratigraphic layer or horizon. At different points along the horizon, however, the material components can be observed to vary, for example exhibiting differences in pottery-making from one island to another or from one village to another.

The "tradition" refers to a degree of long-term stability in the design and use of *latte* structures, of pottery and other artifacts during this period, and of subsistence economy and other aspects of social life. At least some of these activities, however, must have changed in a number of ways over the course of some centuries within the limits of a definable *latte* tradition.

The individual components of a horizon and tradition can be studied in terms of how they relate to one another both geographically within a horizon and chronologically within a tradition. The goal of such an effort usually is to evaluate the degree of consistency versus variation in particular functional categories and in the society overall.

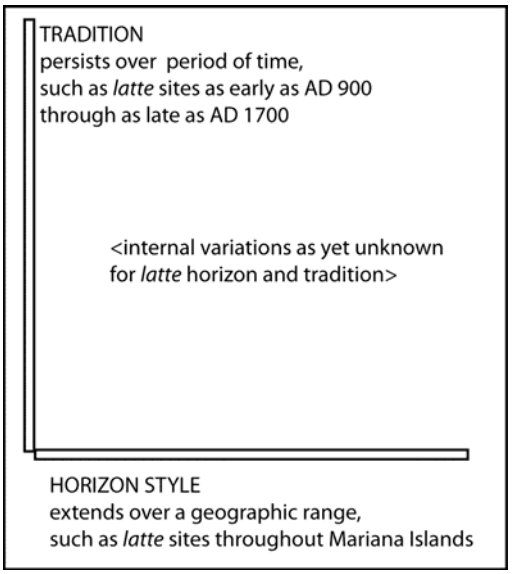

Figure 22. Schematic of horizon style and tradition.

Pottery

Pottery fragments comprise probably the most abundant artifact type of the *latte* period, certainly more numerous, occurring in more locations, and covering more area of ground than *latte* stones alone. Also, of particular utility for archaeological study, pottery of the *latte* period is durable against most erosion and rather distinctive in form due to the thickened rims (Figure 23). Moore (this volume) offers the most recent update of *latte* period pottery studies.

Latte period pottery is made of local clays and temper inclusions, usually rather coarse and with medium to large-sized temper inclusions mostly of volcanic sand particles. The vessels mostly were large bowls, with thickened rims also usually incurving at the top. Other vessel shapes have been described in lesser frequency. The outer surface often has been combed vertically, especially in surface-visible contexts that presumably are the most recent components of the *latte* period.

Compared to the pottery of earlier periods, *latte* period pottery is coarsely made, thick-walled, large-sized, and with little decorative effort. Butler (1990) suggested that this new development in pottery form reflected an increased reliance on boiling of starchy foods. Another notion is that the new pottery manufacturing related in some way to an increased population, feeding more people, and with less time available for pottery-making labor.

The amount of pottery at a site can be calculated to approximate the relative intensity of past activity in any location. The measurement usually is perceived as

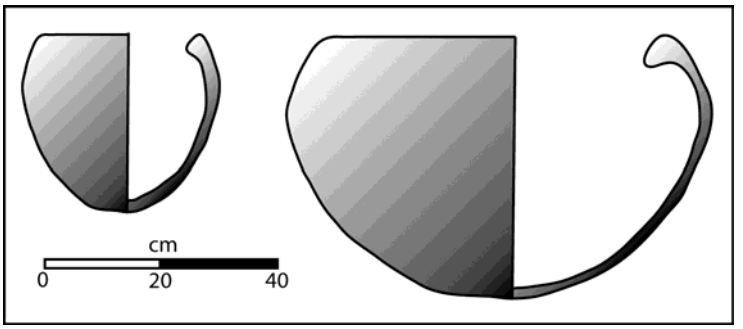

Figure 23. Illustration of common *latte* period pottery types.

density of pottery fragments per unit of surface area (in a surface-visible exposure) or per unit of volume (in an excavation). Densities can be calculated most easily based on number of fragments, weight, or sq cm of surface area of the fragments. More advanced studies can estimate the number of pots that were present and perhaps the ratio of different types of pots.

Pottery densities can be calculated across a site area, compared between various spots, or sub-divided into specific categories of pottery types or sub-types.

When interpreting spatial patterns in pottery fragments, the fragmentation itself must be considered. After a vessel was broken, its many individual pieces were distributed over a broad space and repeatedly so during the course of some centuries. Factors influencing the re-distribution may have included roots of trees and plants, tree-falls, root-throws, heavy rain-wash, animal traffic, curiosity of passers-by, and more. The exact cm-specific point-provenience of each pottery fragment rarely is informative under these circumstances, but at least some control such as within 1 by 1 m grid units is desirable.

Mortar and Pestle Technology

Large mortars (*lusong*) and pestles (*lummok*) typically are found in *latte* period sites but curiously not in earlier time periods (Figure 24). The technology is quite simple, wherein material is placed in the depression of a mortar and then pounded, ground, or pulverized by the pestle fitting into the depression. The material being processed in this manner could have been almost anything, such as nuts or pigments. The only limitation seems to be the size and shape of the depressions in the mortars.

These artifacts were created by shaping the hard stone material with other hard material of stone or possible heavy shell. Percussive hammering and pecking are the dominant techniques, and some grinding or polishing also is

evident for the final shaping and probably during the extended use-life of the mortars and pestles.

Mortars in some cases were carved into bedrock material, but in other cases they were created in heavy boulders that were to some extent portable. They occur in many shapes and sizes (Figure 25). Where the potentially portable objects are found, they tend to be single entities or in very few numbers near *latte* sets such as at the *latte* sets on ridges of the southern Guam mountains, or else clusters of numerous such mortars are found at some distance from the *latte* sets such as at the isolated mortar clustering at the Pagat site in eastern Guam. Where the bedrock types are found, they also are slightly removed from the primary habitation zones, and they almost always exhibit three or more different sizes of depressions.

Given the various sizes, shapes, and settings of mortars, multiple functions can be speculated. The most obvious technological function is for grinding some sort of material, but the depressions also may have served as measuring devices for knowing the volume of different ingredients. In the cases where the mortars are slightly removed from *latte* sites and habitation zones, these settings may suggest communal or inter-group activity by multiple households meeting outside the immediate area of any specific household and sometimes outside the immediate range of a village. By comparison, the mortars directly associated with individual *latte* sets would operate within the domain of that specific household.

One apparently unique case in Pagan is a large immovable boulder with numerous mortar depressions (Figure 26). The location is on a high ridge in the middle of the island, at a natural cross-roads between the two major village settlements on the east and west coasts. No other archaeological traces are in this vicinity, but certainly this unusual mortar stone was used by many people. The setting is clearly removed from any specific household or village, but rather it was associated with some other kind of social context.

In contrast to the multiple functionality of mortars, pestles seem to be restricted to a narrow range of technological effectiveness for pounding, grinding, or pulverizing material inside a mortar depression. Some of these artifacts may have been favored by individual people or perhaps curated as heirlooms, but others are found broken and discarded in archaeological contexts.

Cutting and Slicing Tools

The most common cutting tools in *latte* period sites are adze heads, made usually of giant clam (*Tridacna* sp.) shell and sometimes of volcanic stone (Figure 27). The adze head would have been reduced from a larger parent material by chipping and then polishing for a sharp cutting edge. During the use-life of an adze, dulling and breakage require re-working that inevitably makes the adze head progressively smaller but still usable. The largest forms typically are

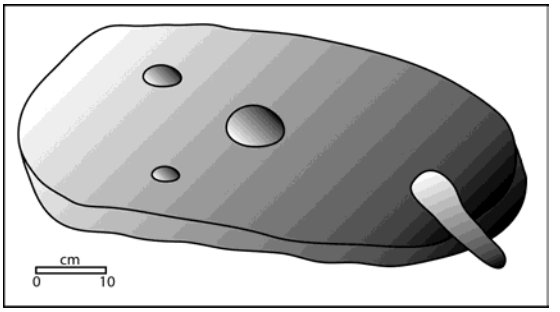

Figure 24. Illustration of mortar (*lusong*) and pestle (*lummok*).

Figure 25. Examples of mortar stone variation in Pagan. Scale bars are in 20-cm increments.

Figure 26. Exceptionally large mortar stone in Pagan.

best for heavy work such as felling a tree, and the smallest forms typically are most suitable for fine and detailed work requiring close control. The smallest pieces actually may have been more practical as percussive chisels than as hafted adzes. The original hafting of adzes does not survive in archaeological contexts, but numerous ethnographic examples have been recorded for clear reference (Figure 28). Accessibility of material may help to explain the apparent prevalence of *Tridacana* sp. shell instead of less common occurrence of volcanic stone for adze heads.

Numerous stone and shell flakes are found in *latte* sites. Many of these items seem to be debitage from manufacture or maintenance of adzes, but others appear to be cutting or slicing tools in and of themselves. Some may have been attached to sticks of wood, but others may have been directly hand-held. The variety of material includes volcanic stone, chert and other crypto-crystalline of very high silica content, and less commonly shell and rarely pieces of limestone.

All of these raw materials and the forms of adzes and other tools have been found in the earliest Marianas sites by far pre-dating the *latte* period, and in fact the diversity of materials and forms seems to decrease overall during the *latte* period. The best sources of chert and other crypto-crystalline may have been largely exhausted by the time of the *latte* period. Also, a larger population and demand for food-producing labor during the *latte* period may have reduced the amount of time available for tool-making and maintenance, thus leading to standardization of forms by a limited number of dedicated specialists. Similar interpretations may be proposed for pottery and other artifacts, and ideally some testing with real data will be forthcoming.

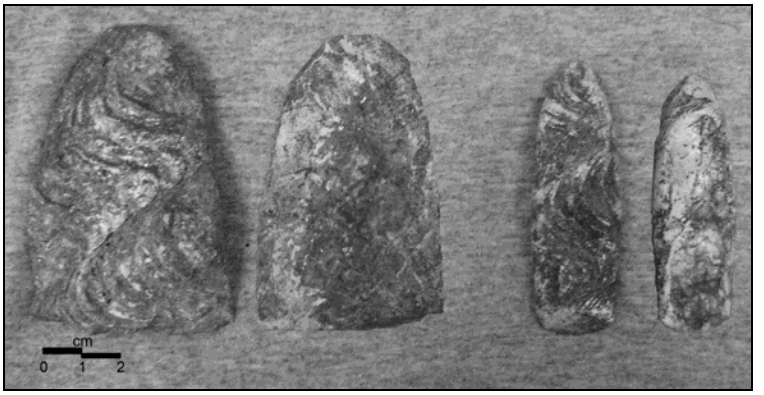

Figure 27. Examples of adze heads and chisels made of *Tridacna* sp. shell, excavated from Tumon, Guam.

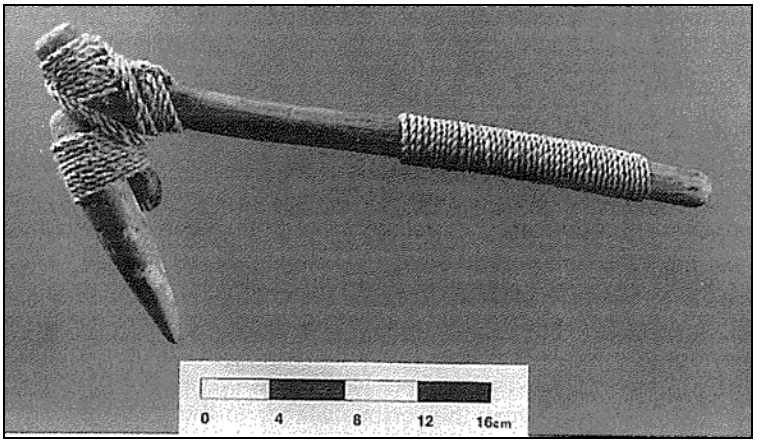

Figure 28. Example of adze with hafting, by Russell (1998).

Missing from the archaeological record are cutting and slicing tools made of bamboo and other perishable material. Bamboo knives very likely were a common daily tool. They can be fashioned expediently and with very little if any specialized skill or knowledge, and the only limitation seems to have been access to bamboo which probably was more widely distributed and available than the best sources of volcanic stone and chert by comparison.

Sling-stones

Sling-stones appear to be restricted to the *latte* period, so far not found in earlier contexts. Most are made of limestone, but a few are made of volcanic

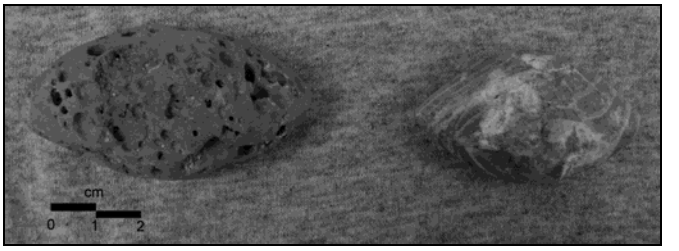

Figure 29. Examples of sling-stones, made of volcanic stone (left) and limestone (right), excavated from Tumon, Guam.

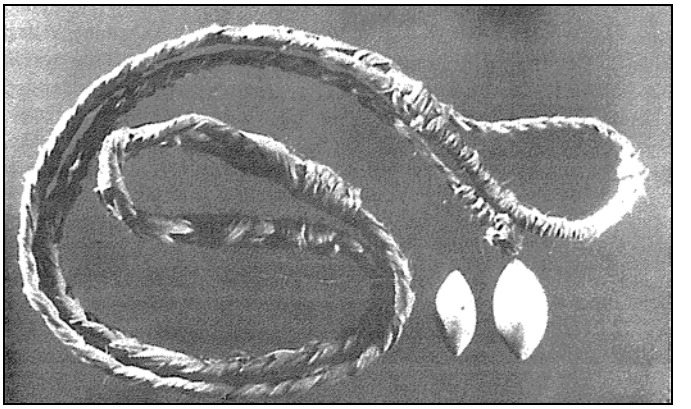

Figure 30. Historically observed sling with sling-stones, by Fritz (2001).

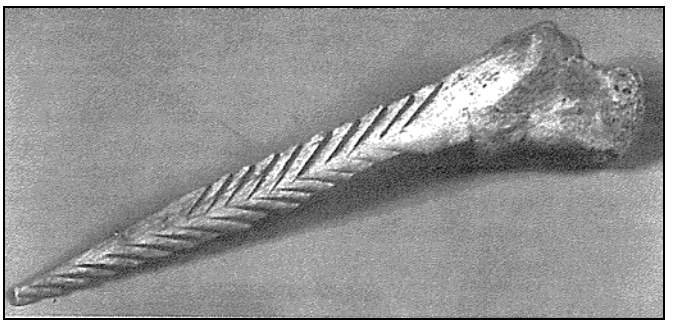

Figure 31. Example of bone spear point, by Fritz (2001).

stone, always in a distinctive shape with pointed ends similar to a U.S. standard football but on a smaller scale (Figure 29). Some are larger than others, perhaps used for breaking canoes at sea or for more ceremonial purpose. A few exhibit a grooved end, possibly for lashing flammable material for burning roofs of houses.

Sling-stones appear to be made primarily for warfare, but some may have been suitable for hunting birds or possibly fruit bats. Secondarily, sling-stones may have been regarded symbolically as respected objects and thus suitable as ceremonial paraphernalia or as grave-goods with certain individuals. This scope of symbolic perception likely contributed to a curated heirloom quality of sling-stones, and they often have been removed from *latte* sites during or shortly after Spanish-era abandonment.

A simple natural rock easily could serve the same immediate purpose of a sling-stone, but the shaped and polished form maximizes the aerodynamic properties of the projectile. The shaped and polished form can achieve maximum velocity and distance with accurate targeting.

Sling-stones imply that slings once existed, but the slings presumably were made of plant fibers no longer existing in archaeological sites. As with the hafting of adzes as described above, however, a number of ethnographic examples have been documented (Figure 30).

Experiments with modern replicas of the same original materials potentially could contribute valuable new information about how slings and sling-stones were manufactured, used, and maintained. So far, this scope of work has not been undertaken seriously, but some local artists have been successful fashioning modern replicas.

Spear Points

In addition to sling-stones, spear points reflect the role of warfare and violent conflict during the *latte* period. Spear points made of human bone have been found in a number of *latte* period sites (Figure 31). These artifacts are so far not known from earlier time periods. McNeill (2005) summarized the technological and possible magical efficacy of bone spear points.

These spear points in fact very closely resemble objects thought to be harpoon points in other regions of the world. The difference is in the attachment of a rope or other line to a harpoon for retracting the targeted prey, usually a marine mammal. No such line attachment is evident in the Marianas points, and hunting of marine mammals is not known ethnographically.

Fishing Practice

Fishing practice certainly is an essential part of life in all traditional island and coastal societies, so not surprisingly many aspects of *latte* period fishing practice are shared with numerous other cases world-wide and across varied time periods. Other aspects appear to be local developments suited for the particular environmental setting and cultural context, in some ways inherited from a much older set of cultural traditions pre-dating the *latte* period.

Latte period fishing practice included both near-shore and deep-sea components, typical in many other Pacific Islands settings such as in Polynesia but curiously not the case in most western Pacific settings. In most of the western Pacific where fishing-related archaeological materials have been found, near-shore fishing was greatly emphasized without significant deep-sea efforts. This apparent pattern may yet need to be modified based on future findings in more sites. Nonetheless, near-shore fishing of course is simpler, less risky, and not requiring special sailing technology, so understandably it may be preferred in most settings.

Deep-sea fishing of pelagic prey requires not only an investment in technology and skill but also an accommodation of long-range expeditions of perhaps several days or possibly weeks in some cases. These characteristics of deep-sea fishing are directly tied to long-distance ocean exploration, sailing skill, and navigational knowledge that must have been among the skill-set of the first successful settlers of the remote Mariana Islands as well as many other Pacific Islands. Typically, not every member of a society engages in these particular behaviors or at least not full-time, but rather they are reserved for certain specialists or for certain times of year, so that sufficient other time and effort can be devoted to land–based food production and other efforts for sustaining a population.

In *latte* period and other sites, evidence of fishing practice includes not only fish bones but also pieces of fishing gear. Fish bones are by far the most numerous item in this catalog. Fishing gear pieces tend to be in small numbers, but manufacturing debris can be quite voluminous in some cases. All of these materials are preserved best in sandy beaches that also happen to be in close proximity to fishing activities. Their discovery in acidic inland clays would be rather surprising and worthy of close study.

Fish bones mostly are not identifiable taxonomically, other than a few mouth parts plus the spines and vertebrae of certain families. Some of these elements are more durable or more easily identifiable than others, contributing to a degree of over-representation in the record such as with the pharyngeal grinding plates of parrotfish (Scaridae family), spines of Diodontidae, and vertebrae of Elasmobranchi (sharks and rays).

Analysis of fish bones usually includes taxonomic identification to the degree possible, with counting and sometimes weights reported for all identified and non-identified items. Total counts are reported as the number of identified specimens (NISP). Based on the skeletal elements present, a minimum number of individuals (MNI) sometimes can be calculated, and sizes of fish (fork length) sometimes can be estimated. The most basic analysis can indicate approximately how much fish was consumed or discarded at a site, and more detailed studies can address the relative contributions of fish captured from near-shore versus deep-sea zones.

Fish bone analysis requires skill of visual identifications, access to an appropriate reference collection of taxonomically known fish from the appropriate study region, some general knowledge of fishing practice, other general knowledge of the behavior of fish, and skill of interpreting the tabulated data. Given these requirements, fish bone analysis usually is the realm of a specialist, but every archaeologist working in an island or coastal setting can be aware of at least the range of essential issues involved.

Fish bones in *latte* period sites are far more numerous and informative than those in older sites of the Mariana Islands, and in fact very little has been found in these older sites. Therefore, a characterization of *latte* period fish bone does not necessarily define this time period separately from others. What seems to be interesting, though, is that fish bones were discarded within or close to *latte* sets, whereas they were discarded in surprisingly small amounts within older habitation sites. A possible chronological change in discard patterning will require further study.

In addition to fish bones, pieces of fishing gear are good evidence of *latte* period fishing practice (Figure 32), most commonly including rotating hooks and V-shaped gorges, and less commonly including components of two-piece trolling lures, bait cups, octopus lures, and net–weights. Most items were made of nacreous shell, almost exclusively of *Isognomon* sp., and considerable debitage or debris from fishhook manufacture also is almost exclusively of *Isognomon* sp. shell. *Turbo* sp. shell is evident only rarely. Human bone as a raw material is found in rather low frequency of occurrence. One portion of the octopus lure typically is made of *Cypraea* sp. shell. Apparently rare net weights usually are fashioned from stone, and some may have been made of shells.

The emphasis on *Isognomon* sp. shell presumably relates to simple physical attributes and technological performance characteristics. The lustrous quality this nacreous shell is attractive to fish, but the same is true of *Turbo* sp. and other shells. The overall flatter surface of *Isognomon* sp. shell, however, was easier to fashion into hooks, gorges, and trolling lures.

The perishable components of fishing gear are perhaps the most informative about how the items were used, for example showing how hooks were attached to lines and set in the water or how nets were designed. Lines, hook attachments, and nets are known from ethnographic recordings (Figure 33), and presumably this information can be extended at least partially into the *latte* period. Similarly, elements made of turtle shell or of coconut endocarp generally do not survive in archaeological contexts, but conceivably carbonized remnants might be found in some rare cases so far not yet documented.

The Gun Beach area in Tumon of Guam has yielded probably the largest known collection of *latte* period fish bone and fishing gear (Kurashina et al. 1987). Sinoto (2007) examined the fishing gorge artifacts from this site in some detail, proposing a manufacturing sequence, range of morphological types, and

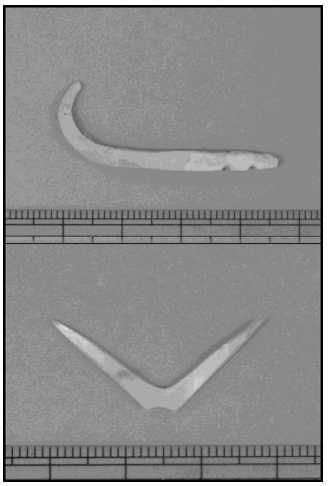

Figure 32. Examples of *latte* period fishing gear, excavated from Tumon, Guam (Kurashina et al. 1987), photographs by Kiyoshi Maruyama.

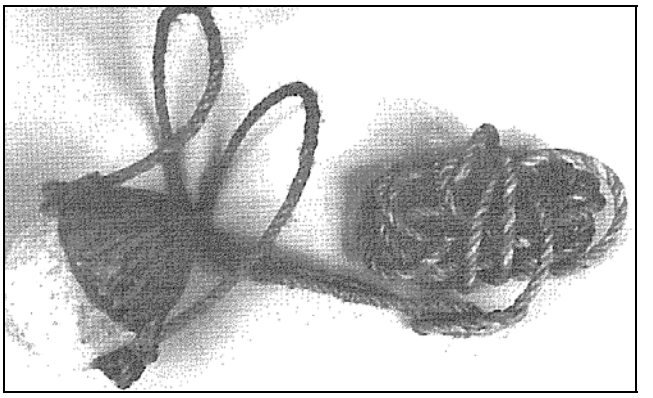

Figure 33. Historically observed fishing gear, described as a chumming device, by Fritz (2001).

mode of past use. The past use seems to have been linked to the capture of flying-fish (*Cypselurus* sp.).

Studies of *latte* period fishing practice most effectively can be based on a combination of fish remains and pieces of fishing gear. Existing collections likely will be sufficient for this scope of research without requiring new excavations, and ideally one site or a few sites can serve as illustrative case examples. In addition, Amesbury and Hunter-Anderson (2008) have reviewed available historical and archaeological records related to fishing practice in the Marianas region, and further detailed studies now can proceed more productively.

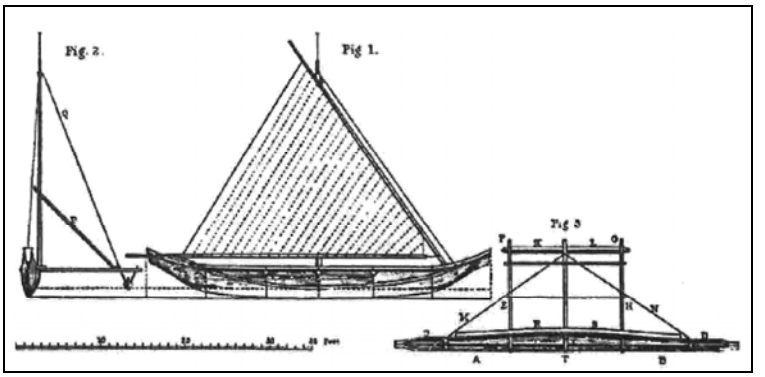

Figure 34. Sketch of historically observed sailing vessel, by Peircy Brett, 1742, archived copy at Micronesian Area Research Center, University of Guam.

Sailing and Voyaging

During the earliest Spanish contact era, Chamorro sailing technology and skills were regarded as among the world's finest. Watercraft were described as quick and highly maneuverable (Figure 34). Russell (2010) reviewed these early historical references. Most of these observations were near the shores, but a degree of long-distance sailing seems to have been important as well.

Some researchers have suggested that societies with strong emphasis on long-range ocean expeditions tend to maintain matrilineal kinship for land ownership issues, because men tend to be absent for extended periods of time while women consistently remain close to the land–based homes (Hage 2000; Hage and Marck 2002; Rainbird 2006). This general concept or something like it may have been the case for *latte* period society or earlier times in the Marianas. However, without knowing the role of long-distance exploration and fishing expeditions relative to other aspects of ancient society during specific time periods, this model remains speculative.

Long-distance sailing technology and navigational knowledge undoubtedly were achieved at a very sophisticated level by at least some members of ancient Chamorro society, or else these very remote islands never could have been settled successfully. The first successful settlement 1500 B.C. required the longest ocean-crossing at its time in human history, in excess of 2300 km (Hung et al. 2011). The extent to which these aspects of ancient society were maintained in the *latte* period is at present unknown.

Shellfish Remains

Shellfish remains are among the most abundant material category found in most island and coastal sites, and the same is true of *latte* period sites. These materials mostly include discarded food refuse, but some shells were used for

Figure 35. Photograph of *Strombus* sp. shells dominating *latte* period midden, excavated from Tumon, Guam.

making tools and ornaments. Some shells are more durable than others, and some possess more easily identifiable anatomical features.

Where shellfish remains are found, they can be extremely numerous, and they tend to be the dominant portion of midden debris accumulated at most Marianas sites. Especially in sandy beach contexts with good preservation conditions, shells can compose the majority of the volume of a cultural deposit, often more voluminous than the surrounding sediment matrix. Astoundingly large shell mounds, middens, and mega-middens are found in many coastal sites of the world, but they are not known in the Mariana Islands or in most of the Pacific Islands region at all. Instead, shellfish remains in Marianas sites simply are one part of midden accumulations, often a dominant part.

During the *latte* period, *Strombus gibberulus* shells often comprise more than 90% of shellfish remains in site middens (Figure 35). Shells most likely were boiled in a soup, as is a common practice in most Pacific Islands societies. Several dozens of *Strombus* sp. shellfish, however, would be needed just for a single meal, partly explaining their exceptionally high frequency. Taste preference may be another partial explanation.

The high frequency of *Strombus* sp. shells in *latte* period deposits sometimes has been contrasted against the preponderance of *Anadara* sp. shells in older site deposits (Amesbury 1999; Amesbury et al. 1996). At an earlier time of higher sea

level supporting mangrove swamps and other conditions, *Anadara* sp. shellfish were more abundant, but they could not survive in healthy populations during a later era of lowered sea level such as during the *latte* period. In this context, *Anadara* sp. shellfish were no longer a productive or reliable food source during the *latte* period, but rather other options such as *Strombus* sp. become more popular.

In addition to the apparent preference for *Strombus* sp., several other shellfish were harvested for eating and for making various artifacts during the *latte* period. Generally, anything edible can be presumed to have been eaten. Also, for any shell fashioned into an artifact, the edible portion almost certainly first had been consumed.

In archaeological work, shellfish remains often are reported in total weights, but weights plus number counts are more informative. When using only total weights, analysis becomes awkward and flawed for comparison of smaller versus larger shells such as *Strombus* sp. versus *Tridacna* sp. specimens.

Basic counts and weights in concert can allow simple assessment of the relative contribution of different types of shellfish in a local diet. Other more advanced studies involve measuring the individual sizes or estimating the ages at death of each specimen, supporting interpretations of the relative health of shellfish populations compared to one another and compared to impacts by human predation and natural environmental factors.

Plant Food Production

Fish and shellfish likely offered a steady supply of protein, but plant foods were a dietary necessity for starches and other nutrients. Several tree and root crops had been introduced into the Mariana Island to support populations long before the *latte* period, but a widespread and intensively cultivated landscape seems to have developed concurrently with the *latte* period. Presumably, this development can be linked to a larger population living in formal village organization with a sedentary lifestyle.

Formal agricultural fields are visible as durable archaeological site complexes in most Pacific Islands and many Island Southeast Asian settings, but such is not the case in the Mariana Islands. Instead, plant food production in the Marianas seems to have included informal use of household gardens probably in the immediate vicinity of homes, as well as a mode of “managed forest” in outlying areas. Over time, larger populations and expansion into new areas created increasingly widespread intensive landscape use, presumably at its maximum during the *latte* period.

The food crops most common in the Marianas during the *latte* period seem to have been coconut, breadfruit, banana, sugarcane, taro, and yam. Several others were cultivated but of lesser overall input in the local diet. Based on observations during the very early 1900s, Safford (2009) described the “useful

plants of Guam" in much detail, also discussing methods of crop growth and cultural perceptions of these plants in Chamorro society. Various options were practiced for managing wet and dry seasons for crop growth.

Rice seems to have been grown locally in the Marianas during the earliest Spanish contact era or slightly earlier, in either case within the range of the *latte* period (Craib and Farrell 1981; Hunter-Anderson et al. 1995). Curiously, no pre-Spanish rice fields are known in the Marianas region, and evidence of rice is extremely sparse in *latte* period site deposits, as compared to the obvious rice fields and abundant preserved rice remains in Asian and Southeast Asian sites where rice was a staple food crop. Also, the local mortar and pestle (*lusong* and *lummok*) technology was not appropriate for processing more than a few grains of rice at a time.

Overall, rice appears to have been introduced into the Marianas somewhat later during the *latte* period. It may not have been grown in the region long enough to develop as the highly significant food crop and essential element of life that it was in other areas. In another viewpoint, rice clearly requires much more labor investment than the apparent preferred patterns of informal household gardens and managed forests in the Marianas. Moreover, the Mariana Islands offer only very limited terrain suitable for rice fields.

If *latte* period land use indeed was widespread and intensive within the limits of informal garden plots and managed forests, then perhaps a further increase of population would necessitate adoption of formalized cultivation fields such as was the case in almost all Pacific Islands settings. In this context, rice conceivably could be viewed as one possible option for maximizing food production per unit of land area, but this option would not have been available for everyone because of the limited rice field-friendly terrain in the Mariana Islands.

Formal cultivation features and complexes are not evident in the Mariana Islands, but rather less obvious landscape features very likely relate to past crop growth. Moore (2005) documented a case of *latte* period gardening of thorny yams. Bulgrin (2006) examined charcoal-stained mounds that seem to have been linked to crop growth at *latte* period sites. Peterson (2010) studied small rock-pile features associated with clay deposits containing preserved starch evidence of yam gardening. Dixon et al. (this volume) pursue soil chemistry studies for ascertaining past land use history potentially reflecting *latte* period crop growth in the vicinity of low-density pottery scatters among limestone forest terrain. Other similar studies in the near future may yet increase understanding of the range of evidence for past crop growth in the Marianas, previously ignored in archaeological research largely because formalized agricultural fields were not immediately obvious.

The emerging picture from this recent research suggests that crop growth in fact did result in material traces detectable today in the archaeological record. Moreover, cultivation activity seems to have been especially intense during the

latte period, but researchers will need to accept new ways of thinking for identifying and interpreting the relevant evidence.

The pattern of most intensive land use during the *latte* period is ascertained mostly from palaeoenvironmental evidence from sediment cores extracted from the bottoms of lakes and swamps in Guam, Tinian, and Saipan (Athens et al. 2004; Athens and Ward 1993, 1998, 1999, 2004, 2006; Dega and Cleghorn 2003; Hunter-Anderson et al. 1989; Ward 1994). These records of preserved pollen and other botanical remains reflect several thousands of years of vegetation history trapped within the gradually accumulated sediments. Pollen and other indicators reflect the relative amounts of native forest species versus introduced crops and secondary growth taxa. Also of interest are charcoal particles, reflecting burning of native forests presumably to clear areas for habitation and growth of food crops.

The palaeoenvironmental evidence shows initial burning of native forests and low-intensity impacts on local vegetation around 1500 B.C., followed by steadily increasing intensity of impacts and a remarkable increase in intensity around or slightly before A.D. 1000.

Palaeoenvironmental evidence also has been recovered from residues on pottery fragments, on stone tools, and within sedimentary layers of archaeological sites. Moore (this volume) describes some of the findings of starch residues on *latte* period pottery fragments. Dixon et al. (this volume) describe new explorations of soil chemistry studies. New ways of thinking and cooperating with scientists in other disciplines very likely will be productive for this scope of research.

Animal Life

Animal life during the *latte* period was much the same as during earlier times, with a few exceptions. Most important was the introduction of rats into the Marianas during the *latte* period, probably responsible for increased impacts on native bird populations (Pregill and Steadman 2009; Steadman 1992, 1999; Wickler 2004). Prior to the *latte* period, no rat bones are evident in the Marianas, and only a few local bird extinctions are documented as compared to more dramatic avifaunal depopulations evident in other Pacific Islands where rats were introduced along with the first people. If the *latte* period also was a time of increased human population and intensive land use, then this change in human activity likely contributed to native bird extinctions following forest clearing and other disturbance.

The combined effects of rats and people resulted in accelerated extinctions of native birds during the *latte* period. By comparison, the impacts on fruit bat populations are unclear, yet most likely the fruit bats were reduced by human predation. Both birds and fruit bats likely were perceived similarly as food resources within the “managed forests” of the Mariana Islands.

Monitor lizards were living in the Marianas during the *latte* period and much earlier. These and other reptiles existed in the islands (Pregill 1998), but they so far have not been identified as possible food resources or as filling any clear cultural roles.

Other animal life included fish, turtles, shellfish, and various crabs. Nearly all of these were food items, but some were more sensitive than others to human predation.

As *latte* period populations increased and forests were cleared for residential villages and crop growth, the native animals certainly were disturbed by removal and reconfiguration of their supporting natural habitats. The same kind of disturbance occurred along beaches and within coral reef ecosystems. The disturbance is some cases may have contributed to depopulation and localized extirpations (i.e., extinct in one area but surviving elsewhere), but outright biological extinction of native species seems to have been limited to the birds.

Regarding how the local animal world was perceived in a cultural sense during the *latte* period, the absence of domesticated animals must be noted. This absence suggests that animals were regarded as part of the natural world and not necessarily integrated with the human social realm in the same way as was the case in other Southeast Asian and Pacific Islands settings where domesticated pigs, dogs, and chickens were important parts of everyday life for thousands of years. The continued absence of these animals in the Marianas consistently from earliest settlement through the *latte* period indicates cultural choice of preventing domesticated animals from being part of traditional life (Wickler 2004). Only later during the Spanish period were pigs, dogs, and chickens introduced, along with horses, cattle, water buffalo, and other animals.

Cooking

Cooking activities are well represented in the archaeological record, and examples from the *latte* period include remnants of heated-stone ovens, broken earthenware pots, burned starch and other residues in the pottery, other residues in the soil matrix, and discarded animal remains. In addition, food processing tools include mortars and pestles, and well as various stone and shell cutting and slicing tools. A variety of cooking techniques were available, including roasting, grilling, boiling, and steaming. This full range of activity seems to have been practiced during the *latte* period, and probably this same full range had been practiced much earlier as well.

Some kinds of foods and cooking practices may have been reserved for different social groups, special events, and other possible differentiations. If such were the case, then the same patterns can be detected in archaeological deposits. Developing testable models along these lines will be important for verifying, disproving, or modifying ideas about social functioning during the *latte* period.

Mortuary Practice

Mortuary practice during the *latte* period is known from hundreds of grave features that have been recorded, mostly in Guam during the course of urban development projects. Nearly all archaeologically documented skeletal remains in the Marianas relate to the *latte* period.

Most *latte* sets include burial pits on their seaward or streamward side, leading Hornbostel (n.d.) to consider the possibility that *latte* sets were mortuary markers. However, burial of individuals at their places of residence is a world-wide pattern (Adams and King 2011). Generally, it is understood as continuing the same residence into an after-life, also providing a means for the living to continue some sort of contact with the deceased. Another principle concept in these cases is a sense of permanence and becoming part of the land and its associated place.

Latte period burial pits also have been found within caves and along the base of steep limestone cliffs. These cases are slightly removed from the primary residential zones, so they do not reflect the same sense of permanent site-specific identity as for burial pits directly at *latte* sets. They could refer to individuals of younger age not having finished rites of initiation into certain types of group membership, so that a specific place of residential burial would not be appropriate (King 2006). They also could refer to other individuals recognized as somehow separate from ordinary *latte* period society.

Many other *latte* period graves are densely packed together, sometimes vertically stacked and intruding into one another, found in areas of sandy beaches but clearly outside formal *latte* village habitation zones. These findings suggest an interest to bury numerous individuals without much attention to individual identity and linking with a specific place of former life but rather more generally to a communal area. This practice perhaps could be suitable for circumstances of many people deceased within an unusually short span of time.

Within burial pits, the interred skeletal remains generally are found in two categories of either primary or secondary. Primary burials are the remains of individuals that originally were interred as whole, articulated bodies, usually in extended position but sometimes flexed. Secondary burials are the remains of individuals that were disarticulated and rearranged, sometimes with commingling of partial remains of multiple individuals. Primary burials tend to be in extended horizontal pits, whereas secondary burial pits tend to be narrower.

In many *latte* period secondary burial pits, the skeletal remains are not only disarticulated but also broken and burned within an ashy matrix, mixed with broken and burned animal bones and shells. These characteristics prompted Hornbostel (n.d.) to consider the possibility of cannibalistic feasts.

A few primary burials contain definite grave goods, identifiable as objects buried with the deceased. Archaeologically identifiable grave goods are limited mainly to durable items. Most common are shell pendants, necklaces, bracelets,

and other personal adornments. Less common are adze heads and sling-stones. Somewhat rare are small pots placed with the deceased. Unknown at present are the possible perishable goods, such as flowers, woven mats, and other such items that would require detailed residue analysis for identification not yet performed in Marianas burial features.

Primary burials of the *latte* period almost always are in pits just slightly larger than the size of the deceased, often with some clean beach sand lining the pit and occasionally scattered over the top of the deceased. The remainder of the pit-fill material consists of a mixed re-deposit of the originally excavated sediment, often containing artifacts and midden from the original layer disturbed by digging the interment pit.

Treatment of the dead in some ways reveals more about the surviving living communities of the *latte* period than about the deceased individuals. During the *latte* period, portions of the deceased evidently were kept as reminders of the individual's role during life or as objects of veneration. Most often, the head or skull was harvested from the corpse, in many cases removed from the burial pit some time after burial as indicated by disturbance of burial pits and post-burial displacement of vertebrae and other skeletal elements. Also, the tibia or occasionally other long bones were removed from grave features, and a number of spear points and fishing gear pieces were crafted from these bones.

The *latte* period treatment of the dead indicates at least a few important cultural perceptions and practices, and probably a greater diversity accorded with a large and diverse human population. First, the dead were treated with respect and reverence as individuals when buried in formal graves and especially when buried at a *latte* set and with grave goods. Second, other burial practices suggest less emphasis on the individual people, for example when commingled in secondary pits or when buried in multi-stacked pits intruding into one another. Third, the dead were perceived as continuing some sort of existence in the living world, in some cases becoming a permanent part of the land in a burial pit or in other cases continuing with the living as remembered directly by curation of body parts. Fourth, a number of interpretations are possible regarding the harvesting of human bones from graves for making spear points and fishing gear.

Diversity in mortuary practice probably relates to both varying perceptions among the living population and changing cultural ideas and practices over time. In other words, no single explanation can account for the evident diversity of *latte* period mortuary practice and treatment of the dead.

Beyond mortuary practice itself, burial features potentially can be informative about a number of topics generally within the research focus of physical or biological anthropologists or osteologists and not necessarily within the scope of archaeology. Examples include studies of causes of death, overall health and stress, demography, diet, and possible genetically inherited diseases and other attributes.

Generally speaking, archaeologists study only the most easily observable characteristics of mortuary practice as described above, whereas physical or biological anthropologists and osteologists require closer examination for their research. In this sense, the most basic aspects of mortuary practice can be recorded by archaeologists in the event of inadvertent discovery of burial features such as during construction work, then preserved in place. However, more detailed research would require the input of skilled specialists and usually the temporary disinterment of the skeletal remains.

Burial studies have been of great importance world-wide for learning about past lifeways and for establishing firm chronological sequences based on discretely dated burial features, but today the intrusion into past burial features generally is considered unjustified. If respect for the dead includes leaving them in their final resting place, then the more detailed research as described above can be justified only in cases when dis-interment truly is necessary such as for supporting modern roads, utility lines, airports, or other developments that cannot be moved into alternative engineering design locations.

As noted above, several hundreds of *latte* period burial features have been reported in the Marianas, mostly in Guam and almost all recorded when discovered in modern construction zones. Recovery of burials is in itself not a research focus, but rather details are recorded when necessary in support of modern construction projects. The recorded details typically are archived in government offices, but a few researchers have made efforts to publish the more significant findings.

Based on information available from government offices and published scientific literature, Euber (this volume) summarizes the current trends in scientific studies of human remains. These studies sometimes are termed human osteology, physical anthropology, biological anthropology, or bioarchaeology. A few other key studies were published (Hanson and Butler 1997; Hanson and Pietrusewsky 1997; Ikehara-Quebral and Douglas 1997; Pietrusewsky 1990), but the vast majority of work has been restricted to the "gray literature" archived in government offices and not realistically accessible to the public or even to other researchers.

Artistic Expression

Artistic expression can reflect identity of an individual or of a group, and it is equally important for showing membership and differentiation. Throughout Southeast Asia and most of the Pacific Islands, the most common forms of artistic expression include tattooing, bark-cloth and other clothing, pottery design, woven mats, shell ornaments, and rock art. Of these possibilities, the findings of the *latte* period in the Marianas are curiously limited.

Tattooing has not yet been verified indigenously in the Marianas. During the earliest Spanish colonial era, no tattooing was noted, although it was prevalent

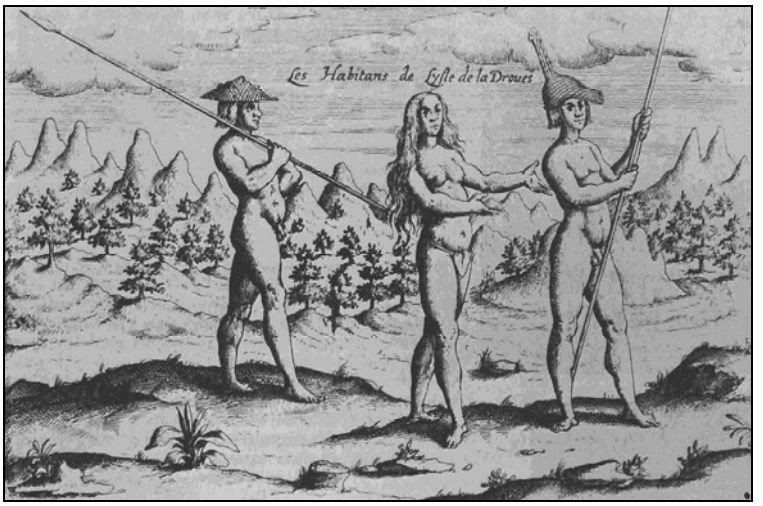

Figure 36. Sketch of Mariana Islanders wearing woven hats, circa 1600, illustration in archives of Micronesian Area Research Center, University of Guam.

throughout Southeast Asia and the Pacific Islands. Tattooing needles so far have not been found in Marianas archaeological sites.

Although tattooing apparently was not practiced, other forms of body modification are evident. Artificial modification of teeth has been documented in skeletons of the *latte* period, including darkened coloring and patterns of incisions (Ikehara-Quebral and Douglas 1997). In other cultures practicing tooth modifications, these expressions signaled membership in a social group or category, most often as living proof of having completed a rite of passage. Tooth modifications also seem to relate to notions of beauty.

During the earliest Spanish contact era, only woven hats and extremely limited body coverings were noted as clothing apparel among the Chamorro people (Figure 36). Elsewhere, clothing designs represented membership in villages or lineages. Spindle whorls are common in Southeast Asia, and bark-cloth beaters are common in both Southeast Asia and the Pacific Islands. However, both are curiously absent in the Marianas.

Pottery design presents many opportunities for artistic expression, but *latte* period pottery is remarkably plain and lacking individuality. Instead, *latte* period pottery appears to be more or less similar throughout its scope of occurrence both geographically and chronologically.

Shell ornaments of the *latte* period mostly include small beads that presumably formed necklaces or other strands. In addition, single-shell pendants were made of larger pieces and sometimes of orange-colored *Spondylus* sp. shells

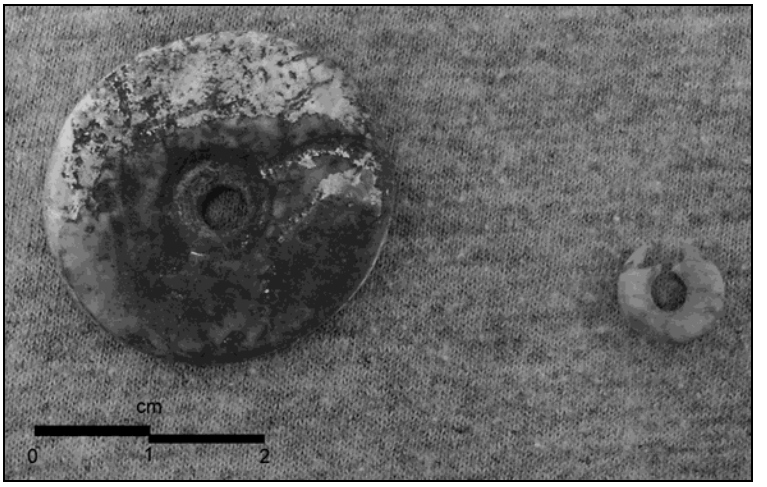

Figure 37. Examples of *latte* period shell ornaments, from Tumon, Guam.

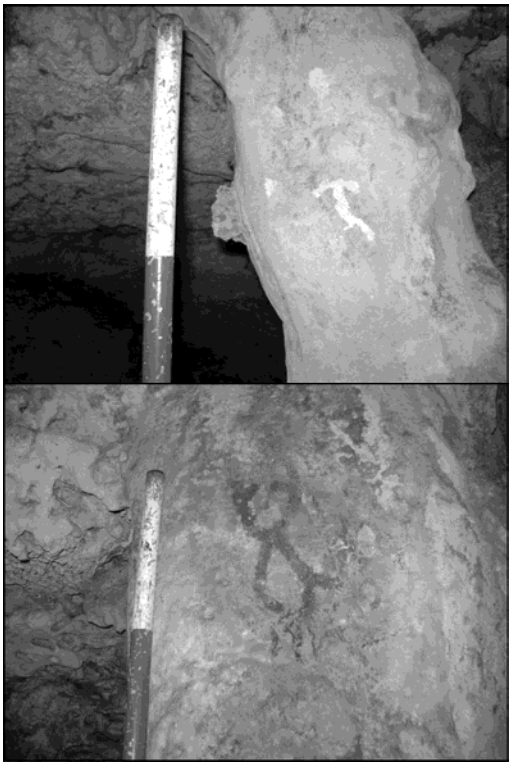

Figure 38. Examples of rock art at the Ritidian site, Guam. Scale bars are in 20-cm increments.

(Figure 37). Missing, however, are some of the diagnostic ear-rings and pendants commonly found throughout Island Southeast Asia at this time.

Rock art in the Mariana Islands so far has not been dated directly, but painted designs occur in caves that also contain midden deposits dating to the *latte* period. Examples of rock art include both positive and negative hand–prints, male and female figures, rows of dots and circles, and various geometric forms (Figure 38). These findings are generally consistent with rock art throughout the western Pacific and most of the world cross-culturally. One somewhat unusual motif in the Marianas depicts a headless human figure found in some caves, possibly signifying a burial feature where the head had been removed (Cabrera and Tudela 2006).

Overall, archaeological evidence of artistic expression is rather limited for the *latte* period, but perhaps it was more popular in perishable materials of woven mats, wood carvings, and other items no longer surviving in archaeological contexts. The limited findings suggest at least a few opportunities for artistic expression.

Language undoubtedly is a primary carrier of artistic expression, group membership, and cultural identity entirely outside the material archaeological record. However, understanding the fundamentals of language communication may assist in formulating models for finding parallel expressions in material culture for archaeologists. This scope of research is applicable not only for the *latte* period but in fact world-wide and in all time periods.

Chronological Resolution

The *latte* period can be defined as spanning approximately A.D. 900 through 1700, yet of course a number of changes, transformations, and developments occurred during these centuries. Most obvious was external influence by Spanish and other foreigners starting technically in 1521, but internal cultural change also must have occurred.

Knowing a precise age is essential for understanding how different sites relate to each other and how aspects of traditional culture changed over time. Site findings for example dated A.D. 900–1200 cannot be equated with others dated A.D. 1400–1600. Without knowing some finer degree of dating, findings of the *latte* period cannot be specified any more than the most general potential range of A.D. 900 through 1700.

Latte stones and diagnostic pottery very confidently can indicate a general *latte* period association, but certainly a more precise age range is desirable. Findings in surface-visible contexts suggest most likely site abandonment during the late 1600s as part of the region-wide *reduccion* program. By comparison, findings in buried contexts presumably are somewhat older.

Items of foreign manufacture clearly indicate a post-Spanish age, usually found in surface-visible and near-surface middens. Examples include glass beads,

metal pieces, and fragments of porcelain. The associated age range potentially could be as early as Magellan's arrival in 1521, but the most intensive Spanish influence and access to foreign goods started in the late 1600s.

Where buried cultural deposits or middens do not contain foreign items of definite post-Spanish age, presumably a pre-Spanish age can be assigned. In these cases, radiocarbon dating can provide a reasonable estimate of the associated age. Radiocarbon dates can indicate a most probable range of a few centuries, and multiple dating results potentially can point to a more precise range.

Any single radiocarbon dating result indicates a potential range of a few centuries (Figure 39). The given intercept point is not the most probable age, but rather it indicates one point around which a potential range of highest probability can be applied. The true age could be at any point within the full potential range, usually spanning a few centuries for the range of highest probability. The range of probability does not indicate that activity started at the earliest point and ended at the latest point of this range. Rather, each point within the extended potential bears a certain chance of being accurate.

Complicating the dating of a site is the likelihood of site use over an extended period of time. In these cases, varying forms of time-sensitive artifacts and radiocarbon dates of varying ages offer useful clues about the extended period of site use.

Radiocarbon dating in itself is not sufficient for most studies, but rather the dates must be understood in their context relative to the target point of interest. Most important is to obtain a datable sample of organic material from a secure context and to know how it relates to a specific past cultural activity, for example within a layer containing *latte* period pottery versus in a layer pre-dating or post-dating such pottery or other indicators. A basic understanding of geological layers and stratigraphy is therefore essential.

Without a rudimentary understanding of chronological issues, as outlined above, several important research questions cannot be addressed satisfactorily. For example, comparison of sites is not necessarily warranted when the site ages are unknown or improperly interpreted. Also, studies of cultural change or any other change over time are impossible without knowing accurate ages of sites.

Figure 39 summarizes radiocarbon dating related to *latte* period occupation at two localities at Ritidian in northern Guam, instructive for clear separation of geological layers and also dating of short-lived carbonized coconut endocarps in each case. Two localities were excavated, including first an earlier stabilized beach in a landward portion of the coastal plain and second a more recently prograded portion of the beach in a more seaward location. In the geologically earlier landform, a stable land surface was inhabited in the range of 794–421 B.C., but *latte* period pottery fragments first were deposited in this location within an upper and more recent layer dated in the range of A.D. 1174–1281. In

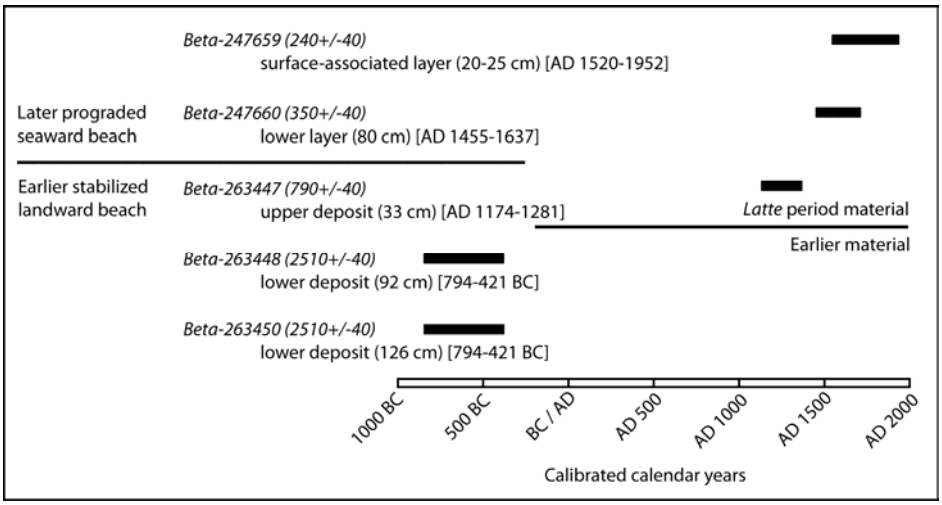

Figure 39. Radiocarbon dating probability distributions of carbonized coconut endocarp specimens relative to latte period settlement at Ritidian, northern Guam.

the geologically younger landform, *latte* period pottery fragments occurred in two separated layers, first in the range of A.D. 1455–1637 and second in the range of A.D. 1520–1952.

In the case of the two overlapping date ranges calibrated A.D. 1455–1637 and then A.D. 1520–1952, a variety of statistical probability models further may be employed to highlight how the two dating results constrain one another, and the known site abandonment by A.D. 1700 offers an additional constraining factor. In very simple terms, the range A.D. 1520–1952 can be shortened to A.D.1520–1700, with the original portion 1700–1952 removed and instead increasing the likelihood of the true date occurring in the few decades of the late 1600s just prior to 1700. Indeed, this re–distributed probability fits expectations of last site use just prior to 1700, as is the expected case for nearly all surface-visible and near-surface *latte* period deposits. Next, the revised range 1520–1700 (with emphasis toward these final decades) can be constrained again by the range calibrated A.D. 1455–1637 that must pre-date it. The range 1520–1700 therefore becomes further constrained to most likely post-dating 1637 yet pre-dating 1700.

Other dating models are possible. In the above-noted example, the date range A.D. 1455–1637 is unchanged, but other statistical models could propose for the two date ranges constraining each other equally. In yet another view, the two date ranges may be seen as dating the same period, despite their stratigraphic separation, and the overlap of the two may be taken as the most likely range. In fact, if not for their stratigraphic separation, the range of overlap would offer the most convincing proposal for a true date range.

The Ritidian results show at least three distinctive geological layers in a relative sequence within the *latte* period, verified as temporally distinctive time units by radiocarbon dating. Further studies will be needed for investigating any change over time within the material culture record. At least one important change over time must have involved adjustment to the transforming coastal plain as indicated by separate geological layers in a prograding landform.

Cultural Change

Archaeologists trace cultural change reflected in the durable physical remains of material culture, also keeping in mind that cultural change potentially could include other aspects of culture not directly observable in the material archaeological record. Compared to other fields of study, archaeology may seem limited in its scope of raw data, but it bears the unique advantage of examining long-term chronological change. Making the most of this strength, though, requires good understanding of chronological resolution issues as outlined above.

In an archaeological perspective, cultural change is regarded as an inevitable fact of life, so that social life during the *latte* period was different from life both before A.D. 900 and after A.D. 1700. Also, cultural change clearly took place between the beginning and ending of the broadly defined *latte* period. Exploring the scope of this cultural change is not possible through historical documents that almost entirely post-date the *latte* period, but it is possible through archaeological study.

In general terms, cultural change during the *latte* period can be explained as a response to a set of external and internal factors, including climate variability, contact with foreign cultures, population growth, social and political developments, and other forces acting on the diverse ways of achieving cultural goals. Probably all of these factors were of variable importance in influencing cultural change, some more than others at different times.

Change in climate most directly affects potential land use and subsistence economy, and extreme cases may involve other cultural change as well. Unexpected rainfall patterns conceivably would necessitate some degree of change in crop-growing strategies. Even minor fluctuations in sea level and temperature can affect coral reef ecosystems and by extension alter the ways people harvested from these resource zones. If these aspects of life change significantly, then other changes may take place accordingly in terms of overall labor allocation, social relations, political structure, and other cultural factors.

Actual effects of climate change during the *latte* period may not have been as pronounced in the Marianas as was the case in other parts of the world following the transition from Little Climatic Optimum (LCO) conditions A.D. 1000–1300 to Little Ice Age (LIA) conditions A.D. 1300–1850 (Nunn 2000a, 2000b). In some cases outside the Marianas, the LCO to LIA transition has been

interpreted as linked to societal change (Nunn et al. 2007). However, some caution is advisable when assessing the detailed facts, not always considered convincing (Fitzpatrick 2010).

The *latte* period emphasis on arboriculture and low labor-input horticulture was resilient to a broad range of climatic conditions and could tolerate unpredictable periods to a certain extent, possibly as an adaptation to periodic typhoons but also suitable for withstanding long-term climatic variability. Traditional management of coastal and marine resources may have involved similar strategies of adjusting to periodic instability.

The generally favorable and stable conditions of the LCO may help to explain the rapid emergence of *latte* villages and intensively utilized landscapes after A.D. 900–1000, but the effects of the LIA after A.D. 1300 are not necessarily reflected in the archaeological record. Hunter-Anderson (this volume) considers this model in more detail. Peterson (this volume) proposes a longer-term view of climate change for understanding larger regional patterns.

Contact with foreign cultures certainly occurred during the *latte* period. In addition to Spanish contact following Magellan's arrival in 1521, contact with other traditional Micronesian societies very likely took place from time to time. Peterson (this volume) considers multiple cultural contacts that may have influenced the origins and development of *latte* period society. In a general sense regarding contact-induced change, the scope of study must include the movement, interaction, and exchange of people, materials, and ideas for each of the cultures involved. The most obvious effects in the *latte* period were adoption of foreign-made materials such as metal, glass, and high-fired ceramics. However, cultural contact included much more that may not be directly traceable in the archaeological record, yet an awareness of these issues can help toward understanding cultural change overall as suggested by Peterson (this volume).

Population growth often is considered unavoidable for human groups, but of course it fluctuates in rate and magnitude depending on various factors. Chamorro population collapse is well known following Spanish colonial efforts (Shell 1999; Underwood 1973), but presumably the local population grew during the *latte* period. Moreover, the archaeological signature of the *latte* period indicates a much larger population than had existed previously in the Marianas region. Kirch and Rallu (2007) review the ways archaeologists can approach population studies in general, with focus on the issues most relevant to the Pacific Islands. Such a study has not yet been attempted in the Mariana Islands.

Change in population size and density very likely related to change in social interaction and political structure, capacity to fulfill community labor tasks, impact on the local environment, and other factors. The details of these relationships can be rather complex, and simple explanations of population-driven cultural change probably are inadequate. Rather, population growth can be viewed as one important factor in a set of inter-related variables.

Various social and political developments presumably occurred during the *latte* period, perhaps linked to population growth, climate variability, external cultural contacts, and other factors. Some degree of change likely took place in terms of land tenure, village layout planning, resource management, political structure, social relations, and other aspects of *latte* period culture. Each of these topics, either singly or in relational combination, may be pursued through archaeological study.

Concluding Remarks

Given the significance of *latte* period archaeology for scientific research and for cultural identity and other issues, the present volume offers an update of findings for general reference. The foregoing introductory narrative summarizes what is known versus not yet known of the *latte* period, overall recognizing that little actually has been studied despite the fact that nearly all archaeological efforts in the Mariana Islands over the last several decades have concerned the *latte* period. Similarly, this summary narrative offers a number of speculations that are not to be misunderstood as factual conclusions, but rather these conjectural notions serve only as working hypotheses pending substantive testing.

As outlined above, the resulting archaeological signature of the *latte* period is abundant and widespread throughout the Mariana Islands, forming the most readily accessible portion of the regional archaeological record. Of the total amount of archaeological study in the Marianas region, more than 90% of it relates to the *latte* period of approximately A.D. 900 through 1700. The oldest sites in the Marianas date around 1500 B.C. (Butler 1994; Carson 2008, 2010a, 2011; Craib 1993), so by comparison the *latte* period represents only a small and most recent portion of the total potential archaeological record. In this context, the *latte* period has been over-represented in archaeological efforts, yet awkwardly much about *latte* period archaeology requires more attention than has occurred so far.

The *latte* period naturally can be represented and interpreted in multiple ways, and diverse perspectives can be supported by the available evidence. For the purposes of cultural heritage and identity studies, *latte* period society tends to be viewed as a singular entity that is also synonymous with ancient Chamorro society. In an archaeological perspective, the *latte* period was the last in a long series of traditional cultural periods, and it included at least some variability both geographically and chronologically.

Archaeological representations of the *latte* period are not nearly as confident or precise as may be desired for cultural heritage and identity studies. The archaeological evidence indeed is quite abundant, but the ability to make definitive statements about precise ages and functions of sites has been rather

limited. Given these constraints of the material evidence, further interpretations of *latte* period culture and society are necessarily even more limited. Clearly, more effort is needed for developing logical links between raw archaeological evidence and theoretical interpretations.

The other chapters in this volume address some but not all of the research questions relevant to archaeological studies of the *latte* period. The foregoing narrative summary hopefully offers an accessible context for understanding the scientific contributions of the other chapters and of future works. Meanwhile, archaeological research proceeds at a rapid pace, so inevitably the present volume will need to be updated.

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