Casas de los Antiguos: Social Differentiation in Protohistoric Chamorro Society, Mariana Islands

by

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This thesis is a product of the author's research. In the analysis of some data the assistance of specialists in various disciplines was sought and is acknowledged. Except for these instances the thesis is my own original work.

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ABSTRACT

Identification and explanation of patterns of social complexity have been a central concern in recent archaeological studies. Research into social complexity tends to focus on the development of political hierarchies measured by the increasing number of social strata (vertical differentiation). However, societies are also differentiated along an horizontal axis which measures social divisions within a single stratum. This is a critical distinction with important archaeological implications but has rarely been investigated.

Little is known about indigenous society within the Mariana archipelago at contact. Yet based upon fragmentary early historic descriptions, Chamorro society has previously been characterised as highly stratified, containing distinct social classes. The archaeological record was used to support this claim.

Variation in house size is commonly used as a measure of social divisions within a society. The archaeology of the Mariana Islands is characterised by stone pillars known as latte. Earlier authors held that the primary function of these features was as supports for houses and other buildings and that latte are clear markers of social divisions - people of higher status lived atop latte while commoners inhabited wood-based residences.

Research for this thesis focused upon latte, exploring questions regarding function, size variation, and patterns of inter and intra-site distribution. Results indicate that latte were used only as houses and exist in five size classes. No evidence of other types of residences was found; it is argued here that all portions of the population lived in latte supported houses. Individual settlements are shown to be composed of spatially distinct groups, each containing a single 'large', and several 'small' latte, exhibiting a consistent ratio of about 1:5; these are argued to represent corporate residential groups. Present evidence now suggests that Protohistoric Chamorro society was not highly stratified but rather was characterised by autonomous villages comprised of kin groups (represented by the intra-site corporate residential divisions) differentiated by a system of horizontal ranking.

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CHAPTER ONE - INTRODUCTION

> For there are in all parts of the island a number of ruins of a very particular kind (Anson 1748).
>
> These latte are truly remarkable structures in that I believe that their counterparts are not found elsewhere in the world (Hornbostel n.d.[1922-26]:5).
>
> In all the islands, at places formerly inhabited, are found certain monuments, which the natives call 'latde' or 'Houses of the Old People [Casas de los Antiguos] (Calderon 1875).

The archaeological landscape of the Mariana Islands (Figure 1-1) is dominated by megaliths known as latte. These paired rows of stone pillars topped by capstones (Figure 1-2) have been reported from most of the fifteen islands in the archipelago and from all major terrestrial physiographic areas. They appeared very late in prehistory, probably no earlier than about 800 BP, only three hundred years before contact. Because their use ended rapidly after Spanish settlement, direct ethnohistorical documentation of the function and social context of these structures is meagre. Even the term Latte is of ambiguous origin. The Spanish designation Casas de los Antiguos (Houses of the Ancients) was often used but neither term appears in the literature until the middle of the nineteenth century (see Calderon 1875), four centuries after contact. Latte have been the focus of much curiosity, speculation, and research for the past 250 years.

At the centre of this speculation is the question of how latte functioned and what they may indicate about the nature of Chamorro social organisation (Chamorro refers to the indigenous population of the Marianas, another term of uncertain origin (Plaza 1971)). Most other high islands of Micronesia represent well-documented cases of highly stratified societies, each delineated archaeologically by architectural remains. A long standing view of Marianas prehistory maintains a similar pattern of social organisation existed within the archipelago and that latte served as markers of social

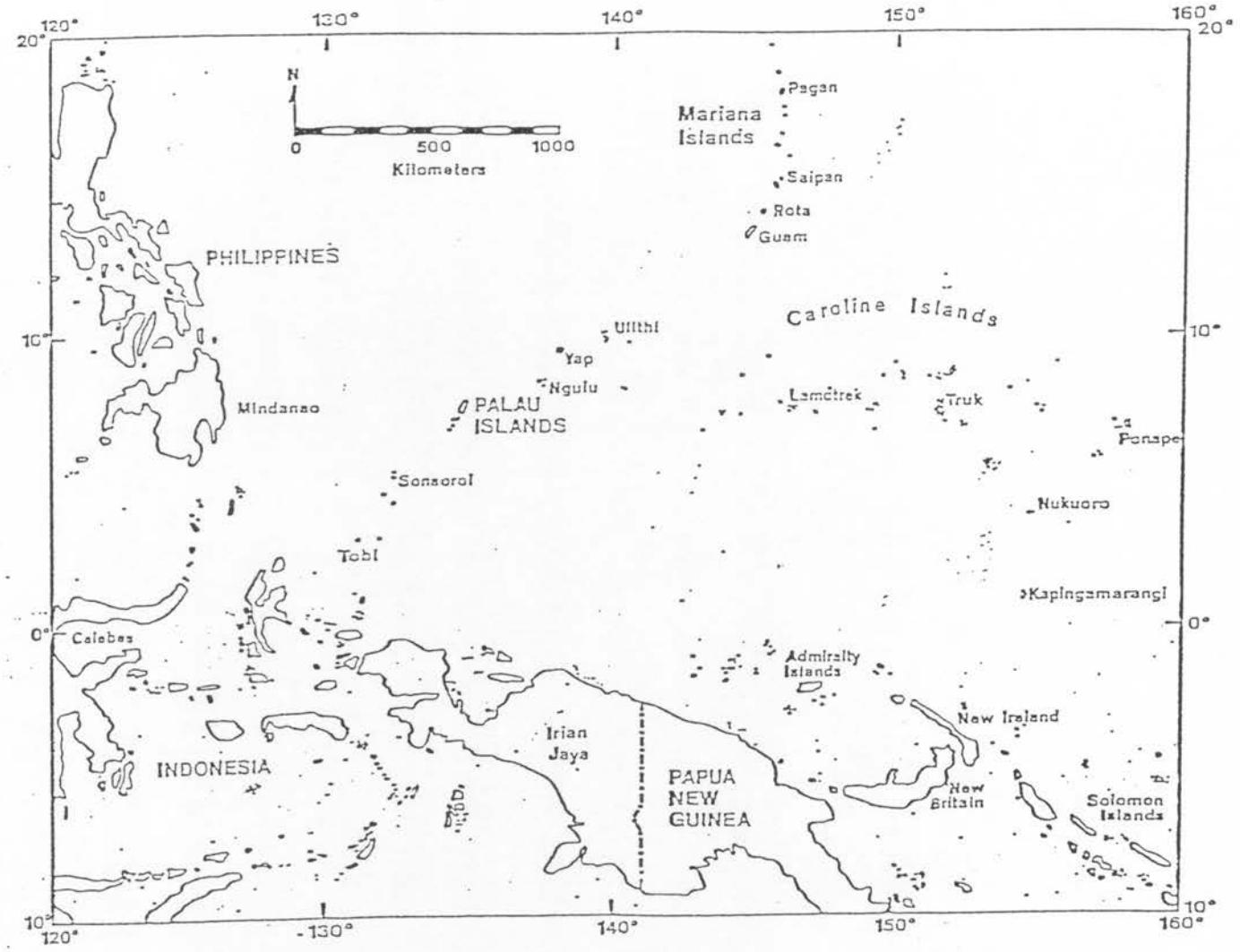


Figure 1-1 General Location of the Mariana Islands, Western Pacific

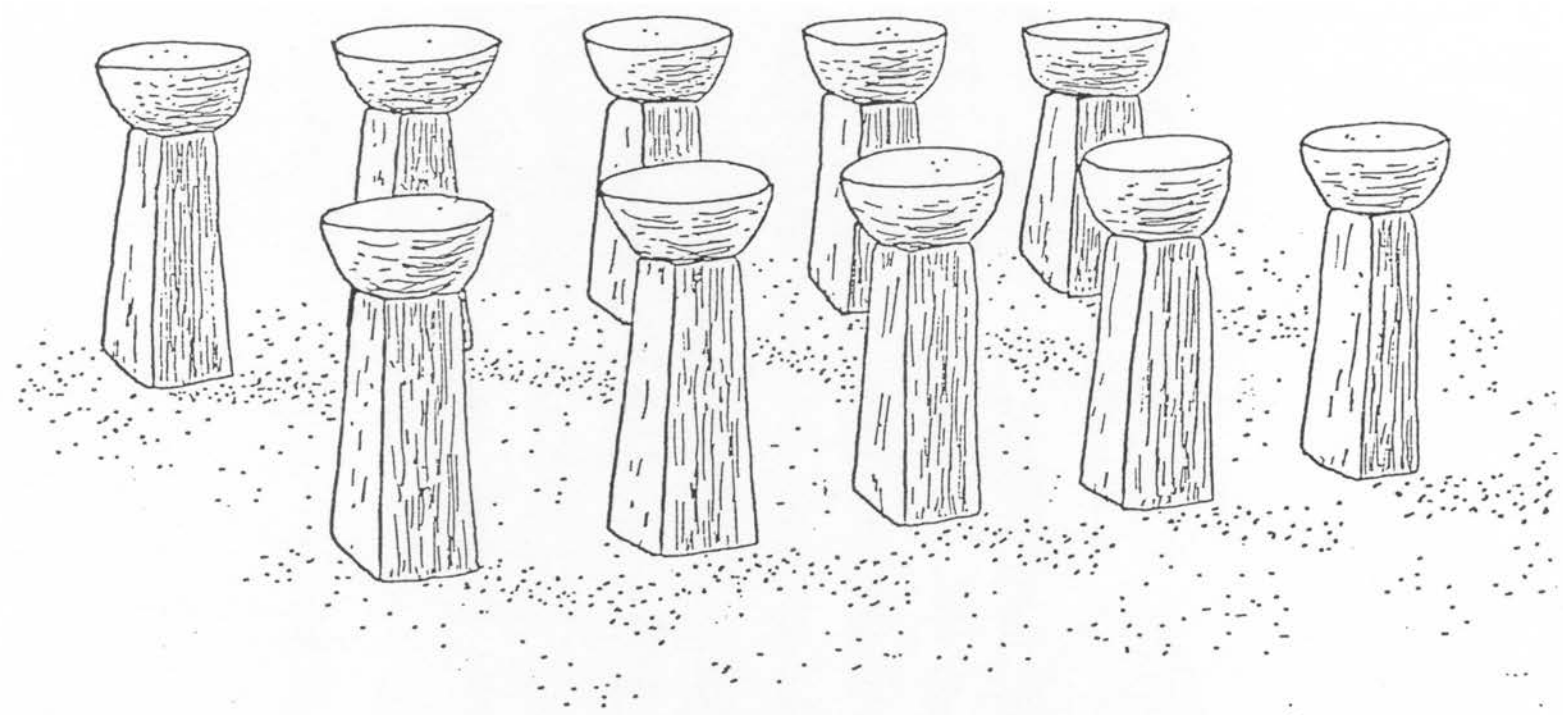


Figure 1-2 Latte: a series of pillars and capstones

differentiation and increasing complexity (Thompson 1940, 1945, 1969, Spoehr 1957). Graves (1983:11) has explicitly argued that latte are, 'unambiguous measures of increasing social complexity.'

Nearly a half century ago, Laura Thompson presented a short, concise discussion on the structure and function of latte. Her article (Thompson 1940) was the first attempt to collate and correlate ethnohistorical and archaeological observations in order to produce an interpretation regarding the function and social context of these megaliths. Subsequent archaeological investigations in the Marianas have usually relied upon Thompson's interpretations which had become the de facto source authority. As a result, most of her interpretations have become 'fact' in Marianas prehistory and this is specifically true regarding latte. Her work has had a profound effect upon the way archaeologists perceive latte.

Our understanding of Chamorro society at contact has been dominated by the works of Laura Thompson (1932,1940,1945,1947,1969). Based on her reading of the scant ethnohistoric record, Thompson saw Chamorro society as 'highly class conscious with three distinct social castes' (1945:13-14, 1969:55-56). Turning to the archaeological record, she argued that the megalithic remains, known as latte, must have been specifically associated with the high status people. Subsequent to Thompson's Native Culture of the Marianas (1945), most authors offer generally consistent presentations of protohistoric Chamorro society.

I argue the existence of a de facto model of the contact period, suggested by the consistent and wide ranging citation of Thompson. It is my contention that while there has not been a complete acceptance of all facets of Thompson's arguments, until recently the few authors who have commented critically or offered modifications have not challenged any of her basic assumptions about the structure of Chamorro society. Thus, I view these disagreements or modifications as variations on a theme.

Historians have cited her description of Chamorro society at contact (Beardsley 1964:63-64, Carano and Sanchez 1964:20-21) while Social-Cultural anthropologists have relied upon Thompson's depiction of indigenous social structure (Spoehr 1954, Hughes and Lingenfelter 1974, Alkire 1977). And Thompson is widely cited by

archaeologists in connection with the social context of archaeological remains and to the correlation of latte with high status people (Spoehr 1957, Shutler and Shutler 1975, GovGuam Parks Division 1976, Reinman 1977, Ray 1981).

Until recently the nature of Chamorro society at contact has been taken as given and there has been no perceived need for the characterisation to be critically explored. Recently archaeological attention to the Marianas has increased substantially with some researchers (e.g. Cordy 1983a, Craib 1983c, 1984, Graves 1983, in press) questioning various aspects of the de facto model.

For the last decade or so, many archaeological projects in the Pacific have been directed towards documenting the development of these complex societies. Architectural remains usually figure prominently as social markers. For example, Ayres and Haun (1978) have argued that the variations of megalithic architectural forms of Ponape offer 'clear archaeological evidence reflecting consolidation of political authority and social status differences'.

A basic, often implicit, assumption of these studies is that a regular discontinuity exists between the social organisation of chiefdoms and other social types. It is further argued that this is expressed archaeologically (Peebles & Kus 1977). While there are major debates over the causal variable(s) involved in reconstructing trajectories towards state formation, a less apparent but fundamental reappraisal of the distinguishing features of a chiefdom is occurring. Nevertheless, many discussions proceed as if we had a good idea of what a chiefdom looked like either socially or archaeologically (Carneiro 1981). A general tendency has been to examine the structure and growth of social complexity primarily in terms of social ranking along the vertical (political) axis to the virtual exclusion of horizontal (within-group) differentiation. Yet it is precisely this dichotomy which may be at the core of the problem regarding protohistoric Chamorro society.

By breaking down the various arguments regarding Chamorro society into their constituent parts and examining the fundamental assumptions, alternative hypotheses can be formulated which not only examine the established 'facts' but explore the framework of the models themselves (Feyerabend 1975). The goal of this thesis is not

to model change but rather to discuss and describe the configuration of Chamorro society during the Protohistoric. Unless we have a coherent model of Chamorro society ideas about change will not serve us well (cf. Cordy 1981c).

Archaeology in the Marianas: an overview

The history of most archaeological research in the Pacific spans no more than a few decades; it is largely a post- WWII phenomenon. The Mariana archipelago is one of the few Oceanic areas where archaeological attention has a long tradition. An important factor in the longstanding interest in the archaeology of the Marianas is related to the rapid decline of the indigenous Chamorro. With no direct behavioural links to the creation of the archaeological record in evidence unlike most other places in the Pacific, it appears that it was the 'mystery' of the latte which first excited interest.

Another important factor in the development of archaeological interest in the Marianas was the relative ease of access into these islands. Guam was established as a major port by the end of the sixteenth century and began regularly receiving ships. The presence of a series of foreign administrations (Spanish, German, U.S., Japanese) began in the late seventeenth century and continued for nearly three hundred years.

Perhaps the first antiquarian description of latte is found in the journal of Captain Anson who visited the island of Tinian in 1742 and observed the spectacular latte remains at what is known as the House of Taga site. Based on information obtained from local informants, Anson stated that latte were places inhabited only by those taking 'some religious vow'. Later, Arago, a draughtsman on Freycinet's voyage in 1819, provided a description of a circular latte on Rota and also suggested that latte represented religious/ceremonial loci (No latte of the configuration described by Arago has ever been recorded and it is assumed here that he was in error).

The Marianas were visited by naturalists during the nineteenth century, who included archaeological and ethnographic materials in

their discussions on the natural history of the Marianas (i.e Freycinet - 1819, d'Urville - 1828, 1839, Marche - 1886-87, Safford 1899-1900). Collections of these materials were made, including some skeletal remains cached away in caves (Marche [1982]). Marche also noted the presence of latte on many islands in the archipelago including more northern ones. This latter observation was confirmed by the German administrator, Fritz, who also journeyed to all the islands under his control.

General access to the islands north of Guam became more difficult early this century as the Japanese administration began to effectively close off most of Micronesia which they held as a Class C mandate through the League of Nations. At this same time, a U.S. Naval officer, stationed on Guam, Hans G. Hornbostel, began a series of archaeological investigations. Though largely confined to Guam, he was able to make brief journeys to Rota, Tinian, and Saipan before they were completely cut off (Ballendorf 1982). At about the same time, Japanese anthropologists travelled to the Marianas and described latte and associated artefacts (e.g Hasebe 1928, Yawata 1945).

The southernmost Mariana islands of Saipan, Tinian, Rota, and Guam (Figure 1-3) have received nearly all the archaeological attention since late last century. While this work has been sporadic and of varying quality, it has provided a data base far exceeding any other area within Micronesia. The bulk of this data relates directly or indirectly to latte.

Two questions dominated the discussion of latte; who were the builders and what function did they serve? Most anthropologists (e.g. Hasebe, Yawata), naturalists (e.g. Marche, Safford) and some laymen (e.g. Fritz) described latte as having supported structures as suggested in early Spanish accounts. Hornbostel, on the other hand, became convinced that these features were not used to support structures but rather took the view of Anson and Arago that latte served to demarcate areas representing ceremonial gatherings which often included cannibalistic feasts.

Though aware of the Spanish accounts, Hornbostel chose to dismiss these and instead looked to his abundant archaeological material to argue his interpretation. He found that when he dug in and around

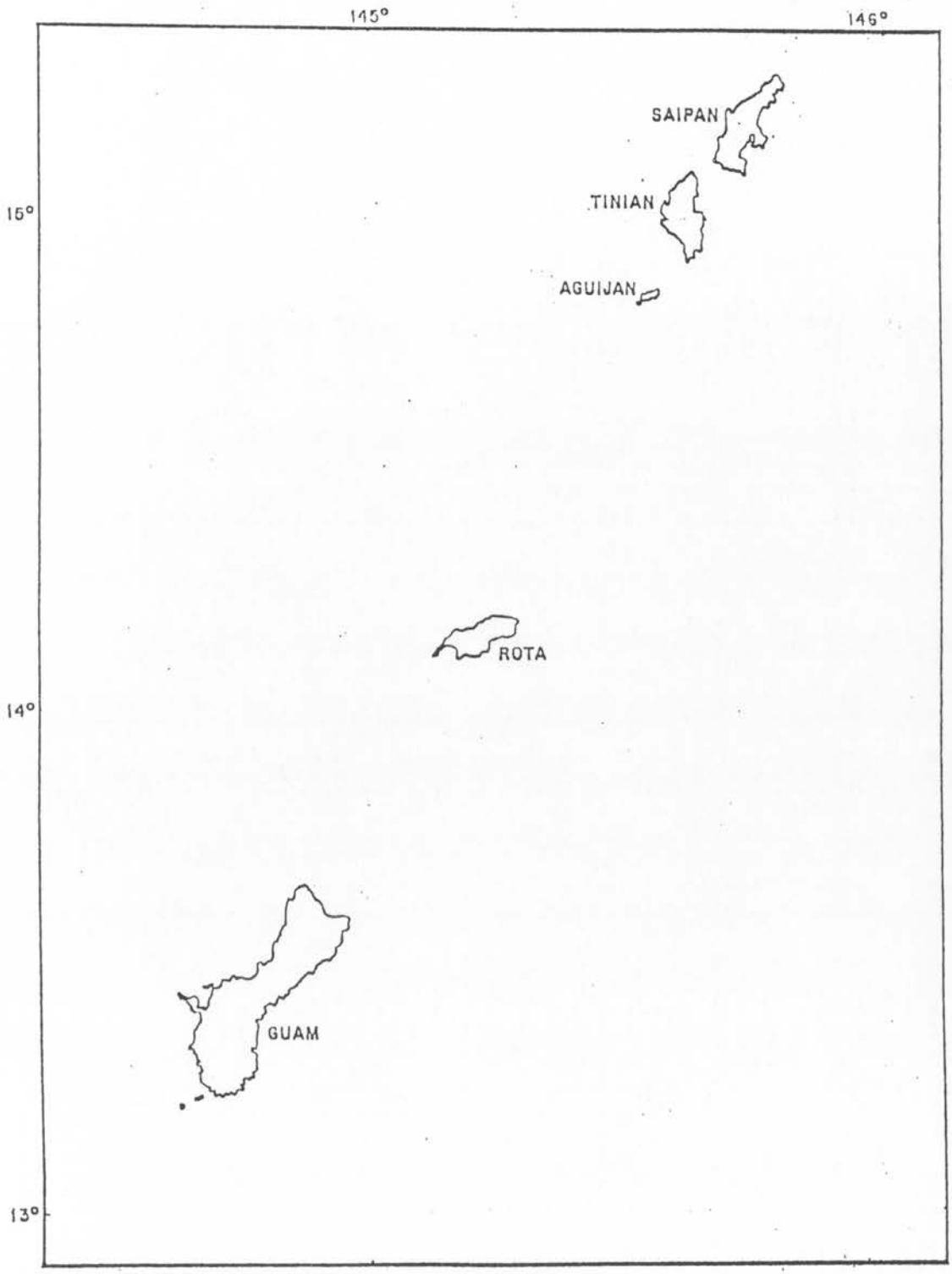


Figure 1-3 The Southern Mariana Islands

latte, in addition to a wide range of artefacts he also encountered human bone and evidence of 'fire pits'. The human bone was usually in the form of distinct burials but often he found it highly fragmented and sometimes burned. Based on the so-called fire pits and the broken , occasionally burned bone, Hornbostel drew his conclusions about the cannibalistic feasts and ceremonial nature of latte.

Whether Hornbostel was the first to excavate sites in the Marianas is unclear though he has, without doubt, excavated more sites than anyone before or after. In fact, it may be only a slight exaggeration to state that Hornbostel excavated more (by volume) in the 1920's than all subsequent excavations in the Marianas combined. He excavated at least 25 latte, often opening large areas in and around these features. His work resulted in the collection of thousands of artefacts and scores of burials which he shipped to the Bishop Museum in Honolulu where his collection and field notes are still housed. Unfortunately, his questionable excavation techniques (by today's standards, though perhaps no better or worse than others of his time), poor field recording and incomplete note taking make much of his work useless for generating any useful data. He never published the details of his work preferring to present short articles in the popular press. However, a brief summary of his notes was presented by Thompson (1932).

The years leading up to, and during, WWII brought a halt to archaeological activity in the area. However, the resumption of archaeological endeavours actually began again before the end of the war. Dilatush (1945, 1950) collected artefacts and conducted reconnaissance surveys on Saipan in 1945, noting that survey of some areas was incomplete due to sporadic sniper fire! At about the same time, Osborne described a series of latte sites on Guam and organised the restoration of a latte at the coastal site of Gogna (Osborne 1947).

In 1949-1950 Spoehr (1957) conducted a series of excavations on Saipan and Tinian. At a time when anthropologists and prehistorians conceived of settlement in the Pacific as a late event of perhaps no more than a few centuries, the dates from the Marianas were dramatic. Based on a date derived from an oyster shell (Ostrea

cucullata), recovered from near the bottom of a deposit at Chalan Piao on Saipan, Spoehr argued that the Marianas had been settled for at least 3500 years (3479 ± 200 BP [C-669]). Latte, he stated were a late manifestation, first appearing around 1100 BP. This was based on a date from a Tridacna recovered from a refuse pit near a 12 pillar latte at the Blue site (this site is now referred to by its Chamorro name, Tachogna) on the coast of Tinian.

Spoehr maintained that coinciding with this emerging two-phase sequence (i.e. pre-Latte, Latte phases) was a demonstrable change over time among Marianas pottery. Based primarily on variation in surface treatment Spoehr identified two major types of ceramics - Marianas Red and Marianas Plain, an early and late ware, respectively.

Shortly after the initial dating of the oyster shell another portion of the same shell was redated and yielded a date only half as old as the original data (1739 ± 450 BP) (Cloud et al 1956). Although this new date was published prior to Spoehr's monograph, he did not acknowledge or discuss it. Indeed, it seems to have lain hidden and only recently has been rediscovered (Kurashina and Clayshulte 1983). In the meantime Spoehr's date has become firmly entrenched in the literature as the earliest from the Marianas and, indeed, Micronesia (Craib 1983a, Kirch 1983).

Cultural historical concerns have dominated archaeological research since Spoehr first proposed a sequence for the Marianas. Since pottery appeared to have potential as useful temporal markers most attention has been given to the ceramic variation in an attempt to better define variation and further refine chronological controls (Reinman 1977, D. Thompson 1978, Moore 1983). While archaeologists agree that Marianas ceramics do change over time there is still no clear consensus on which variables are most appropriate to monitor. The most detailed study to data (Moore 1983:101) argues that determining the mean and range of thickness may indicate their approximate age.

The last two decades have witnessed an increase in archaeological activity in the Marianas, due in part to the creation of the Territorial Archaeology Laboratory on Guam and the Office of Historic Preservation for the Commonwealth of the Northern Marianas.

Compliance with cultural resource management legislation has led to numerous surveys and excavations within the southernmost islands (GovGuam 1976, Russell and Fleming in press).

To date, archaeological work in the northern portion (i.e. north of Saipan) of the archipelago is extremely limited. Yawata (1940) described two burials eroding out of a cave mouth on Asuncion and that one of these was covered with rice. Unfortunately these grains did not survive the journey back to Japan. Artefacts presumably associated with the burials belong to the general Chamorro assemblage found during the late prehistoric period.

The only other work yet reported was an excavation of a latte on the island of Pagan (Egami and Saito 1973). This brief but valuable report stated that the deposit in and around the latte was shallow and contained a typical late prehistoric assemblage found in the southern islands. The dates ranged from 285 $\pm$ 95 to 623 $\pm$ 90 BP, placing it at about contact. An interesting item recovered from the excavation was a carnelian bead, unknown from other sites in the Marianas but known to occur in the Philippines.

Despite problems with the dating, Spoehr's bipartite sequence for the Marianas is still used though some modification has recently been suggested. Using his two radiocarbon dates, Spoehr argued that initial settlement began about 3500 years ago and that this period is defined by the occurrence of a well-made thin walled ware. About 1100 BP latte made their appearance and at the same time, a poorer made, thicker ware became predominant. Reinman (1968, 1977) presented a date from Nomna Bay along the southeastern coast of Guam, of 3270 $\pm$ 170 BP (GaK-1364) suggesting its antiquity supported Spoehr's date. However, a problem with the sample's stratigraphic association has cast doubt over its usefulness. While no other site has yet revealed dates to match Spoehr or Reinman, dates hovering around 3000 BP are increasing (e.g. Tarague - Kurashina and Clayshulte 1983, Mochong - Ward and Craib 1983, Laulau - Marck 1978, Bonhomme pers comm.)

The only significant modification to Spoehr's scheme has been proposed by Moore (1983). Based primarily upon the long, relatively well-dated sequence from Tarague (Guam) and her analysis of pottery from this site, she proposes a three phase sequence. The Pre-latte

period is divided into an early (3500-2500 BP) and intermediate (2500-2000 BP) phases, each identified by ceramic characteristics. A 'Transition' period covers a span of about a millennium (2000-1000 BP) with the final 'Latte' period appearing about 1000 BP.

These phases cover vast time spans and are still poorly defined. In this thesis I propose a new, more specific temporal unit in Marianas prehistory, the Protohistoric period. This is defined archaeologically by the presence of latte and, following Graves (1983), extends no more than about three centuries before European contact. My usage of the term, protohistoric, varies somewhat from previous authors (e.g. Clark 1954) in that it extends into the period before contact. I propose that the social pattern and material content of Chamorro society first observed by the early European arrivals nearly 500 years ago was not significantly different than that about 300 years previous (see Warren 1984 for similar usage).

The Protohistoric period differs from the 'Latte' period delineated by either Spoehr or Moore in its more restricted time span and because latte are used as the sole temporally diagnostic marker. Spoehr argued that the Latte period was defined by a constellation of archaeological markers in addition to latte (e.g. Marianas Plain pottery, flexed burials). While a general change in ceramics does occur over time there is no clear indication that this is specifically associated with the appearance of latte. In fact, latte may be shown to be a late addition to Spoehr's Latte period assemblage.

Geographic Setting and Environmental Context

The Mariana archipelago lies in the northwest corner of Micronesia between 13deg14' and 20deg33' N. and from 144deg38' to 146deg05' E. making them relatively isolated within the western Pacific. The nearest Micronesian landfall is Ulithi atoll, approximately 500 kilometres southwest of Guam. The islands of the northern Philippines sit over 1600 kilometres to the west while the small, currently uninhabited Volcano Islands lie about 360 kilometres north of Farallon de Parajos (also known as Uracas).

The fifteen islands of the Marianas stretch north-south for about 700 kilometres along a roughly symmetrical arc bending eastwards (Figure 1-4). Though they extend over a long, linear area, the distances between any two islands vary only from 10 to 180 kilometres. The islands are high volcanic/raised reef formations ranging in size from 550 sq.km. (Guam) to less than 1 sq.km. (Farallon de Medinilla) and displaying a wide range of environmental diversity. The combined land area of the Marianas is approximately 1000 square kilometres. The majority of land, slightly more than 80%, is contained among the southernmost islands - Guam, Rota, Tinian, Saipan. Guam, with its area of 550 square kilometres is larger than the rest of the Marianas combined and is the largest island in Micronesia. By Micronesian standards the land area of the Marianas is considerable; the combined land area of the Marianas nearly equals that from the remaining 3000+ islands of Micronesia.

The entire archipelago lies along the eastern edge of the Andesite line, the demarcation between an older continental land mass and the Oceanic basin. Areas to the west of this line (including the Marianas) can exhibit ancient metamorphic rock types such as slate, gneiss, and schist in addition to younger, intrusive rocks such as andesite and basalts. These islands are geologically more varied and complex than Oceanic volcanic islands.

At contact, the Chamorro exhibited a typical Oceanic maritime-horticultural economy. Cultivated plants included aroids and tubers, as well as an extensive array of economic trees. Land animals, with the possible exception of the chicken, were absent prehistorically. However, as rich as this environment may have been, it was in many respects unstable or, at least, inconsistent. Random disturbances such as earthquakes and tidal waves have been recorded in addition to more frequently occurring events such as typhoons and droughts. Each of these contained the potential to significantly alter or destroy portions of the natural and cultural environment in the Marianas.

In areas believed to contain ranked societies the location of habitation sites is a primary variable. Within an area characterised by marked environmental diversity and resource availability, those sites occupying a space which could maintain a



Figure 1-4 The Mariana Archipelago

large measure of subsistence autonomy are argued to be centres of socio-political power (Peebles & Kus 1977). Cordy (1981d) has suggested that a fruitful avenue of research into prehistoric Marianas settlement patterns might begin with a detailed investigation of 'geographical factors...to identify the continuum of optimal-unfavorable environmental zones'; these zones being defined in terms of what is known of late prehistoric Chamorro subsistence. These factors could then be used as a baseline from which to generate hypotheses regarding initial settlement strategies and subsequent distributions of settlement.

The detailed study that Cordy envisioned is indeed important but beyond the scope of this thesis. Critical environmental data are lacking from many areas in the Marianas due to uneven coverage. Guam and, to a lesser extent, Saipan, have received the bulk of the research to date. The presence and distribution of microenvironmental zones in the Marianas vary considerably within and among islands of the archipelago. This section will emphasise variation within, as well as threats to, the environment.

Geologically, the archipelago can be divided into a northern and southern half. The five southern islands are older, essentially limestone islands formed upon the foundation of igneous rocks (Thomas 1963). The nine islands of the northern half are younger, entirely volcanic with some vulcanism still in evidence on Pagan, Asuncion, and Uracas.

Little environmental data are available from the northern islands though Marche's observations late last century provide a general view of environments from this part of the archipelago. Of the islands from Farallon de Medinilla to Pagan few were considered fit for habitation (Marche 1889 [1982]). Ironically, those most suitable (Anatahan, Alamagan, Pagan) all exhibited evidence of volcanism. Yet Marche, and later Fritz, noted latte on these three islands.

These northern islands are drier than in the south, affecting the range and density of local vegetation. It has been reported (Office of Military Affairs 1944) that the islands of Anatahan, Guguan, and Uracas contain almost no soil cover and consequently have practically no vegetation except for grasses. This, coupled with the lack of reef development make these northern islands marginal areas

at best. The possible exception is Pagan where fertile volcanic soils were present. However, the presence of an active volcano may have precluded early settlement.

Due to the age difference and the basic composition, the northern islands also vary considerably from the southern ones in terms of reef formation and vegetational patterns. Reef formation in the north is slight (Eldredge et al 1977); apron reefs are found at Maug, Agrihan, and Anathan. Soil development is poor on many of these same islands with a corresponding lack of floral abundance or diversity. The notable exception to this pattern is Pagan though much of the island currently sits under a thick layer of ash expelled in the eruption of 1980.

Rainfall is the most variable climatic element throughout the Pacific and in the Marianas. General patterns of seasonal and annual variation have been recorded in addition to regional variation on larger and/or higher islands. As in most tropical areas, the annual rainfall pattern in the Marianas can be characterised by a wet season, roughly incorporating the 'summer' months, and a dry 'winter' season. On the average, about 25% of the annual precipitation occurs in the dry season with the remaining 75% coming during the wet (NOAA 1980).

While this two-season pattern holds for the entire archipelago, the amount of rain varies according to the size of the island and its location within the archipelago; larger and/or more southerly islands receive higher rainfall. For example, Guam receives an average of nearly 400 mm/year more rain than its nearest neighbour, Rota.

Drought is common within the Marianas and severe drought is not unusual; drought defined as that drop below the monthly/seasonal rainfall average where floral food sources begin to be affected. Figure 1-5 shows the annual rainfall figures measured at the NOAA station in northern Guam for a period of 23 years. The series of dramatic peaks and valleys indicate significant annual variation and how the occurrence of a typhoon can skew this picture; roughly 20% of the entire annual rainfall for 1976 occurred in torrential downpours lasting only 18 hours during Typhoon Pamela. It is likely that the longterm weather disturbance associated with a storm of

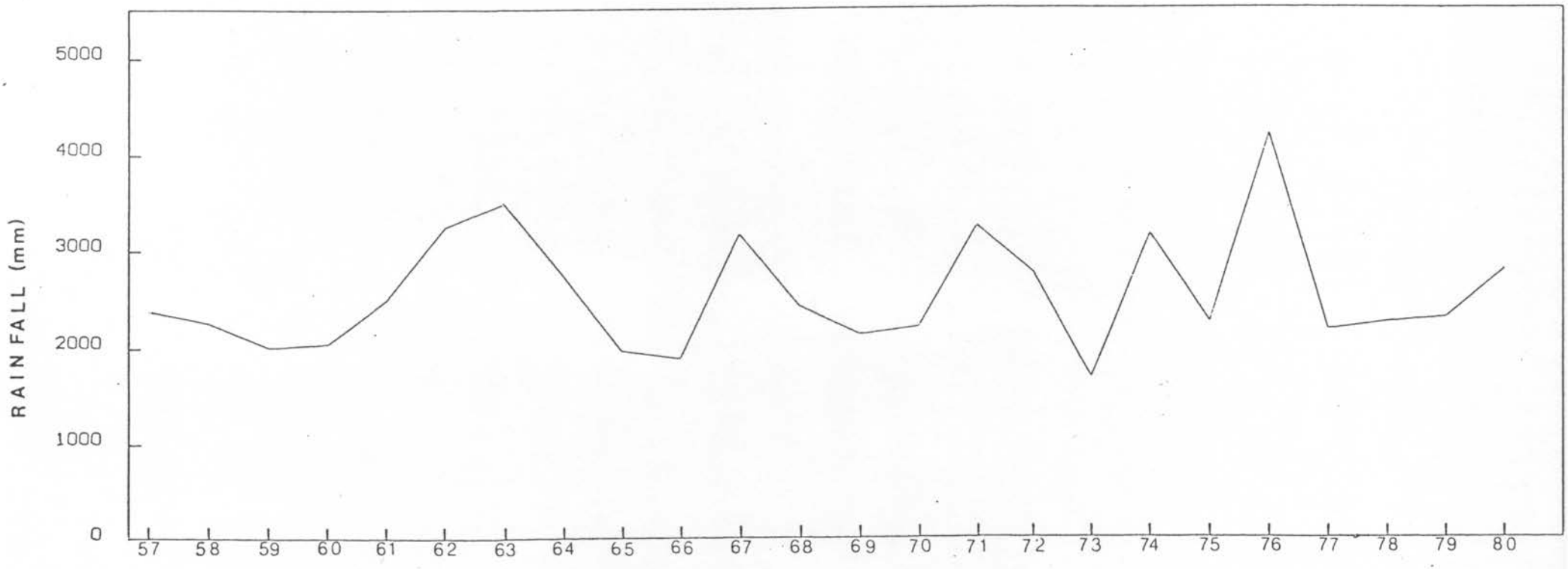


Figure 1-5 Variation in Annual Rainfall - Guam (Data from NOAA 1980)

this magnitude added considerably to the annual total. As Thomas (1963) points out, with such torrential rainfalls, the runoff is very high, therefore a simple correlation between high rainfall and favorable agricultural conditions cannot be assumed.

Climatically, the Marianas occupy one of the more unstable areas of the Pacific. As Thomas (1963:28) points out,

> The northern Philippines, the Marianas and Midway are subject to the westerlies and their cyclonic storms during the winter season, thus experiencing occasional cold waves of general extent and severity that are important not only in the economic sense of land use but in the ecologic sense through reduction of the range of thermally sensitive plants.

Thomas further identifies two sub-regions within the Pacific with high frequencies of typhoons. The Marianas are included within the western Pacific sub-region, an area usually experiencing at least one typhoon per year. Most typhoons in this region develop to the south and east of the Marianas (around Ponape or Truk) and move in a northwesterly direction. The larger, more southerly Mariana islands are especially prone to these storms. For example, Guam can expect a major typhoon to pass close by every three years and pass directly over the island every eight years (NOAA 1980). Given the distances involved within the Marianas these typhoons have differential impact throughout the archipelago and even within larger islands (The implications of this for settlement/subsistence will be discussed later).

With their precarious placement in the western Pacific, the Marianas may be one of the most affected areas in Oceania. There is a potential threat year-round that a developing tropical cyclone (a generic term for both typhoon and tropical storm) will affect some portion of the archipelago. While the following meterological data comes from Guam, most statements would generally hold true for the rest of the archipelago.

On the average, 28 tropical storms and typhoons occur annually across the north-western Pacific. These disturbances are defined by the speed of associated winds: a tropical storm is characterised by winds from 64 to 119 kph while a typhoon has winds in excess of 120

kph. In the 32 year period from 1948-1980 94 tropical cyclones passed within 330 kilometres of Guam, defined as the critical distance, 'to significantly affect the island with high wind, heavy rainfall and seas' (Weir 1983:5). Even storms passing as far away as 830-1100 km will result in gale force winds. Although they may be random in their intensity, there remains a consistent pattern of occurrence; on average nearly three cyclones per year will approach Guam and one typhoon every seven years will strike the island.

While these storms are often accompanied by heavy rainfall, the most damaging aspect is the high winds. Supertyphoons are defined by winds in excess of 240 kph. These wind speeds characterise sustained winds; gusts can be even stronger, especially over land. Gusts have been estimated in excess of 330 kph (wind speed devices usually fail at this point). Guam has experienced two supertyphoons in the last 29 years (1962, 1976) as well as three 'near misses' (Weir 1983). During typhoon Pamela (1976) a prolonged wind speed of about 100 kph lasted nearly 30 hours. Safford (1905) quotes a description of the devastation of a typhoon on Guam in 1671. This violent storm was responsible for, '...ruining nearly all the houses of Agana and the other towns of the island...tearing up breadfruit trees, together with palms and other plants with which they nourish themselves, leaving them in a condition without farms, without houses and without food.'

Rainfall can be extremely variable; in fact, tropical storms tend to drop more rain than typhoons. Nevertheless, when these storms are accompanied by high rainfall much flooding and inundation of low areas occur.

Another significant, often highly destructive, effect of typhoons is storm surge. As Weir (1983:26) explains, 'significant inundation should be expected in low-lying coastal areas with the passage of the center of [typhoon] within about 110 km of Guam'. The highly destructive typhoon Karen in 1963 is reported to have 'engulfed and washed away all the existing coastal structures and vegetation' (Weir 1983:28).

Eyewitness accounts of typhoon devastation in the 17th century attest to the powerful destructive forces of these storms. In 1671 a typhoon passed directly over Guam destroying most of the the houses

on the island and inflicting major damage to agricultural areas (Paster 1938). Tree crops, particularly breadfruit and bananas, are very susceptible to wind damage. Many people were said to have been killed though no estimates of fatalities were given. Nine years later (1680) another typhoon struck with the same disastrous results (Le Gobien 1700).

The recovery rate for areas devastated by typhoons can be quite slow. Not only does it take time for an area to become capable of supporting economic plants again but to this must be added the further delay as these plants develop and eventually produce. On some coral islands, even with high rainfall, it may take nearly a decade to begin to produce at the level prior to the storm (Alkire 1978).

Three important points emerge from this discussion of storm damage. First, tropical cyclones can result in serious environmental damage involving loss of crops and destruction of agricultural lands. Secondly, these storms were not uniform in their coverage; differential destruction was sustained both within an island (if large enough) and throughout the archipelago. According to German reports storms are more frequent and violent in the southern part of the archipelago. Lastly, an area heavily impacted by these storms does not recover immediately and may remain effectively unproductive for years.

Variation in environmental type and complexity exists on two levels. First, significant differences exist between islands on a north-south basis; the younger, more volcanic northern islands are relatively impoverished in comparison with the larger, older, southern islands. Secondly, intra-island variation may be significant in terms of presence and extent of major zones.

An examination of Guam will illustrate the potential intra-island variation. Guam as the largest island is also the most environmentally diverse. Three major physiographic regions were defined by Tracey et al. (1959). These are the northern limestone plateau, the central mountains and the southern mountains. Karolle (1973) has added a fourth region, the coastal lowlands. The greatest variation exists between the northern and southern portions of the island.

The southern end of Guam is characterised by a heavily dissected topography forming numerous river valleys. In contrast, the northern plateau is a long, slightly undulating mesa with steep cliffs dropping almost vertically to the sea about 100 metres.

The northern area of Guam is also characterised by a lack of surface water, the porous limestone allowing little runoff. The soils in the north are lithosolic latosols (Tracey et al 1959), a slightly alkaline soil developed from decomposing coral and generally of minimal agricultural value. Fertilisation and irrigation have improved the modern agricultural potential but its use prehistorically is questionable. This is supported by the almost total lack of archaeological sites on the plateau top. The notable exception is the limited areas of what Safford (1905:135) describes as 'fine agricultural districts' in Yigo, Santa Rosa, Finaguayog, Mataguag, and Mogfog which contain nitrate rich soils. That they were productive prehistorically is supported by the presence of latte sites within these areas.

The soils of southern Guam, though also clays, also consist of rich loams, resulting from alluvial fans entering the numerous bays. Few areas have been identified as humanly produced or modified swamps. The largest swamp on Guam lies immediately inland from Agana Bay and recent archaeological survey indicates it was used prehistorically and modified at least during the Spanish period (Price and Thomas 1979).

As Fosberg (1960:168) points out, 'a long history of disturbance by the Guamanians, by frequent typhoon, and by the destructive effects of World War II and subsequent military activities, have left little undisturbed forest on the island.' The same could also be argued for Tinian and Saipan. Fortunately, a comprehensive botanical survey was undertaken on Guam about the turn of the century (Safford 1905) which includes a detailed description of plant species and floral communities.

Given the differences in topography, hydrology, and soil types, it is not surprising that the southern half of Guam supports denser and more diverse plant communities. The interior of southern Guam is characterised by the Ravine forest and Savanna ecosystems (Fosberg 1960). The Ravine forest contains nearly all economic trees present

in the Marianas in addition to marsh lands.

The presence of savanna has been argued to be the result of human clearance (i.e. burning) (Fosberg 1960, Stone 1970). Economic plants are usually rare in this community. A recent survey in the Ugum river valley (Dye, Price and Craib 1978) noted that interior sites tended to be situated adjacent to savanna areas. While burning still occurs today, this apparent correlation between sites and savanna is intriguing.

The Mixed Limestone Forest community characterises the northern limestone plateau. Though the floral community in this part of the island has now been greatly disturbed by housing developments, military bases, and local gardens, Safford (1905) described this area nearly 80 years ago as heavily forested. The community is dominated by economic trees (e.g. Artocarpus spp., Pandanus spp., Cycas circinalis).

Agriculture in the northern plateau occurs today in scattered pockets. Safford (1905) noted that where garden plots in this region had been cultivated 'for a long time' (duration unspecified), the locals claimed the soils became 'tired' and must lay fallow. While Colocasia was reported to have been planted in newly cleared ground in this area, large taro gardens were impractical if not impossible owing to the lack of surface water and insufficient soil development (Safford 1905).

In terms of its economic potential, the reef flat is a major marine biotope (e.g. Kirch and Dye 1979). Reef development within the Marianas archipelago is highly variable; the northern islands exhibit little, if any, reef development, most coastlines characterised by their rugged configuration with poor anchorages. Reef development is at its maximum among the southern islands though rarely is it extensive. Most are narrow fringing reefs, common along the leeward portions of the island. Windward coastlines often exhibit a lack of reef development such as along the northeast coast of Guam.

Given the typical Oceanic economy of the Chamorro, access to a combination of terrestrial and marine environments should provide an optimal setting. The earliest dated deposits in the Marianas are found in these optimal areas. Sites such as Tarague, Mochong, Nomna

Bay, and Laulau are situated along well-watered coastal flats facing a well-defined reef area. The deposits at these sites also reveal a long, continuous occupation of these areas into the protohistoric.

Given the generally marginal (i.e. arid, no reef developments) environments described from the northern islands and the patchy nature of more optimal areas, it is argued here that in terms of settlement potential the islands north of Saipan are marginal.

Less attention has been given to sites in marginal areas though site survey have revealed the presence of latte settlements in such areas. As discussed in Chapter Six, the latte site at Pagat is situated in such a marginal area and it is expected that settlement should be relatively short.

In sum, the Marianas enjoy a rich environmental setting though one which is much less secure than most other high islands in Micronesia.

Concluding Remarks

This thesis is largely exploratory in scope though guided by explicit research problems and methods. Specifically, it is concerned with the question of the nature of Chamorro society in the protohistoric period and the utility of archaeological record in the Marianas to demarcate social divisions. It examines current thinking about Marianas prehistory and assesses the assumptions and fundamental arguments which form the foundation for the study of this area and then explores the ethnohistoric and archaeological record. Thus the primary focus is at the lower level of abstraction (Claessen 1981) although the implications of the Marianas study for the study of social development elsewhere in Micronesia and the Pacific will be discussed. By the nature of the investigation it will assess the usefulness of current approaches to the archaeology of complex societies.

The central problem under consideration in this thesis concerns the nature of complexity which characterised protohistoric Chamorro society and how it might be assessed and measured in the ethnohistoric and archaeological records. As discussed earlier, inferences regarding protohistoric Chamorro society have already been made; the traditional view states that distinct vertical differentiation was present (Thompson 1945); another suggests a less hierarchical structure, though also emphasises vertical differentiation (Cordy 1983a); and the most recent argues that although ranking was present it occurred primarily within kin-based groups though some ranking of these groups may have occurred (Craib 1984, Graves 1985). Just how was Chamorro society divided and which, if any, of these models can best be supported?

The primary goal is to clarify and correlate the ethnohistorical and archaeological characteristics of the protohistoric period in order to create a coherent, consistent synchronic model. This is a crucial step, basic to any meaningful statements or models concerning the development of social complexity in the Marianas. Thus, on one level the goal is to deal with a problem specific to the prehistory of the Mariana Islands while the implications of the research findings will be relevant to another level of analysis involving general models of social complexity and the use of archaeological remains as social markers. This chapter examines various assumptions and approaches to the archaeological study of social complexity, outlines the various views regarding the configuration of protohistoric Chamorro society and concludes by deriving a series of working hypotheses and discussing test implications.

Social Complexity and the Archaeological Record: The Archaeologist as Status Seeker

One of the predominant themes in archaeological research for more than a decade has been the documentation and explanation of social complexity. Investigations of this kind have occurred in most areas

of the world. For example, among the megaliths of Europe (e.g. Renfrew 1981), the emerging urban settlements of southwest Asia (e.g. Adams 1966, Wright 1977), the mound villages of the American Midwest (e.g. Peebles 1971; Steponaitis 1978), and the ethnographically documented chiefdoms of the Pacific (e.g Cordy 1981c; Kirch 1984).

Much of the discussion on the general patterns and variation of sociopolitical organisation in Oceania, derives from the work of Sahlins (e.g. 1957, 1963). His characterisation of the pyramidal structure of the Polynesian chiefdom, represented by the conical clan, and the segmental nature of the Melanesian, Big-man, societies have done much to shape the thinking of archaeologists about the nature of society in this region and ranked societies generally. For example, Tainter (1975:2) has argued that, generally, the structure of rank society is pyramidal while Renfrew (1978, 1981) has discussed some British megaliths as reflecting segmental societies. Recently Lightfoot and Feinman (1982) have discussed the emergence of leaders among the pithouse dwellers in the American southwest in terms of a segmental, Big-Man society.

Many early studies of social complexity (e.g. Renfrew 1973, 1978) were analysed within the context of the models of sociopolitical evolution as proposed by Service (1962, 1975) and Fried (1967). Stages of social development were identified by the presence of a single critical variable; redistribution was central to chiefdoms, based upon Sahlins' work in Polynesia.

Also characteristic of earlier studies was the emphasis on documenting the rise of the state with concomitant focus placed upon political differentiation (Yoffee 1979). As a result, little attention was given to distinguishing between social and political differentiation; evidence was sought to demonstrate the emergence of new, elevated social classes in the developing hierarchy.

However, as attention turned more towards non-state, ranked societies it became increasingly apparent that the stage categories were much too broad and masked important variations within each level. Furthermore, it was argued that these stages were not definable by the presence of a single variable from which all other aspects of social complexity may be inferred (e.g. Earle 1978,

Peebles and Kus 1977). Finally, it was recognised that more detailed analysis of the nature of social differentiation and integration was required.

There now appears to be a general movement away from univariate analysis involving a search for a particular key variable defining an ideal type and towards a more multivariate approach which considers the identification and relationships of variables associated with social complexity. Yet, often, while the names have changed (i.e. chiefdoms and tribes becoming 'simple ranked', 'complex ranked', '2-3-4 decision-making levels') some fundamental assumptions regarding the nature of complex societies and, by implication, the manner of interpreting the archaeological record from the original models, have been retained in these newer approaches. Predominant are the concept of discontinuity (discrete forms of society) and vertical hierarchical configuration.

Peebles and Kus (1977) sought to refine the model of chiefdom after they correctly pointed out that redistribution was not the single, key variable in defining a chiefdom. However, they retained a basic assumption regarding the nature of societal organisation:

> ...there is not a continuum of complexity from the least to the most complex society. Instead there are major discontinuities between various societies arranged along the scale. That is, there are observable, measurable differences between the structure, organisation, and behavioral repertoire of states, ranked societies, and egalitarian societies... (1977:427).

While they acknowledge that various levels of complexity can exist within their category of chiefdom, they argue that, archaeologically, clear differences exist at both the upper (i.e. state) and lower (i.e. egalitarian) ends of the chiefdom category. However, they do not offer any suggestions as to how to differentiate these intra-level variations or indeed what these might look like. To acknowledge the presence of internal variation simply begs the question.

The discontinuous, vertical nature of social differentiation is also emphasised in the approach based on information theory. Here

decision-making levels are argued to arise in order that information can be effectively monitored (Wright and Johnson 1975, Johnson 1978). These levels are considered to represent qualitative jumps in organisational structures which imply the addition and/or intensification of other aspects of society. Not only are there discontinuities but the presence of a specific number of decision-making levels also assumes the existence of an array of corresponding traits.

Rather than searching for particular features of a society, Wright and Johnson (1975) argue that the focus should be directed towards the total organisation of decision-making activities (1975:265). They have examined, on a most general level, the change over time of settlement patterns arguing that from an examination of settlement dominance and administrative artefacts the emergence of decision-making groups may be adduced. They further state that the presence of four settlement size groups from the middle Uruk period is suggestive of four decision-making levels which they define as a state. Their attention to vertical complexity appears crucial to their arguments about state formation. Here control and organisation, based largely upon political power, characterised by permanent specialised administrators (Yoffee 1985), is superordinate to social power based upon kin ties. The question becomes whether this type of approach is useful in dealing with the entire range of 'chiefdoms'. Nevertheless, their work has become influential among some archaeologists working within the chiefdom level (e.g. Steponaitis 1978, Cordy 1981c, Lightfoot and Feinman 1982, Feinman and Neitzel 1984).

It is further assumed that these discontinuities in social organisation are arranged in a specific hierarchical order so that each step along the scale of complexity is vertical; societies become more complex by exhibiting a greater centralisation of power bringing with it new positions of status and authority. Thus, the chief (decision-maker) and his lineage are seen to be 'qualitatively set off' (Peebles and Kus 1977:422).

With the focus of these arguments on the vertical dimensions, horizontal, within group, differentiation is often excluded. This has been argued to be a reflection of the preoccupation, in studies

of social complexity, with state formation (Carneiro 1981). Yet, the recognition of this distinction and the examination of the relationship of these axes may prove to be crucial to our understanding of the configuration of social complexity as well as to our ability to interpret variations within the archaeological record. A recent reassessment of social characterisations of Oceanic societies (Douglas 1979) suggests we should proceed with caution in extending the strict, vertical hierarchical view too far into less complex, non-state, ranked societies.

Douglas (1979:4) has questioned the simple division of societies into 'Melanesian' and 'Polynesian' types arguing that previous investigations (i.e Sahlins 1968, Valentine 1963) mask considerable variation in the nature and degree of social differentiation. She further suggests that the relationship between achieved and ascribed status is much more dynamic than previously acknowledged. Stage models have distinguished between levels by arguing there is a clear distinction between societies based upon achieved (tribe, egalitarian, Big-Man) versus ascribed (ranked, chiefdom) positions of status and power.

Douglas makes the important point that some societies distinguish between rank and power. For example, Tikopian society is characterised as genealogically stratified but otherwise egalitarian (1979:13-14). A central assumption within decision-making models is that a positive correlation exists between rank, leadership and power. However, as Douglas has pointed out, even in the most stratified Polynesian societies (i.e. Tonga, Tahiti) highest social rank and greatest amount of political power are not always found together in the same person (1979:24-25). This has important implications for the utility of decision-making models at least among many Pacific societies.

An example is found exhibited in a recent study of Tongan burial mounds (Kirch 1980). Kirch sought to test the proposition that levels of energy expenditure identify social rank (e.g. Tainter and Cordy 1977). Kirch emphasised the Tongan distinction between the social standing of the Tu'i Tonga and the political position of the 'Ulukalala and concluded that the variation in tomb size and construction styles reflected the relative political status of these

positions rather than existing 'class' hierarchy. Cordy (1981a) replied by stating that he saw no difference between Kirch's 'socio-political' level and his and Tainter's 'social rank' which they defined as a composite social persona after Goodenough (1965). While there may have been some semantic difficulties the important point is that to fully understand the variation of Tongan tombs Tainter and Cordy's concept of social rank must be broken down into more specific components which recognise the separation of rank and power (cf Douglas 1979).

Tainter (1977) explicitly discusses horizontal variation but argues that it covaries with vertical variation in a positive fashion and thus would need not be considered separately. That is, by documenting increasing vertical differentiation horizontal variation is also monitored. Cordy conceptually differentiates between 'social rank echelons' (decision-making levels) and 'social rank levels' (subdivisions within an echelon) but chooses to disregard the horizontal dimension because it, 'is extremely hard to measure' (1981c:38). Yet it is precisely this examination of horizontal and vertical differentiation which is at the core of the problem regarding protohistoric Chamorro society.

Johnson (1978) also has argued a relationship between vertical and horizontal decision-making units though suggests a more complex correlation than argued by Tainter and others. Johnson elaborates upon the decision-making framework outlined in Wright and Johnson (1975) and argues specifically that decision-making organisation increases along both the vertical and horizontal axes. Early in the developmental process, prior to initial vertical specialisation, complexity would be measured solely by the number of horizontal units (1978:97). These are characterised as equivalent units of decision-makers, in terms of information output and monitoring, at the same level.

McGuire (1984) argues that heterogeneity (horizontal variation) is defined by two social parameters. The first is a nominal series of discrete categories lacking any inherent rank ordering (i.e. sex, kinship, occupation). The second involves a continuous, inherently ranked series of status categories (i.e. age, power, wealth). On the other hand, inequality (vertical) is viewed along a strictly

graduated parameter involving differential access to materials and social resources. He further argues that although a change in one will affect the other this does not occur in a linear fashion.

O'Shea (1981) considers horizontal differentiation among burials from the Plains area of North America. An examination of the ethnohistoric literature indicated the presence of horizontal variation within the Pawnee, Omaha and Arikara. O'Shea presented a series of markers which might be expected in the archaeological record indicating these social distinctions. He found that these markers did not preserve well and that those that did tended to be related to more vertical differentiation. While in this particular instance he was not successful in documenting horizontal variation he does draw attention to the necessity of considering the archaeological implication of within group differentiations.

Renfrew (1981) discusses the expected spatial and organisational pattern of a 'segmental society'. His characterisation is based primarily upon Sahlins' description of the segmental nature of 'Melanesian' societies. Here there exists a series of small, autonomous, kin-based residential groups. These are politically unintegrated, similar in structure and size. Renfrew describes these as 'groups of groups' to emphasis the expected repetition of equivalent groups. Here the emphasise is directly upon the heterogeneous (horizontal) nature of differentiation.

The spatial configuration of corporate residential groups has been argued to be difficult to precisely define archaeologically, especially in larger settlements (Hayden and Cannon 1982:146). However, Keesing (1975:40) has stated that if these kinds of groups are strongly corporate they are likely to be separated into wards or barrios. This pattern may be manifested in a the repetition of similar kinds of group structures as argued by Renfrew.

Johnson (1978, 1981) has discussed the results of experimental psychological studies investigating the relationship between group size and group organisation. The results from a variety of these studies suggest that an effective limit to group size is about six. In these particular studies this represents six people although this figure may refer to a variety of units within any group. Beyond this organisational threshold stress becomes greater as does a general

decrease in the quality of decision-making. Methods employed to reduce stress include reducing group numbers (fission, the creation of new groups) or changes in the organisational structure with the creation of an immediate supervisory unit.

Johnson argues that since societies are organisations with similar structures and potential stress problems these findings may have application in investigating the structure and development of social structure. Organisational units exist on a number of levels (e.g. nuclear families, extended families, clans, population). Using ethnographic data from a variety of areas he argues that there is a consistent occurrence of this threshold number of six. For example, among groups from the highlands of New Guinea, Johnson notes that

> while size of exogamous clans (39-650) and size of the largest political units (180-2400) of which they are a part show a great deal of variation, the mean number of such clans per political unit has very little variability (1981:403).

The mean figure for this example was 4.22 ± 1.63.

Nevertheless, in much of the literature attention is still usually given primarily to development along the vertical, hierarchical axis. As such, there is little room in these schemes for anything but 'emergence' of social classes. At the very least alternative models emphasising horizontal and vertical differentiation must be initiated. This approach may be particularly instructive in examining the protohistoric period in the Marianas, especially given that the primary differences in the views of Thompson, Cordy, and Graves and mine specifically involved the nature of Chamorro social differentiation.

Of course the question becomes how to document horizontal differentiation in the archaeological record. Is it inherently as difficult as Cordy suggested or is it that few researchers have actually looked for it and modelled its expected pattern?

Primary among recognised markers in the archaeological record are mortuary patterns and architectural remains. O'Shea (1981) found it difficult to document horizontal differentiation in burial remains,

but it may be less problematical using architectural remains. An important difference exists between these two general classes; mortuary evidence usually reflects the social position of a specific individual while architectural remains are the product of social groups. The organisation and composition of these groups can be highly variable and this variability is expressed in the finished product.

It has recently been argued that examining architectural remains in terms of identifying residential corporate groups may assist in this measurement (McGuire 1984:125). As Hayden and Cannon (1982:133) point out, these groups are potentially important in examining the emergence of stratified societies. It is primarily in architectural remains, latte, in which the bulk of relevant data will be contained. Therefore, these remains will be investigated on a number of levels, beginning with the examination of individual structures and proceeding to more regional patterns.

Often, a simple equation is argued, clustering in a specific class of archaeological remains equals social divisions (Binford 1971, Tainter 1973, 1976, Tainter and Cordy 1977, Cordy 1983b). Archaeologists often measure these levels using the energy expenditure assumption; the more labour required (e.g. to build a house, bury the dead) the higher the status. One of the chief proponents of this approach in the Pacific is Cordy. Based on the decision-making approach, Cordy has argued that, '[I]n Oceania, the number of social strata in a society covaried with the number of major decision-making levels' (1983b:2). Determination of the number of decision-making levels could be distinguished by measuring variations in labour expenditure since, 'each strata tends to have similar amounts of labor...' (Cordy 1983b:6). This approach has recently been adopted by others working in Micronesia (e.g. Bath 1984, Ueki 1984).

A brief review of some archaeological approaches to social complexity in Micronesia may prove instructive. As mentioned, it is the presence and/or variation in architectural remains which is the focus of archaeological attention. The works discussed here have occurred on the islands of Kosrae, Ponape and Yap.

Kosrae exhibits an abundance of architectural remains throughout

the island though none is as impressive as the megalithic community on the small offshore islet of Lelu (Cordy 1981b). The mainland district of Utwa has also received detailed attention (Ueki 1984).

Both studies are identical in theoretical orientation and methodological approach. A model of Kosraean society was developed, based on ethnohistoric accounts, wherein the number of decision-making levels were identified. The emphasis was clearly and explicitly on the political (vertical) hierarchy. Kosrae is argued to represent the pinnacle of political development in Micronesia, exhibiting a four-echelon (read decision-making levels) structure (Cordy 1983b:2).

In their presentations of the ethnohistoric data, Cordy and Ueki mention differentiation within these echelons (at least at the upper ends) but neither discusses this horizontal variation nor the implications they may have for interpreting the archaeological record. Nevertheless, Cordy (1981b:311) states that dwelling areas in Kosrae, 'reflect the entire population and all its social ranks.'

Ueki identifies variation in labour output, and thus social groups, based primarily on the volume of stone per structure. His figures do not indicate any positive correlation between volume of stone and size (area) of compounds. Basically, Ueki discusses horizontal differentiation to explain away deviations in the archaeological record from his expected pattern. Beyond this there is no further discussion.

Cordy also uses the volume of stone and identifies nine groups of compounds on Lelu. 'Each group is considered equivalent to a social rank level' (Cordy 1981b:320) (Figure 2-1). He then proceeds, in a seemingly subjective fashion, to recombine these levels. For example, according to Cordy (1981b:320) Group 8 differs from Group 9 only in having low semi-walled compounds. Thus Group 8 is placed into a rank echelon associated with Group 9. At the completion of this exercise he has combined these nine groups into four classes which he then argues supports the notion that four echelons were present. A strong implication of this argument is that these nine groups may represent horizontal variation within the vertical echelons.

Bath (1984) uses a similar approach in her work on Ponape. Using

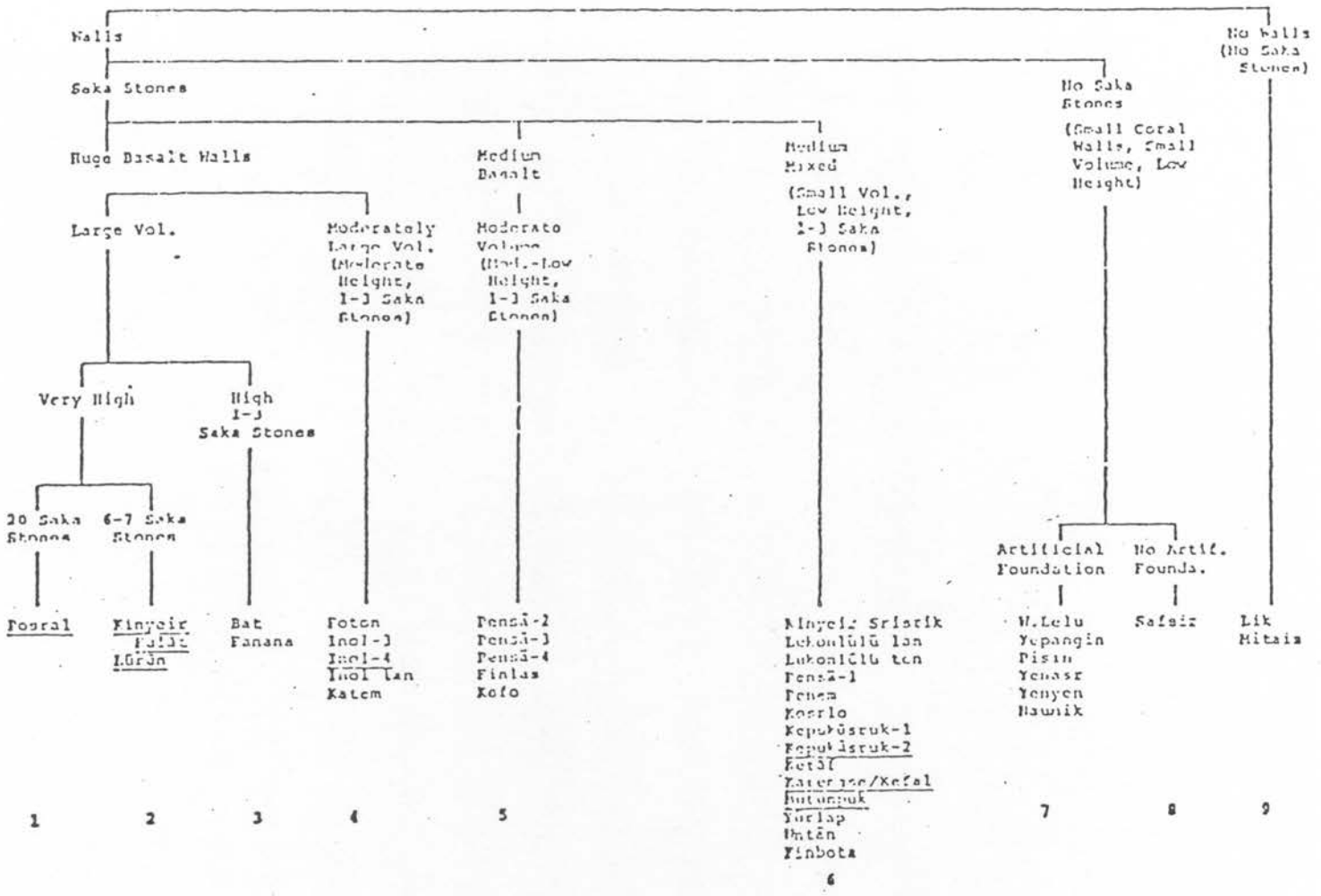


Figure 2-1 Division of Compounds on Leluh (from Cordy 1981b)

oral traditions, she states that, at various times, Ponapean socipolitical organisation was characterised by the presence of 3-5 decision-making levels and this 'could be tested archaeologically due to the distinctive characteristics of Ponapean tomb complexes, architecture and spatial arrangements' (1984:1). She then presents data gathered from survey and test excavations conducted at the Sapwataki area, Kiti municipality, in southwestern Ponape. Again, the explicit emphasis is on the 'rise' of social stratification and the inter-related development of hierarchical political systems (Bath 1984:viii).

Examination of house platforms revealed to Bath that living areas were differentiated into three 'status-related levels' based on relative size (1984:143) (Figure 2-2). Ayres and Haun (1978:32) have argued that an exact correspondence between residential platforms and social rank does not exist but they do maintain that a general trend is evident. Further survey has provided a similar pattern of size distribution (Ayres and Haun 1980).

A similar 'trend' is also evident on Yap where a pattern consisting of spatially segregated settlements based on village rank is well-documented ethnographically. High ranked villages tend to be larger and are situated along the coast while lower ranked settlements are smaller and usually located inland.

A recent calculation and comparison of size variation among three classes of architectural features (house platforms, cookhouses, sitting platforms) from two sites ethnographically documented to be differentially ranked villages has been presented (Hunter-Anderson 1983, 1984). As shown in Table 2-1, an apparent mean size differentiation is observed in each of the architectural classes and the larger features are consistently found within the high ranked village. It is important to note that due to the large standard deviation around each mean, at this general level, no statistically significant differences exist between these means (using the Student-t test).

This is an interesting case study in that it both supports and contradicts statements made by Hayden and Cannon (1982) regarding the usefulness of house size as an indicator of status ranking. While they acknowledge that, within their Mayan sample, variation in

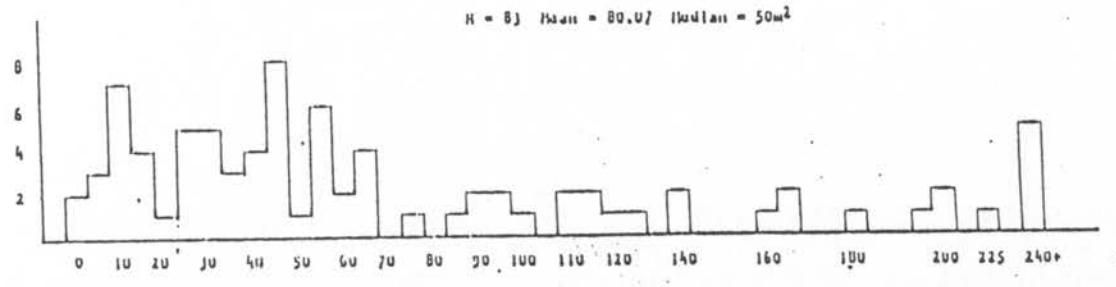


Figure 2-2 Distribution of House Platform Areas From Sapwataki, Ponape (from Bath 1983)

Table 2-1 Yapese Architectural Feature Area (sq.m) (From Hunter-Anderson 1984)

	n	X	s.d.
Toruw (High Status)			
house platform	58	54.8	24.3
sitting platform	47	216.0	131.5
cooking house	44	9.7	4.5
N1ul (Low Status)			
house platform	21	35.4	15.8
sitting platform	16	168.7	92.2
cooking house	10	5.2	2.0

t-Test results	t	df	p	Ho
house platforms	0.669	78	>0.5	Accept
sitting platforms	0.295	62	>0.5	Accept
cooking houses	0.914	53	>0.4	Accept

floor space among individual houses was highly variable, they further suggest that when averaged per rank level the relationship becomes more clear. They go on to argue that, 'before any attempt is made to infer socioeconomic or demographic characteristics using material indicators, it should first be demonstrated that groups exhibit a statistically significant difference in terms of the indicators used.' The examples from Yap certainly illustrate the variation which may be encountered on the individual level but it is also demonstrated that this variation can be carried into the average per rank level, resulting in statistically insignificantly variation. At first glance, it would appear that feature size alone would not be an useful indicator on Yap.

However, the crucial variable in their argument is rank level because the question really is what specific rank level is being identified? Hayden and Cannon refer specifically to economic rank, Cordy and Ueki discuss echelons while Bath investigates decision-making levels. In Yap, there is a series of defined ranks within the general categories of high and low status and it is these internal ranks which may account for the great variation.

Often when a mean exhibits a high coefficient of variance it indicates some internal (usually bimodal) distribution of values (Thomas 1976). Ethnographic data from Yap indicates that Yapese settlements are usually divided into intra-village ranked sections. For example, Nlul contains three sections while Toruw has four (Hunter-Anderson 1984). Hunter-Anderson (1983:74, Table 1) has demonstrated that within the high ranking village of Toruw a similar pattern of mean sizes correlates with the relative rank of each section and that these tend to be spatially distinct. Therefore, the Yapese case demonstrates that rank levels are more meaningful on a horizontal level and can be identified more specifically on an intra-site basis. While a trend is discernible at the most general level (high/low), variation is still quite high.

Outside of Oceania, Feinman and Neitzel (1984) attempt to identify variation within the broad category of chiefdom which they term 'prestate societies', defined as organisationally intermediate between mobile hunter-gatherers and bureaucratic states. Following the lead of Wright and Johnson (1975), they define forms of social

differentiation and political leadership by the number of decision-making levels.

Their classification demonstrates problems inherent in this approach (at least for the chiefdom level); some groups are listed under more than one category reflecting difficulty in determining the number of political strata while other headings contain groups displaying a shifting number of levels, suggesting the transitory nature of political levels within some chiefdoms. Even Cordy acknowledges that the ranking system on Kosrae was 'fluid' below the highest level (1981b:68). Nevertheless, he feels that characterising Kosraen society as a 4 rank echelon type is sufficient. Similarly, Bath's application of 3-5 levels onto the highly complex Ponapean system may mask important distinctions.

Feinman and Neitzel also state that residential architecture and dress are the two most frequently reported indicators of social differentiation in their sample yet neither category occurs in even half (43%) of their cases. While these may represent the 'best' markers they are not convincing in their correlation and, by implication, predictive power.

Yet a closer examination of their housing category reveals an interesting trend which the authors do not discuss; as the number of decision-making levels increases housing becomes a clearer markers. In level 1 (one decison-making level present) there is a poor correspondence of only 18% but it increases significantly so that by level 3 (3-4 decision-making levels) it reaches a 66% correlation. Thus the correlation between housing and status is very weak at the lower end of the chiefdom continuum but becomes stronger in the more complex situations.

An interesting housing pattern is found in ethnoarchaeological data from ostensibly egalitarian village societies in Iran (Kramer 1982) and Mesoamerica (Wilk 1983). Results of both studies suggest that even among these groups variations in house size and the presence of status goods may be detected symbolising social heterogeneity but not necessarily implying a distinction of inequality outside one's own kin group. The 'major discontinuities' suggested by Peebles and Kus (1977) may, in fact, be less distinct than they argue. The point being, that variations in the

archaeological record must not necessarily imply the presence or emergence of social classes and that systems of social reciprocity and kin ties can garner sufficient labour resources to perform tasks such as latte building and do not necessarily require the higher levels of political control implied in most arguments. At the very least, it would suggest that a continuum of complexity may, in fact, exist and that a 'blurring' (at least in the archaeological record) may occur.

As Kramer (1981:104) has recently pointed out,

> If architectural variability is the cross-cultural norm, rather than the exception, then we as archaeologists have the problem of identifying the axes and the range of variation, and then explaining it.

While previous authors have focused on the presence and size variation of latte to denote social groups it may be beneficial to examine the spatial aspects of latte occurrence in order to more clearly define residential groupings as well as investigate the assumed existence of non-latte dwellings.

As Graves has shown, there are important data to be gathered from investigation of latte as structures. However, his attention was upon latte as a class of items; that is, variation was examined among latte as a whole. As he acknowledges (1985:22) his general data should assist in comparisons of corporate group variation within and between sites.

The research outlined in this section will involve examining latte on three levels. First, attention will be given to the questions of function and variation in the structural dimensions within and between size classes. The second level involves exploration of the regional distribution of latte in terms of establishing the relative frequencies of latte per site and also outlining the methods for investigating into the existence of non-latte settlements. Lastly, the focus is directly upon intra-site distributions; initially examining the spatial organisation of latte and secondly outlining the approach to a detailed analysis of intra-

site spatial analysis based upon the distribution of surface cultural materials.

The Protohistoric Period

Early Spanish accounts (e.g. Zamora 1600; Sanvitores 1668) state that most of the islands of the archipelago were inhabited and that they shared a common culture and language. Archaeological evidence from the more northern islands, largely in the form of latte sites, supports this claim (Marche 1982, Fritz 1904).

The Chamorro language belongs to the Hesponerian division of the Western Austronesian linguistic family and is only distantly related to all other languages in Micronesia and Oceania (Dyen 1965). A recent study (Witucki 1974) argues that Chamorro has its closest relationship with Tagalog in the Philippines, though cognate similarities are low (37.6%) suggesting a separation of about 2200±200 years ago. Irrespective of the reliability of this date, the apparent isolation and rather unique material culture (e.g. architecture, adze forms, fishing gear) argues for a relatively long prehistory, characterised by minimal contact with areas outside the archipelago.

The important implication is that the development of Chamorro society throughout the prehistory of the Marianas was largely, perhaps entirely, due to internal factors (cf. Thompson 1969). As such, the usefulness of a direct comparative approach using other Micronesian societies could be misleading. Nevertheless, the Marianas have been discussed as a 'Micronesian society' (e.g. Underwood 1963, Howells 1973) as if it shared a common tradition with the rest of Micronesia, similar to Polynesian societies which are argued to represent different adaptations from a common ancestor. It is my contention that this is not the situation at least in western Micronesia. The western high island groups of Palau, possibly Yap, and the Marianas represent societies which are not linked to the rest of Micronesia nor to each other (see also Barrett 1975:18-19 note 5).

Five primary components in the analysis of latte are examined - 1) Temporal Context; 2) Social Context; 3) Function; 4) Structural

Dimensions; 5) Settlement Pattern. All relevant arguments are reduced to their basic components and presented here. Key inferences and test implications are then derived from each.

Temporal Context

Ethnohistoric accounts leave little doubt that latte were in use at Contact (c. 500 BP); when they first appeared is uncertain. Spoehr (1957) stated that a date of 1105±145 BP (C-721) from Tachogna on Tinian was associated with a latte and represented an early (perhaps initial) occurrence of these features. Until recently, this date has served as the beginning of the 'Latte Phase' of Marianas prehistory. Graves (1983) argued that the deposit from which Spoehr's date derived was not in direct association with the latte. In fact, Spoehr's date came from a small mound feature nearly 10 metres from the nearest latte. Although the deposit at this site is generally shallow, no direct association can be argued.

Reviewing available radiocarbon dates from latte sites, Graves concludes that most of the 13 'early' latte dates (c. 770-1100 BP) are in dubious association and that,

> none of the dates prior to AD 1150 (800 BP) is directly associated with a latte structure in such a way as to permit unambiguous association of the date and the constructional or occupational event (1983:2).

If Graves reanalysis is correct, then latte must be viewed as a very late prehistoric manifestation, perhaps covering no more than the last three centuries prior to contact. Radiocarbon dates from some latte indicate that some were occupied into the historic period, perhaps into the late seventeenth century.

An important simplifying assumption is acknowledged here. Graves' assessment of the temporal range of latte predicts that no latte should be found to date more than 800 BP. This would make latte the 'best' temporal marker yet identified in the archaeological record from the Marianas and specifically diagnostic of the protohistoric

period. It will be assumed that all latte were occupied within a time range of between 200 - 800 BP. While this does not necessarily argue for contemporaneity of occupation it does recognise that latte form a discrete morphological and temporal class. Given this, it should not be expected that deposits associated with latte use should pre-date 800 BP.

Functional Determination

With the exception of specifically arguing that latte aligned perpendicular to the shore were canoe houses, no correlation of functional differences to specific size classes of latte has been attempted. Thompson implies that it was the larger (10+ pillar) latte which served as club house and canoe sheds. Spoehr is more explicit, though ultimately non-committal, when he states that the largest latte often occupies a central place among latte and suggests that it served either as club house or chief's residence (1957:172). Yet he notes that '[A]part from their size, there is little to distinguish them from other houses of the latte type. All have potsherds, artefacts, and the debris of daily life scattered in the ground and on the surface around them' (Spoehr 1954: 36). A more detailed examination of latte associated assemblages (Graves 1983) supports the notion that latte served only as residential areas. Though, as discussed in Chapter Four, this was on a very general level.

Artefact assemblages from a sample of 13 latte will be compared by means of correlation coefficient (see Chapter Four). The following two sets of alternative hypotheses are proposed

A1. All latte exhibit similar assemblages containing a wide range of cultural materials, indicative of general household activities.

A2. Assemblages associated with latte are highly variable in content with some indicative of specialised activity.

If specialised assemblages are identified then a further set of hypotheses must be considered.

B1. Specialised assemblages are specifically correlated with the larger (i.e. 10, 12, 14) size classes.

B2. Specialised assemblages occur randomly among size classes.

It is important to clarify the distinction between latte as residences as opposed to public architecture (e.g. men's houses, temples).

Structural Dimensions

Working primarily from Hornbostel's notes and field maps, Thompson stated that there are five size classes of latte which she grouped into three categories: small, medium, large. Small latte contain either six or eight pillars per set (three or four pillars per row); medium latte exhibit 10 pillars; and the largest group have either 12 or 14 pillars. According to Thompson, the plan of all latte conform to specific measurements: each pillar along the same row is separated by 3.5 metres and this same distance separates the two rows of pillars. Therefore, the width and distance between pillars remains constant regardless of the size of the latte (Thompson 1940:448).

Thompson offered no detailed empirical data to demonstrate these ranges though Graves' (1983) analysis of 61 published latte maps closely matched the above figures (1985:Table 6).

Thompson also stated that there is a linear relationship between the height of pillars within a latte and its size class; the pillars/capstone combined height is higher among the larger size classes of latte.Again, she provided no evidence though Graves has suggested that the correlation is, in fact, very weak. There appears to be little question that distinct size classes exist among latte. That larger classes are not the primarily the result of later additions to existing latte is suggested in the pillar height/latte length relationship.

There has been little explicit discussion about why size classes exist or what they may signify other than to vaguely suggest a correlation between function and size class (Thompson 1940, Spoehr

1954, 1957). Often, rather general observations are used to make specific inferences about latte. Graves (1983), using published maps of extremely small scale, has attempted the only test of Thompson's argument and found a close correspondence. Detailed plan maps of individual latte are needed to fully explore the idea of great consistency among latte sizes. These were obtained during the 1983 mapping project at the sites of Mochong and Dugi on the island of Rota.

Given the findings of Hayden and Cannon as well as Hunter-Anderson we might expect considerable variation among individual latte but would further expect each size class to be less variable. While Graves has demonstrated that size classes do exist and are significantly different (in terms of internal area) he does not examine possible variation within each class; he agrees with Thompson that the consistency of measurements in the construction of latte preclude any significant variation within a class.

Two important implications arise from these inferences. First, given the consistency of measurements, size classes are distinct; they cannot form a continuum in terms of area (eg floor space) given the structural constraints as defined by the spacing of the pillars. Thus the area of a latte is seen as a simple arithmetic interval between classes; each addition or subtraction of a pair of uprights, involves an equal area.

Secondly, if latte can be equated with social groups, each group is tightly defined so that there are no internal divisions reflected within a specific size class. The alternative archaeological expectations arising from these inferences can be stated as follows:

1. The area of a latte is constrained by the number of pillars in a latte set so that no significant variation should exist among latte of a similar size class.

2. The area of a latte can vary significantly within each size class.

Dimensional analysis also bears directly upon another component

of the traditional model, the expenditure of energy involved in the construction of a latte set. This component has rarely been explicitly treated though Thompson strongly implies it in her statement that only high status people lived on latte. This has recently been specifically presented by Graves (1983). He states,

> ...the work involved in quarrying, shaping, transporting, and setting up latte foundations would demand considerable energy (even for small latte sets)...it is reasonable to assume that latte houses were the domiciles of high ranking and wealthy households. Accordingly, these families could best afford the expenditures of resources (to support the labor) involved in the construction of megalithic architectural structures.

Graves' argument that, 'where social ranks have been crystallised, it is not surprising to find rather unambiguous indicators of social distance expressed archaeologically' (1983:7) follows from the assumptions discussed earlier in this chapter (see also Cordy 1981b, 1981c, Peebles and Kus 1977, Lightfoot and Feinman 1981).

In light of this idea, common to many studies, it is ironic that Fritz (1904) uses exactly the opposite argument to support the same idea of latte as high status dwellings:

> It is, after all, difficult to fell trees which might be used to support the roof and raise the floor with stone or shell implements; it is likely that the stone pillars used for the houses of the nobility were used to avoid this labor...

Measuring relative amounts of energy expenditure required in the creation and maintenance of architectural features is argued to be an important variable in the creation of classes of artefactual material and in the site hierarchies. This component is difficult to test directly, short of actually undertaking the construction of a latte. However, relative efforts (energy expenditure) may be reflected in volumes of stone per latte, and the preparation (i.e. shaping) each pillar receives. This could test the hypothesis that pillars belonging to the largest latte sets should exhibit greater amounts of finishing. The basic argument to date assumes there is no difference in finishing and that simply the presence of latte

pillars denotes a significant difference in energy expenditure.

Settlement: Organisation and Distribution

Settlements may be divided into four basic components - households, corporate residential groups, community and region. While each of these can be useful in measuring complexity they are not equally suitable for the same types of archaeological interpretations (Hayden and Cannon 1982). Analysis of corporate groups initially involves the identification of household dwellings. Here an important distinction must be drawn between latte and non-latte dwellings. Although all previous researchers have assumed the presence of the latter, no one has made any attempt to locate and identify these archaeologically.

Renfrew (1981) has offered some suggestions as to the possible spatial aspects of a segmental society. He argues that since the society would consist of roughly equivalent groups a repetition of patterns should be found in the archaeological record; that is, groups of groups (Renfrew 1981:15). If we allow for the potential of internal ranking within a residential corporate group, as demonstrated by Wilks (1981) and Kramer (1981), then the archaeological record may be characterised by the repetition of definable groups of dwellings having the same relative frequencies of size classes.

Regional settlement pattern analysis in the Marianas has received little attention. Those who have commented on it (e.g. Reinman 1977) have discussed it primarily in terms of site location and chronological implications. No attempt has been made to document variation in site composition or define site type despite a wealth of survey data existing from most of the southern Mariana Islands. These data can be used to investigate a variety of questions regarding identification of settlement components and site types from which the existence of a site hierarchy can be investigated.

This component is divided into regional (inter-site) and intra-settlement aspects. There is a paucity of ethnohistoric data relating to the latter while some general estimates of village numbers and sizes describe the former. Reinman (1977) has discussed

late prehistoric settlement on Guam accounting for the presence of latte in the interior while Cordy (1981d) discussed placement of settlements in terms of environmental variables.

Estimates of the number of villages on Guam at contact range from 400 in 1600 (Zamora in Driver 1983) to five in 1690, less than a century later (Repetti 1971). However, it is Sanvitores (the leader of the first Spanish settlement in the Marianas, see Chapter Three) who has provided the most widely cited estimate. He stated that in 1668, the island of Guam had about 180 villages and that the size of the villages, defined by the number of 'houses', varied according to location; large villages (50-150 were situated along the coast while smaller settlements (6-20) were located inland.

The implications for settlement derived from ethnohistoric sources suggest nucleated villages and this has been supported in the archaeological record. A vague regional pattern of settlement is implied in the traditional model; since the 'majority' of people lived in non-latte dwellings, these structures should comprise the majority of sites in the Marianas. It is unclear from the model whether these dwellings formed separate, distinct sites, were part of latte villages, or both. Therefore an important initial step will be to determine whether two spatially distinct, forms of sites exist in the archaeological record. Two alternative hypotheses are proposed:

1: All protohistoric habitation sites have evidence of latte.

2: Some habitation sites should be recognisable by large scatters of cultural materials without the presence of latte. These should be quite numerous

Since no ethnographic descriptions exist of non-latte dwellings its archaeological expression is unclear. However, the scale of these hypotheses is sufficiently general so that the important observation would simply be that non-latte archaeological sites do, in fact, exist. Differentiation will need to be made between non-latte habitation sites and specialised activity areas (eg. fishing camps, collecting/processing stations) where latte would not be

expected to exist.

The importance of determining the existence of non-latte dwellings relates to the problem of identifying residential corporate groups. Did non-latte dwellings form their own spatial groups or were they part of a latte group, if they existed at all?

Site Hierarchy

The establishment of site hierarchies have been developed in many parts of the world and used to discuss site variation in terms of sociopolitical/economic variations. Peebles and Kus (1977) have described this as as primary marker of ranked society though it has also been successfully employed in studies of societies less formally organized politically but equally in terms of economics, specifically trade relations (see Irwin's (1977) analysis of the Mailu system).

Primary criteria for establishing site hierarchies ultimately involve measuring the energy expended in a site's construction and maintenance, usually expressed in terms of site size, population, or magnitude of site components. As Blanton et al. (1983:31) argue, '[T]he scale of architecture at an administrative locality was presumably proportionate to the importance of that place in the region's hierarchy of administrative places.'

The presence of size classes among latte have been argued to represent the existence of variations within high status groups (Graves 1983, 1985) and as a means of identifying special purpose structures from residences (Spoehr 1957). While it has long been recognised that latte come in five size classes no attempt has been made to document or compare the relative frequencies of these classes on an intra-site basis.

Two basic question arise in this context; 1) are there any regular variations between sites in size or composition; 2) if latte size classes are a reflection of only high social rank, they should either be non-existent in some sites or found in small numbers relative to non-latte dwellings. Based upon these questions the following set of hypotheses are generated.

1: The presence and relative frequencies of size classes vary randomly between sites.

2: All size classes exist in all or most sites and in similar relative frequencies.

3: Similar ratios exist between numbers of each size class though not all size classes are found at every site.

Moving to a more regional perspective, if Zamora's characterisation of Chamorro settlement into separate high and low status villages (see Chapter Three) is coupled with the traditional argument that latte are only for high status people then the following alternative propositions are appropriate:

1: a) All interior sites should contain evidence of non-latte dwellings and, perhaps complete non-latte villages; b) Coastal sites should be characterized primarily, if not entirely, by the presence of latte (high status) villages.

2: Latte sites should be found in all or nearly all portions of the island.

This, basically, is implied by Cordy's division of the environment into optimal and marginal areas. Access to resources is cited as a marker of social differentiation; it is central to McGuire's definition of inequality. However, Cordy, quite correctly, does not strictly equate coastal with optimal and interior with marginal. His propositions can best be examined by looking at temporal placement of sites:

1: Movement (and establishment of permanent habitation) into marginal areas occurred late in prehistory after optimal areas were occupied.

2: Establishment of villages occurred randomly in time

Intra-site Patterning

In other areas of Micronesia, spatial analysis has dealt primarily with distributional patterns of structural features such as house platforms, tombs, and other stone remains. Given the generally poor preservation of artefactual and ecofactual materials artefact-artefact or artefact-feature analysis is rare (Green 1984, but see Ayres and Haun 1980:122,124 Figure 37). In the Marianas preservation is often quite good thus allowing the investigation of general spatial patterning using both features (i.e. latte and/or mortars) and the distribution of portable cultural materials.

This type of analysis examines intra-site patterning of latte. The importance here is to further refine organisational characteristics (in spatial terms) of households and residential groups. Do these groups form any coherent spatial pattern in terms of their placement within a site?

Internal configuration of latte sites are rarely discussed except to note that there is often a linear arrangement with the largest latte centrally positioned (Spoehr 1957, Graves 1985). No detailed analysis of this pattern has been attempted so there is no information on the existence or characteristics of internal patterning; are latte randomly, uniformly spaced or do they tend to cluster together in groups? How is the village pattern influenced, if at all, in villages where there are more than one large latte; does each serve as a 'central place', do the larger latte cluster together?

If Keesing's argument regarding spatial grouping and corporate strength has general application then it should be expected that some form of internal clustering of residences occur within settlements. Perhaps the delineation of corporate groups may be adduced through analysis of spatial patterning of latte on an intra-site basis. To this proposition may be added Johnson's (1978) mean figure of six units. Thus, the primary hypothesis guiding this aspect of intra-site analysis reads as follows: settlements are characterised by identifiable groups of residences. While the actual numbers of residences may vary per group the mean figure should be at or near six units (residences) per group.

Little attention has been given to spatial layout of sites in the Marianas except in general terms of the distribution of latte. This is due primarily to the attention to temporal concerns where the vertical variation is deemed most important. Also the practical problems associated with undertaking a large scale horizontal investigation are daunting to say the least. Reinman (1977:161) commented nearly two decades ago that attention should be paid to the non-latte areas within sites, though this admonition has gone completely unheeded.

On this level the goal is to investigate the structure of a latte village as defined by the distribution of artefacts, ecofacts, and features. Analysis of intra-site spatial analysis will proceed from the operational level to the inferential level (Carr 1984). This procedure begins by asking general questions of the spatial distribution such as: 1) are the cultural materials randomly scattered?; 2) what are the spatial limits of the clusters ?; 3) do specific artefact types tend to cluster or co-vary? 4) what are the spatial limits of any multi-type clusters?

Having established these general (operational) parameters, analysis moves onto a more specific (inferential) level and asks; 1) do these clusters represent activity areas and what is the spatial limits? 2) do certain artefact types co-vary regularly so that tool kits can be defined?

Thompson, Plaza and Graves suggest that non-latte structures exist within a latte village. Plaza states that these are cookhouses which may have also served as dwellings for low rank families; Thompson is less specific. Thus, in some villages non-latte structures may have been interspersed among latte. Their occurrence within a site should be expected to be archaeologically visible and spatially distinct from latte.

While it would be desirable to model the expectations for non-latte residences nothing is known about them (indeed, if they exist at all) and general expectations will be derived from the patterns observed around known residences (i.e. latte).

1: Cultural materials will tend to cluster only in the immediate environs of latte.

2: If non-latte dwellings existed within a latte village, they should be archaeologically visible as concentrations of cultural materials, spatially distinct from latte.

Both of the above sets of propositions are directed towards refuting a more general yet basic null hypothesis: that non-latte dwellings do not exist and that the entire late prehistoric Chamorro population resided in dwellings situated atop latte. If this cannot be refuted then the most commonly accepted assumption regarding Marianas prehistory will be challenged and will force a reconsideration of the role of latte in terms of the organisation of Chamorro society during the protohistoric period.

Contact Population/Latte Ratio

This is an important subset of regional settlement. This crucial portion of Thompson's argument contains many critical propositions none of which have been made explicit and most of which are untestable and will remain problematic. First of all, she assumes that Hornbostel's count of 270 latte represents a nearly complete, contemporaneous population. This further supposes no significant destruction of latte occurred prior to Hornbostel's survey and that his survey roughly approximates 100% of latte to have ever existed. Graves has recently doubled that estimate , arguing that Guam may have contained about 600 latte, though offers no support for this figure.

Though Hornbostel did journey to many parts of Guam and produced a 'density' map denoting concentrations of latte around the island, his notes and maps suggest that some areas of the island were not visited. Reinman's nearly identical count of latte (259) is merely coincidental given that he was not able to find some sites recorded by Hornbostel and that he covered areas which Hornbostel presumably did not survey. It should be noted that Reinman estimated that only one-quarter of the island was included in his survey. Subsequent survey in previously unsurveyed areas of Guam have revealed the presence of latte sites (e.g. Dye, Price and Craib 1978; Hardy,

Chester, and Pangelinan 1981). Spoehr (1954:56) has argued that Thompson's reliance on the large number of archaeological remains in the Marianas neglects to consider the unknown time span of occupation and, thus, renders her use of the evidence 'of dubious value'.

The second major assumption of Thompson's is that Sanvitores' population estimate of 50,000 for Guam should be at least tenatively accepted. However, population estimates are notoriously variable throughout the Pacific and those from the Marianas are no exception. Howe (1984:45) has recently suggested that, 'the dubious habit of guessing about earlier guesses has been refined at least to the extent of being able to discard the more extreme figures.'

All discussion of the population/latte ratio has been based on an acceptance of the existence of non-latte residences as stated in the Null hypothesis above and with little consideration of cultural and natural factors affecting the preservation of latte.

Concluding Remarks

This analysis will deal not only with the place of latte within the protohistoric period but with an analysis of the configuration of protohistoric Chamorro society as suggested in the ethnohistoric record. The variables defined in the models of social differentiation will be analysed. A primary consideration will be to determine what support is demonstrated for the various models presented. These are the basic working hypotheses which will direct the research in this thesis. The hypotheses are purposefully general in scope though each was designed to examine specific inferences/assumptions of various authors.

As pointed out by Feinman and Neitzel (1984:75) and many others societies are differentiated by degree not ideal type. Thus it has been argued that it is the analysis of variables which will prove more useful than defining types (Yoffee 1979, McGuire 1984). To emphasise once again, this study is not to determine whether or not protohistoric Chamorro was a chiefdom or exhibited two - four decision-making levels but rather to investigate the degree of

complexity using the ethnohistoric and archaeological records.

As discussed in the preceding chapter, much interpretation of the archaeological record, particularly latte, is purportedly based upon ethnohistoric information. I demonstrate here that misreadings and misinterpretations have been made and how these have affected the way the protohistoric period has been perceived.

Among the better documented areas in the Pacific early narratives can be compared against later ethnographies to investigate their reliability. When the situation arises, as in the Marianas, that these early accounts become the sole sources for the construction of the patterns of indigenous lifeways, the 'accuracy' of these sources becomes critical.

Ethnohistorians are divided on how far narratives can be usefully accepted as descriptions of early lifeways. For example, Lessa (1962:321), in a discussion of early accounts from among the Caroline Islands, argues that, '[C]onsidering the times and the circumstances, the sources in question are surprisingly good. The men who wrote the reports, books, and letters show more objectivity than one would expect...' Leaving aside the epistemological question of 'objectivity', it seems as if Lessa is willing to place great stock in these accounts. On the other hand, Dening (1965:65) states that the descriptions by explorers suffer from their attempt to apply their values and judgments to a society completely outside their experience. As a result, '[T]o find out...what the Europeans really did see and not what they thought they saw is not so easily done' (Dening 1965:65). From the uncritical acceptance Thompson and others gave the early accounts from the Marianas it is apparent they share Lessa's belief in the 'truth' contained therein. In fact, Lessa agrees, in principle, with Dening and admits that indigenous social structure tended to be described in monarchical terms (kings, nobles, etc.) familiar to these European travellers.

Unlike the rest of Micronesia, the direct historical evidence for the protohistoric period is extremely limited in the Marianas. While many ships' logs from the early contact period recall their encounters in the Marianas few offer more than cursory descriptions based upon very short visits. While numerous fragments of

information about protohistoric Chamorro culture are contained in these accounts, the reliability of the more extended descriptions, based on a few days observation (e.g. Legazpi's visit consisted of merely 11 days) must be viewed with caution. Though varying in detail and length, these are the data base from which Marianas ethnohistory is derived. There are precious few primary sources of the protohistoric period. Indeed, some 'narratives' are in fact recitations of earlier sources, usually repeating Sanvitores (e.g. Le Gobien 1700, Callander 1768).

For about the first 150 years after Magellan's arrival in 1521 only sporadic contact occurred between the Chamorro and Europeans. Relations appear to have been tentative and were often hostile. Nevertheless, trading occurred, establishing a flow of materials into the archipelago as well as, perhaps, creating a 'port town' (Spoehr 1963) at Agana.

In early 1668 the Spanish, led by Father Sanvitores, established a permanent base on Guam and the next decade witnessed the collapse of traditional Chamorro lifeways throughout the archipelago.

An important example illustrating the magnitude of change which occurred during this time involves the Chamorro's use and knowledge of the sea. Earliest accounts speak respectfully of the Chamorro's maritime abilities, especially sailing and fishing. The Chamorro outrigger canoe, described by the Europeans as the 'Flying Proa' was an object of curiosity and respect for European seamen and received detailed description (e.g Dampier 1729 [1937]). Zamora marvels at the local fishermen's deep sea ability (Driver 1983:207-208). However, by 1817 two years before Freycinet's arrival, Kotzebue states that, 'the present inhabitants no longer know the sea, are no mariners, no swimmers; they have ceased to build boats.' (quoted in McGrath 1979:47). As Groube (1977:85) has pointed out for other Pacific populations, the impact of depopulation must have shaken even the most conservative inner core of culture. Therefore, I agree with Cordy (1983a) and am proceeding on the assumption that historic sources which postdate 1700 are of dubious value in establishing an ethnographic baseline for the protohistoric period and will be excluded from this analysis.

Long-term visitation did not occur until nearly a century after

contact when Fray Antonio de los Angeles visited (duration unspecified) during 1596-1597, followed shortly by Father Juan Pobre de Zamora who spent 7 months in the Marianas in 1600. Shipwreck victims and self-exiled sailors were present from the beginning of contact but none, to my knowledge, wrote any first-hand accounts though some information from them is represented in later missionary narratives (e.g. Zamora' reliance upon Sancho). It was with permanent Spanish presence in 1668 that the first extended narrative base on longterm observation was written. Unfortunately this was being written at a time when the decimation of Chamorro population and significant alteration to the local lifeways had already begun. Nevertheless, these descriptions have been cited as evidence of Chamorro culture with little, if any, serious evaluation.

This chapter reexamines the primary literature of the protohistoric period. A major focus is upon observations pertaining to social differentiation; can social roles and status relationships be determined from the array of statements contained in these documents? These are key variables and ones in which there is marked controversy (cf. Thompson 1969, Cordy 1983a, Craib 1984, Graves 1985).

In addition, other relevant variables will be discussed. The question of population is central to various arguments regarding latte and the nature of sociopolitical organisation generally. Protohistoric settlement will be examined on three levels: household, village and regional pattern. On the household level, attention will be given to descriptions of houses (latte and non-latte) and other structures and/or features. The village level will involve observation about the range of structures and site size and configuration. Lastly, observation about the presence and size of settlements across the landscape will be considered. The nature of production and exchange will also be discussed in terms of questions such as - was production organised beyond the household level, can craft specialists be identified?

In her presentation of The Native Culture of the Mariana Islands it is unclear whether Thompson (1945) was simply attempting a general description of Chamorro society in the mid-nineteenth century or was using this to extrapolate a model of protohistoric

Chamorro society. She does not define her concept of 'native culture' except to say that it, 'grew out of an inquiry into the history of Guam in an attempt to understand the modern natives and their culture in its historical setting' (1945:4).

Thompson's description of protohistoric Chamorro society states quite clearly that a stratified society was present and that latte were associated with the chiefly stratum. As mentioned above, ethnohistoric sources referring to protohistoric Chamorro society provide only fragmentary, often oblique, descriptions. The testing of the ethnography or ethnohistory of an area using archaeological data is a recent, though now widespread practice in archaeology. It has been undertaken along the entire continuum of social development; hunter-gatherers (e.g. Thomas 1971), chiefdoms (e.g. Kirch 1984), states (e.g. Wright 1977, Flannery 1976).

Although Thompson (1945:4) fully acknowledged the fragmentary nature of the available data concerning the non-material side of life, such as social organisation and religion, she implicitly assumed a strong cultural continuity in the lifeways found in the Marianas. So much so that she felt justified in using travellers accounts from nearly 300 years after initial contact. Nearly all of what she quotes from Freycinet, who visited Guam in 1819, is summarised in the concluding chapter of her 1945 work as indicative of the 'ancient Chamorro'. It is my contention that while some aspects of protohistoric Chamorro society persisted into the historic period, there is virtually no means by which these aspects can be isolated and identified. The same caution which Dening (1965:55) suggests for the study of the development of Polynesian societies, I argue, applies also for the Marianas; 'every theory ... is suspect until it is shown that the evidence on which it is based has not been distorted by the external factors of upheaval caused by European penetration.'

Where possible I have included passages in both Spanish and English. Unfortunately, I did not have access to all texts in Spanish. As will be discussed later, this comparative presentation has proved most useful and served to illustrate potential problems in relying solely upon translated passages. All English translations are taken from the sources cited. While I have checked these

translations to ascertain any discrepancies with the Spanish, I offer no new translations of my own.

Socio-Political Roles and Status

A crucial parameter delineating social differentiation involves authority and power. At its most basic, power is manifest in the control of economic resources (McGuire 1984:124). Power is argued to be a crucial variable here and attention will be paid to the nature and extent of power among the leaders in the protohistoric period. Recently, Yoffee (1985) has differentiated three basic kinds of power - economic, social and political. In non-state societies, we may generally expect power to be strongest along social lines, that is, within one's kin group. At this level, political power would rarely be manifested.

It is expected that some kind of permanent regional political power would be found in the kind of vertically differentiated society Thompson suggests. Superordinate and subordinate village leaders would be present. On the other hand, if differentiation is along kin lines (horizontal) power should be manifested in social terms with each village and/or village section being political autonomous while internally differentiated.

As newcomers to an unknown area, the Spanish, not surprisingly, appear to have been concerned with establishing the pattern of local leadership. This is implied by the fact that it is a recurring topic in most early accounts. A common, general comment encountered in sixteenth century accounts is 'they have no king' (Pigafetta 1521, Legaspi 1526, Loyasa 1565, Zamora 1596). Legaspi provides the earliest specific observation regarding leadership:

> We could not make out whether they have an overall chieftain [Senor]; however, from what we saw, it appeared that they had none, and that in their settlements they live in barrios grouped together by blood relations and family ties (Abella 1965:36).

Los Angeles (1596-1597 [1977]) was the first to suggest that a specific set of decision-makers do, in fact, exist. He states that,

'it is the elders who give orders and that everyone obeys them implicitly' though he does not specify at which level this leadership exists.

At about the same time Zamora identified people at the village level as Principales; locally designated as magaraies or macaraies (Driver 1983:212). He further states that within each village

en cada pueblo uno u dos o tres los mas principales a los quales tienen algun respecto.	there are one, two or three leading citizens to whom degrees of respect are shown.

Like Los Angeles, Zamora (Driver 1983:212) noted the level of respect accorded to elders.

Tienen tambien en algunas islas este mismo respecto a los biejos, aunque no sean tan principales como los otros.	In some of the islands, this same respect is shown to the old people even though they may not hold as high status as the other leaders

A similar depiction of the power structure is found in Sanvitores. He states quite categorically that the indigenous population was,

> ...without a king, without law, and without any kind of civil police. Neither the islands together, nor the villages in particular, have heads which govern the others; only the Principales live like sovereign princes forming in each village a kind of republic, in which opinions are exchanged, but each one does as he wishes if no stronger man prevents it. In each family the head is the father or elder relative but with limited influence (Plaza 1980:266).

Power does not appear to have extended beyond the village level. In fact, Sanvitores noted that, 'neither the island (Guam) in general nor the villages in particular have chiefs who govern more than their immediate vicinity' (Higgins 1937:18).

Apparently the power of even these community 'leaders' to impose general sanctions was limited. For example, Zamora notes that when a

crime such as murder was committed, it was punished by the relatives of the victim. This was also noted by Sanvitores. Other observations also suggest that power and leadership may have been strongest within kin groups. Ledesma (Barrett 1975:21) states that

> ...no one recognise[s] a common head, except only in families, where the right to family leadership is respected by the rest. The head of the family owns the principal house and the best land;...the rights are not inherited by the sons of the deceased but by his brother or his nephew...

Suggestions have been offered that villages may have united during times of warfare (Thompson 1945). However, whether this was a precontact pattern or these alliances were the result of the Spanish presence is unknown since her argument is based upon Freycinet. Additionally, Thompson's contention that Guam was divided into districts is suspect since it was based on Freycinet's observation.

Thompson credits Freycinet as the first to use the term mangatchang for the lower class. As Table 3-1 indicates, he was recording virtually the same term as recorded by Zamora 200 years earlier. However, there appears to be great diversity in the term to designate people of high status. It is perhaps significant that Zamora does not use the term, Chamorri, later adopted by Sanvitores. One wonders whether this term is in fact a local designation or a Spanish appellation.

Table 3-1 Status Term Concordance

	Zamora	Sanvitores	Freycinet	Encyclopedia Espana*
high	Magalahi	Chamorri	Matua	Achoats
middle	---	---	Atchoat	---
low	Mangchanes	---	Mangatchang	Mangachang

*Plaza 1971

The etymology of the term Chamorro is problematic (Plaza 1971). Sanvitores appears to be the first the use the term and he is quite explicit that it refers to the 'upper class'. No accounts prior to 1668 use the term Chamorri/Chamorro but rather refer generally to

the inhabitants as indios, Marianos and distinguish 'upper class' as Principals. Whether Chamorro is an Hispanisized Chamorro term or one of foreign origin applied to the indigenes is still unclear.

Respectful behaviour and preferential treatment was argued to be a sign of 'required etiquette' (Thompson 1945:13) on the part of the lower class. According to Freycinet they were to pass a person of higher standing in a crouched position and remain squatting while conversing with him. Zamora stated that at feasts the principals were given the first and best seating places and the first and best foods.

Thompson was quite explicit about class endogamy being a central trait of the Chamorro social system. She again cites Sanvitores (1945:13):

> ...for nothing in the world would one of their chiefs marry a daughter of a plebeian even if she were very rich and he very poor.

While it is acknowledged that rank and wealth do not necessarily co-occur, it is mentioned here because it runs in complete contradistinction to another statement Thompson makes only a few paragraphs later; it was the upper class who 'controlled the wealth and exchange in the islands' (Thompson 1945:13). If we are to believe that wealth was not an indicator of social status then it confuses her model considerably. Spoehr (1954) and Graves (1983) both specifically argue that it was the wealthy who were responsible for building latte.

The only symbols of wealth noted by the Spanish was turtle shell. According to Zamora (Driver 1983:212) this was used as compensation payment between families when when a member of one had killed a member of the other.

Zamora also commented that status differentiation was recognised between coastal dwellers and those inhabiting the interior. Because of the potential significant of his observation it is quoted here in full:

La gente mas allegada al mar y biue por las plaias se tiene por mas principal que la que bibe adentro... A la gente que biuen en	The people living along the beaches and close to the sea are held to be of higher status than those who live inland... They [principales] consider

los montes los tienen por demas baja suerte, a estos llaman mangachanes los quales tienen gran respecto a los principales que biuen en la plaia y tanto que, sin su licencia, no llegaran a sus casas, ni a sus funeas y barcos.	the people who live in the jungle and hills to be of lower status and they call them mangachanes. These, in turn, have great respect for the principales who live on the beaches so much so that, without permission, they will not go near the houses, nor their funeas [boats], nor their boats (Driver 1983:213).

The source of this information is unclear; a point which may be of some significance. If it was obtained from a coastal village (where presumably Zamora resided) then the distinction may not be a reflection of any society-wide class distinction but rather more small scale biases of competing villages. This has been noted for areas in Melanesia (J.P. White pers comm). On the other hand, such social distinctions have been recorded from Yap where coastal villages were generally of higher status than those located inland (Mueller 1917, Lingenfelter 1975)

Zamora's description raises an important question, did all villages, irrespective of their location, have 'leading citizens' or did this apply only to coastal villages. Certainly the case for a segmental, ranked lineage society would be strengthened if it could be demonstrated that these social distinctions were made in each village. Also significant is the fact that this locational/social distinction is not recognised by any of the succeeding authors even though Sanvitores does discuss in some detail what he sees as social divisions in Chamorro society. In fact, Sanvitores specifically mentions that Principals from 'mountain villages' (Plaza 1980:18) came to protest to the 'chief' of Agana, Quipuha, because he had decided that Sanvitores and his party should reside in Agana while the other Principals argued they should stay with them; not the behavior expected of leaders of 'lower rank'.

Both Zamora (Driver 1983:215-216) and Sanvitores (Plaza 1980:270) describe funerals of Principals each noting the elaborate ceremony accompanying the burial. Zamora further notes that this ceremony differs from what they 'ordinarily do with the dead' (Driver 1983:216). Unfortunately, the mortuary practices of the Protohistoric Chamorro appear to be of little value to the

archaeologists in terms of assigning rank. Apparently any variation in burial appears largely in ceremony, not in specific places of internment nor inclusion of grave goods.

Discussions on the structure of Chamorro society have centred attention on a quote from Sanvitores. The relevant passage reads as follows: '[T]heir barbarity is not in keeping with the great esteem which they have for their nobility and their observance and discretion of lineage, high, low and middle class...' (Plaza 1980:262). Thompson claims that three social classes existed (1945:13 emphasis mine). This, in combination with details provided a century and a half later by Freycinet convinced Thompson of the stratified nature of Chamorro society.

More recently, Cordy (1983a) has analysed the same statement and concluded that Sanvitores was not referring to social classes but rather was talking specifically about lineages and their relative ranks. Cordy, perhaps, puts too much faith in Sanvitores' ability at kinship analysis.

The 'accuracy' of Sanvitores' statement (in terms of Chamorro kinship structure) seems doubtful. Only he and Zamora describe what they saw as social divisions. Zamora used very general terms and there is nothing in his account to even imply the divisions stated by Sanvitores. The kinds of divisions Sanvitores 'saw' in Chamorro society and the terms he chose to use are problematic and it may well be ill-advised to use such kinds of individual statements as the basis for arguments regarding the nature of social organisation as Thompson and Cordy have done. This will be further discussed in Chapter Eight.

Population

The problem of dealing with estimates of contact population is a vexing one for archaeologists and ethnohistorians. Various methods and approaches have been devised though none offer foolproof means to test the validity of early estimates or to arrive at new ones. Research into population estimates in the Pacific have led researchers to generally agree that these estimates are largely inaccurate and generally represent overestimates.

The first numerical estimate for the Marianas comes from Zamora (Table 3-2). Prior to that vague or general statements alluding to the size of the local population are found in some accounts. Legaspi (1565) reported that the island of Guam was 'thickly inhabited' and claimed that visitors to his ship numbered 'more than four or five hundred'. Los Angeles (1596-1597 [1977]) suggests a large population on Guam with his statement that some villages contain about 1000 houses. Fernberger (1623 [Wernhart 1972])claimed to have observed between 200-250 people in canoes upon his arrival in Guam.

Table 3-2 Early Population Estimates

Source	Year	Island	Estimate
Zamora	1600	Guam	60,000+
		Rota	12,000
Sanvitores	1668	Guam	50,000
		Others	50,000
Hernandez	1690	Guam*	1800
Official Census	1710	Guam*	3672
Official Census	1756	Guam*	1600

*represents entire Chamorro population after resettlement to Guam

It is from Sanvitores that the most commonly cited figures are derived. He stated that, '[I]n Guam alone there are fifty thousand, on the other islands, forty thousand, and less on others' (Plaza 1980). This statement has been used to suggest that by the latter half of the seventeenth century the population of the Marianas was about 100,000 with half of the people residing on Guam (Thompson 1969).

While the 'accuracy' of these figure will remain problematic, their plausibility may be assessed in relation to the earliest official census taken in 1710, 42 years after Sanvitores' estimate. Table 3-2 shows that by 1710 there were only 3672 Chamorro residing on Guam. If Sanvitores count was basically accurate this would

entail a depopulation of nearly 97,000 people in about four decades. This brings up two questions; are there any other ethnohistoric data to assess Sanvitores' estimate or is there any evidence of such a dramatic depopulation from elsewhere?

The only other population estimate from this period comes from Hernandez in 1690. He states that there were only about 2000 'Marianaos' to be found on Guam. Though his estimate might be a bit low given the census taken twenty years later, or it may represent a figure prior to the arrival of more northern Chamorro populations, it is still in closer alignment with the census than with Sanvitores. In fact, it suggest that rapid depopulation might have occurred in two decades rather than four.

Underwood (1973) has presented a population history of Guam from contact into the modern period and divided this into four periods;

1. Population stability 1521-1668
2. Population decline 1669-1786
3. Population recovery 1787-1898
4. Population growth and stability 1899-1950

For the purposes of this thesis I will be concerned only with periods 1 and 2.

What effect the first 150 years of contact (Period 1) had on the Chamorro population remains a mystery. Whether Sanvitores' figure (assuming it may be accurate) reflects the initial contact population is unknown though Underwood (1973) argues that this would be unlikely. The occasional violent confrontations (e.g. Magellan) and the removal of males to work the ships (e.g. Loyasa) suggest that the Spanish were active agents from the very beginning. Whether diseases were introduced at this time is unclear; no mention or inference can be detected in the ethnohistoric literature.

Underwood's period 2 witnessed a rapid succession of events which severly affected the local population. Soon after the arrival of the Spanish in 1668, a program of resettlement was instituted throughout the archipelago with the ultimate goal of removing all Chamorro to the island of Guam. This program began in 1680 and by 1694 was completed. The actual loss of life involved in this program is not mentioned in any accounts but given the violent nature of some of

the contacts (entire villages were burned when people refused to move) loss of life was, potentially, very high. During this same period, the Marianas was hit by a series of devastating typhoons (1670, 1671, 1693) which must have severly affected the local food supplies and epidemics are reported (Le Gobien 1700).

Could there have been a loss of life on the order of that suggested by Sanvitores' figures and the census of 1710? In a recent study of Western Pueblos in the southwest of the U.S. Upham (1982) examines the population estimates from this area and argues that in three cases there is a 'dramatic population loss' following Spanish contact, the first fifty years being the most devastating. Upham states that there was an 80% reduction of the Hopi, 67% loss among the Acoma, and a 50% decline of Zuni. To support his claims he compares these figures with other areas in the New World (Valley of Mexico, Mixteca Alta, and California) and shows that similar depopulation rates occur in these areas.

At first glance these appear to be compelling comparative data to suggest that Sanvitores' figures may be close to 'accurate', irrespective of the low 1710 census figure. However, each case Upham presents assumes the accuracy of the original estimate or at least that is implied in his graphs. Perhaps (and he does not discuss this) what he is charting is similarities in estimation error rather than any real trends in population decline.

Upham (1982) cites Dobyns (1966) attempt at a hemisphere wide count of New World population at contact. Dobyns arrives at a general depopulation ratio of 20:1 which can be calculated against the nadir population figure of any given population. While this appears to offer a useful 'generalising' figure, a fundamental problem still involves an implicit acceptance of the original population estimate. As a result, perhaps all that is demonstrated is trends in population estimations and has nothing to do with 'real' figures. Thus, we are left with an estimate of an estimate. For the sake of argument, if we accept its use, it offers a much reduced estimate of Chamorro population. If we accept the 1756 census figure of 1600 then applying the 20:1 ratio we arrive at a figure of 32,000 for the archipelago.

Without meaning to imply any evil intentions, Zamora and

Sanvitores may have consciously, or otherwise, increased their estimates of Chamorro population in order to assure the creation and perpetuation of a mission in the Marianas. As Reed (1952), Spoehr (1954) and Underwood (1973) have suggested the population figures for the Marianas may have been as much the result of missionary zeal has any real concern for demographic accuracy.

Another potential source of error in estimating population has recently been suggested by Ritter (1981). In attempting to account for the underestimation of population on Kosrae, Ritter states that the configuration of local settlement patterns may influence how the local population is perceived. He found that the population of Leluh, a nucleated village on a small offshore island, was overestimated while the population of the mainland, living in widely dispersed villages, was grossly underestimated. This may have applicability in the Marianas where settlement tends to be clustered or arranged in a linear fashion, which could give the impression of large, populous settlements. This may account for the statement that some villages have more than a thousand houses (Los Angeles 1596-1597 [1977]).

Settlement

Regional

Brief mention of general locations of villages has already been provided above. No detailed maps or other types of descriptions of village locations appear to have been attempted by early observers, although place names are occasionally mentioned primarily on Guam and Rota.

Legaspi expressed amazement regarding what he considered to be a large number of villages on Guam. After stating that the island was 'thickly inhabited' he further noted that settlement was not restricted to the coast; 'even in the valleys where there are rivers, it is inhabited' (Abella 1965).

Zamora stated that 'the entire island [Guam] is populated' and then estimated that about 400 'pueblos' were occupied around the island. Rota, he believed, contained around 50 villages (Driver

1983:213).

Sanvitores was more conservative in his estimate of villages on Guam, giving a specific figure of 180. Garcia (Higgins 1938) insists that during the first year of Sanvitores' stay on the island the priest personally visited every village three times. Whether this actually occurred is questionable though through his subordinates a wide coverage of the island must have occurred prior to his death in 1672. However, a search of Sanvitores' account revealed only 28 villages by name.

Sanvitores was also the first to note that villages sizes varied and that these variations were correlated with their general location; coastal villages were larger than more inland sites; between 50-150 houses were found in the villages along the coast while inland sites resembled hamlets, containing between 6-20 houses.

Another anonymous contemporary of Sanvitores (Plaza 1973) offers a conflicting picture of inland settlement stating that these villages contain from 20-30 houses. It goes on to say that most of the houses in these villages are built 'on long column-like stones, in the shape of pyramids.' It is unclear whether this represents a first-hand observation or is a misreading of Sanvitores.

At this point, it is important to acknowledge a potentially significant linguistic problem. In the original Spanish texts the term denoting structures within a village is always given as casa, a generic Spanish term for 'house'. It is unclear from these texts whether the authors are referring specifically to 'residences' or rather using the term more loosely to include all or nearly all 'structures' within a village. Surely, coastal sites would also contain canoe houses, meeting houses, cookhouses, etc. (see next section for details of structures within a village). This point is important because it affects how the content of villages and the relative size and population of each were seen and counted. The population estimates described earlier were made, based on the assumption that the above numbers referred specifically to residences. However, I suggest that they more probably refer to all or nearly all structures within a village and should not be taken as a specific counts of dwellings (i.e. households).

Destruction of villages was a common technique used by the Spanish in their efforts to relocate the Chamorro into fewer, more manageable, villages. Hernandez, in 1690, states that only five villages existed in all of Guam and specifically identifies them - Agana, Pago, Agat, Humatag (Umatac), Fina; each established at a traditional village site.

Statements regarding the relation of settlement patterns to social structure are generally vague. Zamora's statements suggest that separate villages exist, each containing people of the same social standing. Sanvitores, on the other hand, states that different social groups may be found within the same village though spatially segregated. However, both authors agree on the 'separateness' of social classes with an attendant 'exclusiveness' to the high status areas; low status people needed to obtain permission to enter a high status area. However, this neglects to consider the rules of land tenure in operation at this time in the Marianas. It has been demonstrated on many islands in the Pacific that, given the paucity of land, strict rules of access are formed and that these may cross cut various levels of political organisation (e.g. Goodenough 1961, Lundsgaarde 1974).

Agana was presented by Sanvitores as the 'principal village' on Guam -'[A]ll the inhabitants of the island fear and respect the chiefs of Agadna' (Plaza 1980:263). Thompson (1945:12) took this to mean that the village contained the 'nobles of highest rank' though she does acknowledge that this power may derive from the subsequent concentration of population around this newly derived 'Port Town' and not a reflection of the protohistoric period By 1668, it was observed that the Chamorro were coming 'to barter their produce as they do every year when the [ships] arrive' (Ansaldo 1668).

Oliver (1963:44) has described Papeete at contact as a small, politically unimportant settlement on the island of Tahiti. However, after European ships began regularly calling into the bay, drawn by the reef protected harbour and freshwater streams, the settlement began to grow and the nearby chief eventually established supremacy over the entire island.

A further point worth considering comes from Zamora. He states that the 'indios consider it a great honor to have a Spaniard in

their home; also because they can expect to receive a substantial ransom in iron for one of them' (Driver 1983:213). Plaza (1971), suggests that, 'the Chamorri wanted Father Sanvitores to exclude the manachang from the reception of baptism...' However, the fact that Principals from other villages protested Agana's visitors suggested that they did not show 'fear and respect' nor feared reprisals for this apparent breach of respect.

Over fifty years earlier, in 1600, Zamora had already identified two villages, Funa and Motac (Umatac), as among the largest on Guam, claiming these are where the 'gente mas principal' ('more principal people') reside. On what basis this distinction was made is also unknown but it tends to reinforce the argument that Agana became central after European contact and the situation Sanvitores and others describe is not necessarily a reflection of earlier protohistoric patterns.

Intra-Village Patterns

> Their houses are high above the ground, neat and solidly built on posts of big rocks; over these they built their living quarters...they have scaffoldings on which they keep their household implements...these are the houses where they live. They have other low houses on the ground where they prepare and cook their food. In them they have scaffolding for the workmen to sleep on and whatever gear they have...They have other large houses that serve as arsenals for all in common, not as living quarters but a place wherein are kept the big proas and canoes under shed. There is one of these arsenals in every barrio. (Legaspi 1565, translated in Abella 1965:36).

This brief comment is, unfortunately, the most detailed description of a protohistoric Chamorro village. In it Legaspi establishes the use of latte as house supports and the presence of other structures such as canoe/meeting houses and cookhouses.

Sanvitores provides a detailed description of Chamorro houses though, interestingly, makes no mention of the use of latte pillars:

> The houses are the cleanest that have yet been found among indios; built of coconut and Palo Maria. The walls and the ceiling made in the style of a vault are curiously woven of coconut leaves. They have four rooms, with doors, and curtains of the same matting. One serves as a sleeping room, another for storing food, one as kitchen, and the fourth is large enough in which to build and store boats (Plaza 1980:260).

This seems a rather confusing description in that many structures (e.g residence, cook house, canoe house) appear to be combined. Perhaps he was referring to different structures rather than rooms. If so, he would be following Legaspi.

One of the members of his entourage, Brother Marcelo Ansaldo S.J., provides this brief description:

> They [local houses] are built at a distance from one another, raised a story from the ground, built on four pillars. with a roof of thatch which is waterproof (Plaza 1973:86).

Historic evidence on this point is brief and contradictory. Zamora states quite specifically that the higher status villages are coastal and the lower status groups lived in the interior uplands. Yet Sanvitores describes the village at Agana as having 53 Principal houses with about 150 lower status dwellings in a separate area. Since Sanvitores observation of Agana were nearly 70 years after Zamora and given the likelihood of Agana as a port town this oft quoted passage may not have any bearing upon protohistoric Chamorro village patterns. Perhaps the 150 dwellings represented the 'newcomers' to the growing port town of Agana.

Structures

Examination of protohistoric documents reveal little mention of latte pillars even though 'houses' and their construction are described. When latte fell from use is also unclear. By the time Anson visited Tinian in 1742, and marvelled at the proportions of the latte at the House of Taga, the local population appeared to have no intimate knowledge of their function.

Only three primary sources have been found which specifically mention stone pillars (Legaspi 1565; Zamora 1600; Ansaldo 1668) Each was made 'in passing' and no detail or elaboration of the observations were given.

The first comes from the Legazpi expedition in 1565. Three translations of the description exist (Burney 1803, Blair & Robertson 1903; Plaza 1973) and offer slightly, though significantly, different versions. Plaza (1973) offers the most complete translation (including the original Spanish text). The relevant passages are:

Las casas tienen polidas e bien fechas, altas un estado del suelo sobre unos pilares de piedra grande e sobre aquello arman el sobrado	Their houses are high, well kept, and well made. [They] stand the height of a man off the ground, atop large stone pillars, upon which they lay the flooring...

The translation of Blair and Robertson (1903:113) state that ' their houses are high, and neatly and well-made - some, placed on posts of stone, served as sleeping apartments...' Burney (1803:258) states that the houses. 'were lofty, neatly built, well divided into apartments; the whole raised a story from the earth and supported upon strong pillars of stone...' A similar translation is offered by Abella (1965:36).

In 1600 Fray Pobre de Zamora commented that the houses were

casas de indios las mejores que yo e bisto, porque todas enpiecan con sus pilares de piedra, lo que no tienen los demas...	the best native houses I have ever seen because they are all built on stone pillars, which the others do not have.

This is a most interesting, if slightly confusing, statement. If they were <u>all</u> built on stone pillars who are 'the others' in that same statement? Presumably, they do not refer to other Chamorro but to other geographical areas. Zamora had spent time in Japan and

Mexico. If that is the case, the question is, how accurate is Zamora's contention that all houses are built on stone pillars. He visited many villages during his seven months stay in the Marianas, travelling between at least two islands - Guam and Rota. He also describes going into the montes (hills) so he would have had an opportunity to observe inland settlements; he does make the social distinction between the two areas.

Significantly, there is no mention of latte supporting houses of only high status families, even though discussions of both housing and social distinctions appear in the same accounts. For example, when escorted to his host's house on Rota, Zamora noted that it 'was one of the best in the village, for he was among the principales of the island' (Driver 1983:204). He does not elaborate on how it was different from the other houses. Sanvitores, describing the house of a Principal of Agana, simply states that it was 'richly embellished and decorated with palm fronds' (Plaza 1980:272). Perhaps it was the house itself and not the fact that it sat upon latte that identified it as belonging to a Principal. Alkire (1972) has stated that in Lamotrek the pitch of the roof indicates the status of the occupants (and, by implication, not the size of the house platform).

No detailed descriptions of house building has yet been found though Zamora offers an interesting though general account. When a house is to be rebuilt or repaired 'all the relatives and neighbors in the village' assist in the work. This work can take between 1/2 - 3 days (Driver 1983:210-211).

Whether canoe houses had stone pillars is unclear though Thompson (1940) states unequivocally that they did. She cites Burney's translation of Legaspi (1803:258) who states that, 'besides these dwelling houses they had others for their canoes, built likewise with great stone pillars, one of which, near the watering place, contained four of their largest canoes' (emphasis mine). Blair and Robertson (1903) offer a slightly different version, 'They had other large buildings that served as arsenals for all in common wherein the large boats and the covered canoes were kept. They were very spacious, broad, and high, and worth seeing.' A significant difference in these passages is the omission of the mention of stone pillars in the latter. More recently, Plaza (1973) offers the

following:

Tienen otras casas grandes como Tarazana que no son vivienda sino de comunidad en que ponen los Proas grandes, y canoas a la sombra...una de las quales estaba a donde tomanos el agua...y muy ver...	They had other large houses which are used for boathouses. These are not dwellings but communal [houses] in which they store the large proas and [which] shelter [their] canoes...There was one of these where we got our water ...It was very [impressive] to see.

Given the similarities in each of these translations I argue that each represents a slight variation of the same account. The most notable discrepancy concerns Burney's association of canoe houses with stone pillars. In fact, as Burney freely admits his are not literal translations;

> ...from the attention which I have constantly shewn to original documents, it ought not be inferred that I have neglected to examine modern collections. These are not admissible as evidence to early facts; but in matters of opinion, and interpretation of passages in the old narratives, it will be found that writers of the late date have been consulted with much advantage (1806:iii, emphasis mine).

This loose translation style has resulted in a number of errors and inconsistencies in his translations concerning the Marianas. Other errors from Burney, found to date, consist of his inclusion of rice and pigs in the purported narrative of Pigafetta in 1521 (see Craib & Farrell 1981; Craib n.d.). When examined in this light, Burney's translations should be approached with extreme caution and (where other translations can be found) are being omitted from consideration in this thesis.

Other presentations of Legaspi's text (e.g. Sanz y Diaz 1940) make no mention of stone pillars used for canoe houses and correspond closely to that presented by Plaza.

If we believe early accounts, the Chamorros of Guam were capable of launching large numbers of canoes, suggesting that canoe houses

also existed in great numbers (even allowing for a ratio of four canoes for each canoe house). Plaza's (1973:7) translation states that,

> ...en cada barrio hay una atarazama destas...
>
> In each 'barrio' there is one of these boathouses.

Barrio, as Plaza points out, is a general demographic term in Spanish indicating a group of dwellings forming a distinctive unit. How this relates to Chamorro society is unclear; was each village a 'barrio' having a single boathouse or were these 'units' within a village, each having a separate boathouse?

Ethnographic data from elsewhere in Micronesia suggest both situations could have existed. For example, the number of boathouses on inhabited islets in Ulithi atoll depended upon the number of different lineages represented in the village, each having their own boathouse (Lessa 1966:17). Generally, the larger the village, the greater the number of boathouses.

The term, Camarines, used by Zamora, is noted by Driver as being applied to large, barn-like buildings and appears in many documents to describe boathouses as well as other large structures (Driver 1983:211). Returning to Plaza's translation of Legaspi we find that these structures must have been of a considerable size:

> ...muy hermosa de quatro nabes, fecha en cruzero, que podian estar a placer 200 hombres cincuenta en cada nabe: eran muy espaciousas, onchas y altas...
>
> [It was] very handsome with four naves,constructed in the shape of a cross, easily capable of holding 200 men: fifty in each of the naves which were spacious wide and high.

In fact, the size of canoe/meeting houses may argue against their having been constructed atop latte as was suggested by Reed (1952). Thompson argued that they would not only be perpendicular to the shore but that they would most likely sit atop eight pillar latte (1940:463). However, as Thompson and Graves emphasise, the consistency of measurements among latte of all size classes is such that latte area increase as the length increase while the width remains constant. The question then becomes, could

canoes fit into (or beneath) a structure built upon latte? The oft-quoted passage about four boats in a canoe house comes from Burney and appears to be a mistranslation of the term, nabes. The four 'boats' Burney tells us about is in all probability the four 'naves' in the construction of the canoe/meeting house. The dimensions of Chamorro sailing craft are such that a single vessel, with outrigger still attached, could just squeeze between the rows of pillars (see Dampier [1937] for measurements). Thus, there is no suggestion in the ethnohistoric record that latte were supports for canoe houses and that, in fact, their physical dimensions argue against their use in this fashion (see also Reed 1952:24).

Thompson was much less specific in this aspect of her argument. There are very few historic documents which mention men's houses or meeting houses and none specifically mention their placement atop latte.

Sanvitores (Plaza 1980:265) states that, '[T]he young men, who are called Urritaos are very indecent and live in public houses with the unmarried women...' Not surprisingly, these houses began to disappear shortly after the arrival of the missionaries. It is unclear whether two different, specific structures for males may have existed. In 1678 Padre Solozano, referring specifically to Urritaos, states that '[I]n each village there is one house, in the more populous villages two...many of the houses...have been destroyed by us...' (Repetti 1946-47:432 cited in Spoehr 1954:58).

On Yap, for example, these types of houses are represented by two different forms, the Pebaey and Faluw, respectively. In the above cited passages of Legaspi, there is a strong implication that canoe houses also served as meeting places, a common practice in Micronesia. If so, then men's houses would not be expected to have been erected upon latte.

The cookhouse, as a structure separate from the dwelling, is a common feature in the Pacific. While Legaspi's account states its presence there is no additional information from any source regarding the size, form or location (relative to houses) of the cookhouse. It is unlikely that Sanvitores' suggestion that cooking was performed within the dwelling is correct.

The presence of other structures is neither mentioned nor implied in the ethnohistoric record. It may be significant to note that there was no mention of women's houses in the Marianas. This is a common structure within many areas of Micronesia, especially among the Yap and Palau in the west.

In summarising the accounts regarding Chamorro settlement there are several important points which must be emphasised. First, specific observation leave no doubt that stone posts served as supports for residences though not all descriptions of local housing are specific in this. No connection was made between residence upon latte and the status of the dwellers despite mention of status distinctions in the same passage. By the mid-eighteenth century no houses were constructed on latte and probably had not been built in this manner in quite a while. Finally, no mention is made of houses which served as residences being built directly upon the ground.

Production and Exchange

> Their occupation is the cultivation of coconut groves and banana trees, the care of crops, and sea fishing.

Thus Sanvitores summarizes the subsistence activities of the Chamorro in the late seventeenth century. At contact , a typical Oceanic floral assemblage was being cultivated (with the possible addition of rice). Early accounts give only passing mention to local fauna, and then only to point out the absence of land animals. Fray los Angeles felt compelled to state that 'there are no rabbits or similar animals' and thus the Chamorro do not eat meat (1977:21). Zamora merely states that there are many rats, very few birds and no other animals (Driver 1983). Lastly, Legaspi also states that the Chamorro eat no meat and remarks that birdlife is rare (Abella 1965). The Chamorro apparently lacked dogs, chickens and pigs (Burney's 1803 'quote' from Pigafetta notwithstanding). Land mammals consisted only of the rat (*Rattus* spp.) and fruit bat (*Pteropus mariannensis*). If fruit bats were taken as food, and this seems likely, there is no mention of it.

Horticulture

Local foodstuffs were a common item in early journals probably because the Marianas often represented the first landfall for ships travelling westwards across the Pacific and supplies would be replenished there. These provisions included, 'fruits named Cochi; Battate [Yams]; there are birds, figs a palm long [Bananas], sweet canes, and flying fish' (Pigafetta in Skelton 1969).

Tubers and tree crops predominate in Marianas agriculture. Zamora states that the most common crops were tubers and identifies four different varieties - two types of taro (Alocasia indica; Colocasia esculenta) and two yams (Dioscorea esculenta; D. alata) (Driver 1983:209). Four different species of Breadfruit (Artocarpus mariannensis, incisus, integer, heterophyllus) have been identified from the Marianas though it is uncertain if the latter two existed at contact. Nevertheless, the abundance and widespread use of breadfruit is evidenced in its frequent mention in early narratives (Pigafetta, Loyasa, Legaspi, Zamora, Sanvitores, Dampier, Cooke). Zamora (Driver 1983:213) also noted the the Chamorro had 'high regard for the large trees...orimayes.'

Sanvitores suggests a seasonal round in the crop cycle:

> They live during four months of the year on products of the ground, coconuts, which are abundant, bananas, sugar cane, and fish. The remainder of the year they supplement the lack of fruits with certain roots similar to sweet potato (Plaza 1980 260-261).

Zamora indicates that garden plots were contained in the ' hills or jungles' though does not indicate how far these were from villages. Presumably, inland villages would sit near and/or adjacent to some of these plots. He also states that the gardening was left largely to the women.

That these various plots provided different amounts of crops is implied in two separate statements by Zamora. He first remarks that:

> Sometimes when they return early from fishing, or when they do not go fishing [by his own definition

> he is referring to coastal dwellers, the principales] they go to the hillside or jungle to see their farm plot, where every ablebodied person goes to work (Driver 1983:209).

Yet later he states that:

> The people living along the shore have an abundance of fish; those who live inland have an abundance of agricultural products. Consequently they arrange exchanges (Driver 1983:213).

Surprisingly, no mention of the cycad exists in any of these reports yet it is cited in much later works (i.e. Safford 1904) as being a major staple of the early Chamorro.

Despite claims to the contrary, Pigafetta's journal does not mention rice in the list of local foods. As recently pointed out (Craib and Farrell 1981) this error is the result of using Burney's translation. There seems little doubt that rice was mentioned in 1565 by Legaspi and possibly earlier (1526) by Loyasa. Though rice is mentioned the general observation was that rice comprised a minimal portion of agricultural produce. Not only was the yield small but often unpredictable due to droughts and storms. In fact, rice cultivation followed this same pattern even when later supervised by the Spanish. Rice is usually mentioned in association with special events (i.e. feasts, funerals, etc) and must not have ever served as a major staple. Furthermore, there are no data to support the argument that rice has great antiquity in the Marianas as proposed by Yawata (1961) and Takayama and Egami (1971).

There is no suggestion in any of the sources that agriculture consisted of anything other than garden plots. No evidence of terracing, swamp expansion or other indications of agricultural intensification. with the possible exception of the Agana swamp. Use of this area, immediately inland from Agana Bay, during the Protohistoric period is attested by the presence of artefactual material on some of the elevated areas around the perimeter of the swamp (Price and Thomas 1980). Whether the swamp had been modified and/or enlarged by the Chamorro is unknown though historic and

archaeological evidence indicate subsequent modifications by the Spanish. Nor is there any mention of food storage such as breadfruit fermentation pits. Perhaps the variety of breadfruit in the Marianas were capable of providing a nearly year-round supply. Zamora (Driver 1983:213) states that breadfruit 'provides their daily sustenance.'

Fishing

According to early reports Chamorro were excellent fishermen. Zamora enthusiastically described them as 'the most skilled fishermen ever to have been discovered.' They often fish in the open sea for many of the pelagic species inhabiting the waters around the Marianas (Driver 1983:208). Zamora also proclaims them to be 'great enemies of the shark' (Driver 1983:208).

No mention is made of other forms of fishing such as inshore fishing (e.g. netting, drop-line) and shellfish gathering except for Legaspi's comment that Chamorro had the ability to catch fish with 'the naked hand'. On Guam, freshwater streams contain eels. Zamora notes that these, or any fish caught from freshwater, were not eaten by the principales; Sanvitores repeats this same observation.

Exchange

Only two, extremely brief statements suggest the movement of materials (in both cases, food) on an intra and inter-island basis. Zamora states that 'the people living along the shore have an abundance of fish; those who live inland have an abundance of agricultural products. Consequently, they arrange exchanges...' (Driver 1983:213). Inter-island trade is suggested by los Angeles (1977), 'they barter with fish on the islands where it is not available. In exchange, they return with whatever they need but do not have on their island.'

Several tentative implications can be derived from these, and other indirect, observations. First, exchanges appear to have been small in scale and did not involve interaction among more than a few villages. The nature and organisation of these 'exchanges' is uncertain though Zamora stated that 'at special times fiestas are

held, sponsored by a particular village. He further claimed that these gatherings can attract 'two or three thousand people...though usually not more than one or two hundred, possibly a thousand, depending upon the resources of the fiesta's host' (Driver 1983:211). While the host village provides most of the food, Zamora noted that others brought food also.

While data are sorely lacking there is nothing to indicate that general production existed much beyond the domestic unit. Likewise, exchange is suggested to have existed on a small scale, occurring primarily, if not entirely, among individual villages.

Warfare

It is difficult to characterise warfare in the protohistoric period due to the general lack of specific statements regarding hostilities among the Chamorro. Zamora tells us that while 'war...usually occurs between the people of one coast and those of another' no such occurrence took place during his year-long stay.

Sanvitores' description of Chamorro warfare offers some interesting observations. He characterises these hostile encounters as occurring between individual villages ('one town...against another'), short-lived ('hesitant to attack, and prompt to flee'; 'when they arrive at the moment of battle they arrange peace very soon') and poorly organised ('without a leader, without order or discipline').

This conflicts with other statements (Garcia in Higgins 1938:12) that Guam was divided into two 'factions' which split the island on a north-south basis and that in one 'battle' there was a confederation of twelve enemy villages (1938:15). However, this may have been a result of Spanish presence since the southern villages were considered friendly while the northern areas were 'the enemy'.

Sanvitores specifically relates the conflict between two villages on Tinian, Marpo and Suharon. This appeared to be a long running antagonism which occasionally flared into open hostility. These were the principal villages of the island; the conflict increased until 'all the island was involved and every village allied with one side or the other.' (Garcia in Higgins 1938).

Most of what is written about Chamorro warfare is in the context of how it was used against the Spanish. Their arsenal consisted of slingstones which they threw with great accuracy and spears tipped with sharpened wooden and bone points.

Concluding Remarks

Having presented relevant portions of the ethnohistoric record the questions posed earlier can be examined. Certainly Thompson's characterisation of a strictly stratified, three class social structure is not supported nor even suggested, beyond Sanvitores' comment. Her model derives primarily from Freycinet and I argue that the variation between what is seen here and her model illustrates some of the basic changes in Chamorro society from the protohistoric period.

Neither is Cordy's model completely supported, although here it appears to be more a matter of emphasis, that is, he was focusing on levels of sociopolitical status and power arranged in an hierarchical fashion. However, his 'chiefs and commoners' misrepresent the protohistoric pattern of social differentiation. If political power is characterised by specialised and permanent administrators (decision-makers) then political power in the protohistoric period appears weak at best. There is no evidence of overarching political power beyond the kin group or outside the village level.

It appears that the village was the focal point in Chamorro society. These villages were autonomous groups of one or more kin groups. Older (and probably eldest) males were considered heads of these groups and, I suggest, represented the Principals described by the Spanish. Ranking occurred within one's kin group (horizontal) but it is still unclear whether kin groups were ranked in relation to each other (vertical). Perhaps, the fact that a village could contain more than one Principal suggests ranking was primarily kin-based and had little, if any, political implications. This would also contradict the essence of Cordy's model of two social strata. The deferential behaviour observed by the Spanish is consistent with kin-based behaviour elsewhere and even among Chamorro today. That

internal divisions may have existed within villages is suggested by the statements regarding 'barrios'. Elsewhere in the Pacific villages have been shown to be socially and/or politically subdivided (e.g. Force and Force 1968, Lessa 1950, Alkire 1965).

A number of structures could be expected within a village; residences, cookhouse, men's house and/or canoe house. Only the residences were mentioned as being atop latte. Whether all residences were built on latte is unclear from these sources since few specifically mention or imply the presence of pillars. No connections between status and latte supported residences were made.

Though most of the archipelago was inhabited by 500 years ago, population may not have been as high as some of the earliest estimates suggest. This question cannot be evaluated through the ethnohistoric record alone. Further discussion will be presented in Chapter Eight.

There is no information regarding the scale or intensity of production during the protohistoric period. That exchange occurred between villages is hardly surprising but, again, no suggestion as to the nature of organisation of the exchange is made. The range of exchange is only obliquely suggested; inter-island trade of at least foodstuffs occasionally occurred.

Thus from the ethnohistoric record protohistoric Chamorro society appears to have been differentiated primarily along kin lines. No regional or inter-village level leaders with the ability to overrule local decision-makers are apparent. While the ethnohistoric record is indeed meagre it does suggest that the Chamorro were not organised in the fashion suggested by the traditional model.

To emphasis an earlier point, the ethnohistoric accounts are scant and often contradictory. From these only the most minimal model could be devised. As Groube (1977:86) has argued, cultural situations characterised as unstable or rapidly changing are not the best analogue situation. This is well-exemplified in the Marianas context. Using the same accounts, researchers of protohistoric Chamorro society have described sociopolitical organisation as

ranging from a highly stratified class society to one based on a loose ranking of localised kin groups. As a result, the delineation of many aspects of protohistoric Chamorro society is ,ultimately, solely an archaeological problem.

While ethnohistoric accounts state that structures sat atop latte, they do little to corroborate the view that latte supported different functional types of structures. Graves has recently presented a general analysis of latte and concluded that associated assemblages suggest that only residences sat atop latte. In the first part of this chapter, additional artefactual evidence and a more detailed analysis will be presented in order to examine the nature of latte assemblages and the range of variation between these assemblages. With residential groups comprising a central analytical category, a primary concern involves differentiating such groups from other, more specialised and/or public types of structures.

The second part will investigate variation within and among latte size classes. Latte have been grouped into discrete size classes based on the number of pillars per set (Thompson 1940) and the area enclosed by the pillars (Graves 1985). Though it has been argued that each size class is statistically significantly different, the sample was derived from a general population of latte from many different sites. A similar approach will be applied here but on a specific site by site basis. The question of size classes is further related to energy expenditure and this will also be discussed in the latter portion of the chapter.

Functional Variation

Spoehr (1957:172) argued that artefactual assemblages he recovered from around latte comprised the 'debris of daily life'. Despite this claim and the proposition that latte may differ in their status level or functional category (e.g. Thompson 1940; Spoehr 1954,1957), no systematic attempt has been made to explore the similarities and variations of assemblages recovered from latte. However, Graves (1985) has recently examined the cultural material (features and artefacts) associated with eight latte and concluded that they represent similar, generalised assemblages. He concludes that this offers no support for the proposition that latte supported specialised use structures.

This section explores the question - what differences, if any, exist in the archaeological assemblages associated with latte? Thompson and Spoehr imply that assemblage variation should be greatest between latte of different size classes while latte of similar size class should exhibit less variation. More specifically, these alternative propositions can be stated:

1. Assemblage composition is variable and varies systematically among size classes.
2. Assemblages are more or less similar to each other, irrespective of size class; no latte exhibits any specialised activities.

Although a large number of latte have been excavated as these features have consistently been the focus of archaeological attention throughout the archipelago, few have been reported in sufficient detail to be useful here. Those which are amenable to analysis have been excavated by various techniques, and in differing quantities so that comparison of assemblages requires a method which accounts for the unequal sampling,

A problem is that most classificatory schemes presented in monographs are ad hoc devices designed for a specific excavation assemblage. What is needed is a detailed inventory of artefactual remains which encompasses all known forms of Marianas artefactual material.

Graves' analysis of latte associated assemblages was based on a comparison of materials from eight latte; some of which are also included in my analysis. He argued the assemblages were homogeneous and reflected a wide range of activities. This led him to conclude that there was no support for specialised use structures atop latte. He was quite explicit regarding canoe houses (1985:9). Instead he argued that latte represented loci of residential units constructed and occupied by kin groups (1985:9-10).

Two potential problems exist with this analysis and conclusions drawn from it. First, Graves created an extremely general typology in which to categorise the assemblages involving source material as the primary attribute. It will be argued in Chapter 6 that this variable serves little useful purpose. If we are investigating the

pattern of variation of functional classes between latte it does little good to group artefacts under a heading of 'Bone-other' or 'Shell-other' and then compare assemblages. Additionally, the generality of such categories are predisposed towards a pattern of homogeneity. For example, are beads, often a symbol of wealth, to be considered to be functionally equivalent to shell scrapers or shell knives?

The second problem involves the implicit assumption of Graves and others (Spoehr 1957, Reinman 1977) that if latte did support specialised structures such as men's houses or canoe houses, then this should be reflected in a limited, functionally specialised assemblage. Lessa (1966) and Craib (1980) have reported that activity and associated material correlates in canoe houses in Ulithi atoll are wide ranging and while predominantly male oriented are not exclusively so. This pattern of wide ranging activity in canoe houses has also been reported from Kapingamarangi where portions of these structures can also serve as residences (Buck 1950:76).

While we know nothing about the range of activities in and around men's houses in the Marianas, observation from other western Micronesian islands may prove useful. Barnett (1960) states that men's houses in Palau served as areas where personal articles were kept. On occasions, meals were eaten at these houses though usually were consumed at home. On Yap, eating at club houses was strictly prohibited. However these too served as storage areas and were the loci of a wide range of other activities. For example, it was here that young men learned fishing, rope weaving, tool making and other crafts (Lingenfelter 1975:83).

Having established an inventory, the next step involves the application of an objective measure to gauge the degree of similarity in assemblages while allowing for the vagaries inherent in excavated samples from latte.

The samples analysed here do not include all excavated latte but only those which yielded sufficient data. Thirteen latte from seven sites are examined here (Table 4-1); nearly half are from a single site (Nomna Bay). Three size classes are represented - 8 pillar (n=7 - 54%), 10 pillar (n=4 - 31%) and 12 pillar (n=2 - 15%). No 6 pillar

latte have been excavated and the only 14 pillar latte that I am aware has been dug (ML-4, Mochong, Rota) has not yet been reported.

TABLE 4-1 EXCAVATED LATTE SAMPLE

PREFIX	SITE	ISLAND	LOCATION	CLASS	CU.M.*	SOURCE
OBJ	Objan	Saipan	Coastal	10	27.8	Spoehr 1957
LHA	Laulau	Saipan	Coastal	10	4.3	Spoehr 1957
BLI	Blue	Tinian	Coastal	12	31.3	Spoehr 1957
NB3	Nomna Bay	Guam	Coastal	8	1.4	Reinman 1977
NB4	Nomna Bay	Guam	Coastal	8	4.2	Reinman 1977
NB5	Nomna Bay	Guam	Coastal	8	1.4	Reinman 1977
NB8	Nomna Bay	Guam	Coastal	8	1.4	Reinman 1977
NB9	Nomna Bay	Guam	Coastal	10	2.1	Reinman 1977
NB15	Nomna Bay	Guam	Coastal	8	1.1	Reinman 1977
PGT1	Pagat	Guam	Coastal	8	3.0	(see Chapter 6)
PGN	Regusa	Pagan	Coastal	10	10.0	Egami & Saito 1973
ML-1	Mochong	Rota	Coastal	12	14.4	Takayama & Egami 1971
ML-13	Mochong	Rota	Coastal	8	4.5	Takayama & Intoh 1976 Ward & Craib 1984

* Imperial measures used by Spoehr and Reinman have been converted to metric units for comparative purposes.

Unfortunately, no coastal/inland comparison is currently possible due to the lack of excavated inland sites. Only a single inland latte has been excavated, the Pulantat site on Guam. The deposit was extremely shallow and sparse and yielded few artefacts, half of which were historic (Reinman 1977:50-51).

Despite the large numbers he examined no latte sites excavated by Hornbostel are included here. His field notes do not list the kinds and numbers of artefacts recovered in his excavations; burials are often described in some detail but even they have poor provenience data.

Little detailed attention has been given to defining associational context between latte and archaeological deposits on either a horizontal and vertical dimension. As a result, identifying artefact categories confidently associated with latte in this sample was not without problems. Fortunately many of these latte sat atop relatively shallow single component deposits. However, those that

sat atop multi-component deposits or had a single stratum which exceeded the base of the pillars were more problematic.

These factors limited the number of excavation units to be considered. Only artefacts from those units placed between the rows of pillars and immediately adjacent were counted. While it is acknowledged that 'latte areas' exceed the immediate confines of the feature itself (see Chapter Seven for detailed discussion of these 'areas'), unless strict control is maintained in the delineation of vertical and horizontal stratigraphy, mixing of areas can occur. (For example, see Graves' argument regarding the lack of association between the Spoehr's radiocarbon date and the latte [Blue I] Spoehr claimed it dated). By demanding such a restricted zone, this problem can be minimised. Fortunately, the majority of excavated deposit (by volume) were in these areas (See Appendix A for methods employed here in defining a latte floor).

Given the nature of the latte sample and the artefact inventory, an objective measure was required which could accommodate these variables. Methods for determining resemblances or dissimilarities between various taxa are common in the biological sciences (Sokal & Sneath 1973). A variety of methods have been devised for this purpose, each designed for specific properties of the available data. In archaeology, similarity, as Spaulding (1971:11) defines it, is measured in practice by some sort of coefficient, explicit or implicit, for each pair of components based on the common presence or absence of selected classes of artefacts or on a comparison of the relative frequencies of the selected classes. In this exercise, each assemblage is compared with all others by counting the shared variables, both positive and negative.

Uses of similarity coefficients in Oceanic archaeology include comparison of temporal aspects (sequential ordering of excavated deposits in Kirch & Yen 1983) and spatial dimensions (distributional patterns of ceramic trade ware in Irwin 1977).

In order to establish a situation in which similarity analysis can be usefully performed, an extensive set of variables must be formulated. For the method to be reliable, many variables are needed (Sneath & Sokal 1973:6). This supports my earlier comments regarding the general nature of Graves' scheme. Each latte serves as a

separate 'specimen', potentially containing a series of artefact classes (variables), thus a 'splitter' taxonomy is most appropriate.

In order to establish a measure of similarity a sufficiently detailed trait list must be provided. The use of general categories (i.e fishing gear, chipped stone) might mask important variations in content between latte. A major problem in constructing such a list was the fact that most monographs have devised ad hoc typologies for their samples resulting in classificatory schemes of varying specificity.

The inventory adopted here is the same as outlined in Chapter Six and is offered with the full expectation that additions and modifications to it will inevitably occur as more excavations and more detailed analyses of materials are undertaken. Yet it serves well in this study and further refinement will more than likely serve to increase the level of similarity between latte.

The creation of the latte inventory initially involved listing all artefacts reported in association with latte. The proposed inventory (Table 4-2) tends towards a 'splitter' classification though does combine some material into general categories. It stems from the problem of different levels of analysis by various authors. For example, adze typologies vary widely in the nature and number of types (see Appendix B). This inventory sought a level upon which all typologies initially divide types (e.g. in the case of adzes - source material and cross section) and establish classes at a most general level.

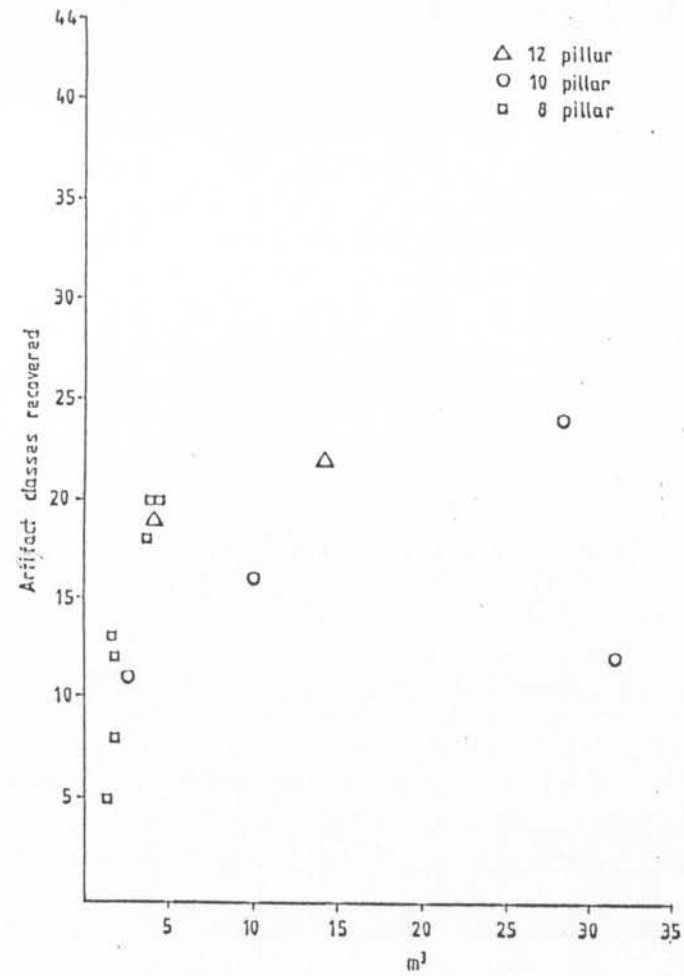
A significant variation in sample size (cubic metres) is clearly evident. Thomas (1983) has demonstrated that assemblage diversity is often closely related to sample size; the greater the sample size the greater the diversity. Excavated areas from the latte sample range from 1.1 to 31.3 cu. m. with the mean slightly more than 9 cu. m. At the same time, variation in the totals of artefact categories range from 5 to 24 (X=14.7) per latte. Figure 4-1a illustrates the relationship between sample size and assemblage diversity; only a very weak correlation is observed. Perhaps a larger sample of excavated latte, including some with large excavated area, may clarify the relationship. A 'ceiling' for the potential range of artefact types is suggested by the curved nature of the distribution

TABLE 4-2
MARIANAS ARTIFACT ASSEMBLAGE INVENTORY

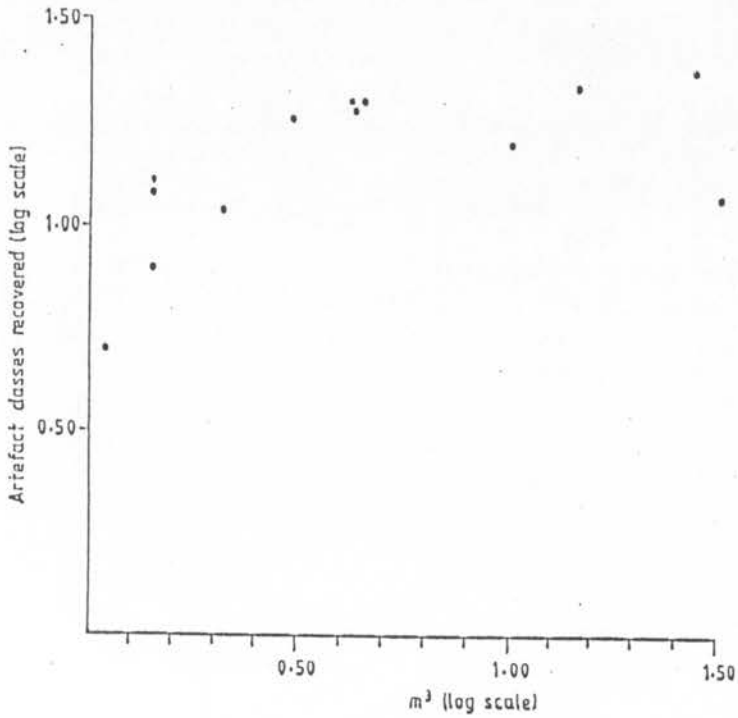
	OBJ	LHA	BLI	NB3	NB4	NB5	NB8	NB9	NB15	PGN	ML1	ML13	PGT1
SIZE CLASS	10	10	12	8	8	8	8	10	8	10	12	8	8
SQ. METER*	46.3	52.2	7.2	2.3	9.3	4.6	2.3	4.6	2.3	20.0	24.0	11.6	7.5
CU. METER*	27.8	31.3	4.3	1.4	4.2	1.4	1.4	2.1	1.1	10.0	14.4	4.5	3.0
FISHING GEAR													
Hook	+	-	-	+	-	+	+	+	-	+	+	+	+
Gorge	+	+	+	+	+	+	+	+	-	+	+	+	+
Barb	-	-	-	-	+	-	-	+	-	+	-	-	-
Shank	-	-	-	-	-	-	-	-	-	-	-	-	-
Weight	+	-	+	-	-	-	-	-	-	+	+	-	-
Poio	-	-	-	-	-	-	-	-	-	-	-	-	-
WEAPONS													
Spear Point	-	+	-	-	-	-	-	-	-	+	+	-	+
Slingstone	+	+	+	+	+	+	-	-	-	+	+	+	+
ORNAMENTS													
Pendant	+	-	+	+	-	-	-	-	-	-	-	-	+
Bead	+	+	+	-	+	+	+	-	-	+	+	+	+
FABRICATORS													
Hammers	+	-	+	-	+	-	-	-	-	+	-	+	+
Abraders/File													
pumice	+	+	+	-	+	-	-	+	-	-	-	+	-
coral	?	?	?	-	-	-	-	-	-	+	-	+	+
Scrapers													
stone	+	-	+	-	-	-	-	+	+	-	+	-	+
shell	+	-	-	-	-	-	-	-	-	-	+	-	-
Thatching/Weaving													
needle/awl	+	+	+	+	+	-	-	-	-	+	+	+	+
pin	-	-	-	-	-	-	-	-	-	-	-	-	-
CUTTING/HEWING													
Adze													
stone													
circular	+	-	+	-	+	+	-	-	-	-	+	-	-
lenticular	+	+	-	-	-	-	-	-	-	-	-	-	-
preform	-	-	-	-	-	-	-	-	-	-	-	-	-
shell													
tridacna													
triangular	+	-	+	+	+	+	+	+	-	+	+	+	+
rectangular	+	-	+	-	+	+	-	+	+	-	+	+	-
preform	-	-	+	+	+	-	-	-	+	-	-	-	+
terebra	-	-	-	-	-	-	-	-	-	-	-	-	+
Knife													
stone	+	-	-	?	?	?	?	?	?	?	?	-	-
shell	-	-	-	?	?	?	?	?	?	?	?	-	-
Chisel													
terebra	-	-	-	-	-	-	-	-	-	-	-	-	-
urchin spine	-	-	-	-	+	-	-	-	-	-	-	+	-

PROCESSING IMPLEMENT													
Pestle	+	+	+	+	+	+	+	+	−	+	+	+	−
Maul	+	−	−	−	−	−	−	−	−	−	−	−	−
Mano	−	−	−	−	−	−	−	−	−	−	−	−	−
Misc. frags	−	−	−	−	+	+	+	+	−	−	−	−	−
Mortar	−	−	−	−	−	−	−	−	−	−	+	−	−
basalt													
limestone													
Stone Dish	−	−	−	+	+	+	−	−	−	−	−	−	−
CONTAINER													
Ceramic	+	+	+	+	+	+	+	+	+	+	+	+	+
Shell													
lime	+	−	−	−	+	−	−	−	−	−	−	−	−
general	?	?	?	?	?	?	?	?	?	?	−	−	−
MANUFACTURING MATERIAL													
Stone													
cores	+	+	+	+	+	−	−	−	−	−	+	+	+
debitage	+	+	+	+	+	+	+	+	+	−	+	+	+
raw material	?	?	?	?	?	?	?	?	?	+	+	+	−
Shell	?	?	?	?	?	?	?	?	?	+	+	+	+
Bone	−	−	+	?	?	?	?	?	?	?	?	?	?
METAL	+	+	−	−	−	−	−	−	−	+	+	+	−
BURIAL	+	−	+	−	+	−	−	−	−	−	+	+	+
Total Classes	24	12	19	12	20	13	8	11	5	16	22	20	18

* - excavated area and volume
\+ - present
\- - absent
? - no evidence to determine presence/absence (excluded from count)



A) Actual Counts



B) Log-Log Scale

Figure 4-1 Relationship of Sample Size (cu.m.) and Artefact Classes Recovered

of points. Even when converted to a log/log scale, which generally serves to create a more linear pattern (Thomas 1976), the same general pattern is discerned (Figure 4-1b). This ceiling is rapidly reached as indicated by the sharp rise of the line to the 5 cu. meter mark. From there it nearly levels off even when the volume of excavated area increases over 500%. This configuration suggests that materials are rather uniformly distributed around the immediate environs of latte.

Figure 4-2 illustrates the pattern of artefact occurrence among the latte sample. Only two classes are present at all latte - pottery, and unmodified shell. Eight of the ten major functional categories are present in over 50% of the latte indicating a wide range of activities. Since all latte are located in coastal villages it is not surprising to observe fishing gear as a prominent artefact class. That all latte were sites of manufacturing activities is supported in the presence of manufacturing waste in nearly all of the latte.

The artefact inventory is recorded on a presence/absence basis only since the counts are derived from greatly differing sample sizes.There are 43 variables (discrete groups of cultural materials) divided into 10 general categories. All 13 latte in the sample have less than 50 % of the list present, therefore, the majority of matches between latte will be negative ones; a negative match consists of the absence of a artefact in both latte being compared. Given the significant differences in sample size an equal weighted test would produce better results and also one which would deal with items not as relative frequencies but on the level of presence/absence. The Matching Coefficient (Kirch and Yen 1983) is used here.

$$MC= (a+d)/(a+b+c+d)$$

where a is the number of artefact types present in both samples, b is the number of types present only in sample 1, c being the number of types only in sample 2, and d is the number of types occurring in the inventory but not present in either of the samples being tested.

Table 4-3 presents the 78 similarity coefficients. The sample has been arranged according to size class in a descending order (12-10-8). The values range from .41 - .89 with a mean of .68 $\pm$ .09. Nearly

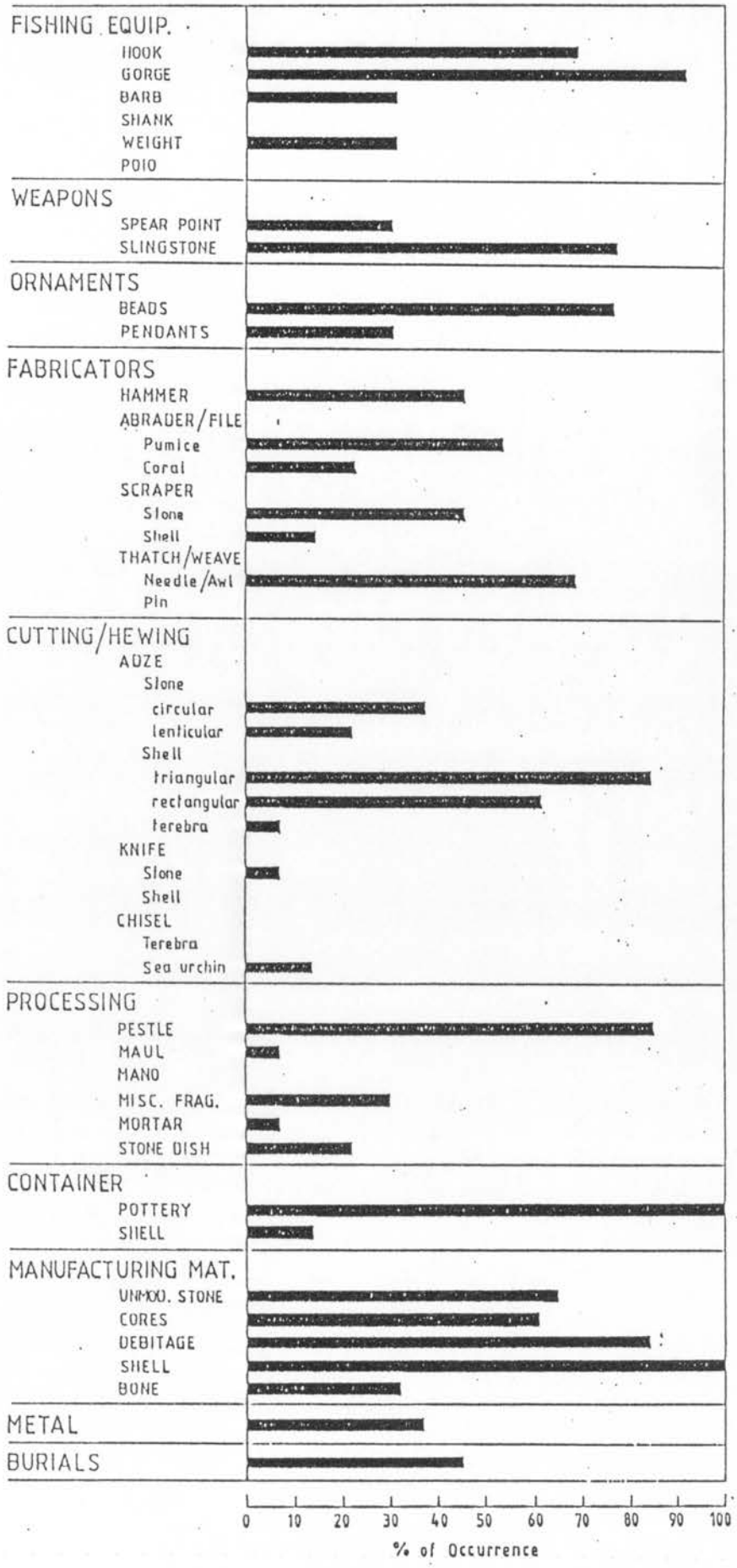


Figure 4-2 Variation in Artefact Occurrence

TABLE 4-3 SIMILARITY MATRIX - LATTE ASSEMBLAGES

BLI	OBJ	LHA	NB9	PGN	ML13	NB4	PGT1	NB3	NB5	NB8	NB15	
,73	.76	.68	.63	.73	.71	.62	.62	.60	.68	.63	.55	ML1
	.78	.69	.65	.65	.79	.78	.76	.73	.68	.62	.65	BLI
		.65	.54	.62	.73	.64	.68	.61	.58	.51	.41	OBJ
			.65	.76	.78	.62	.71	.73	.68	.72	.46	LHA
				.64	.68	.66	.58	.71	.79	.87	.79	NB9
					.76	.58	.66	.69	.68	.74	.57	PGN
						.76	.69	.71	.73	.71	.58	ML13
							.62	.68	.74	.63	.55	NB4
								.71	.55	.62	.58	PGT1
									.79	.79	.71	NB3
										.89	.71	NB5
											.76	NB8

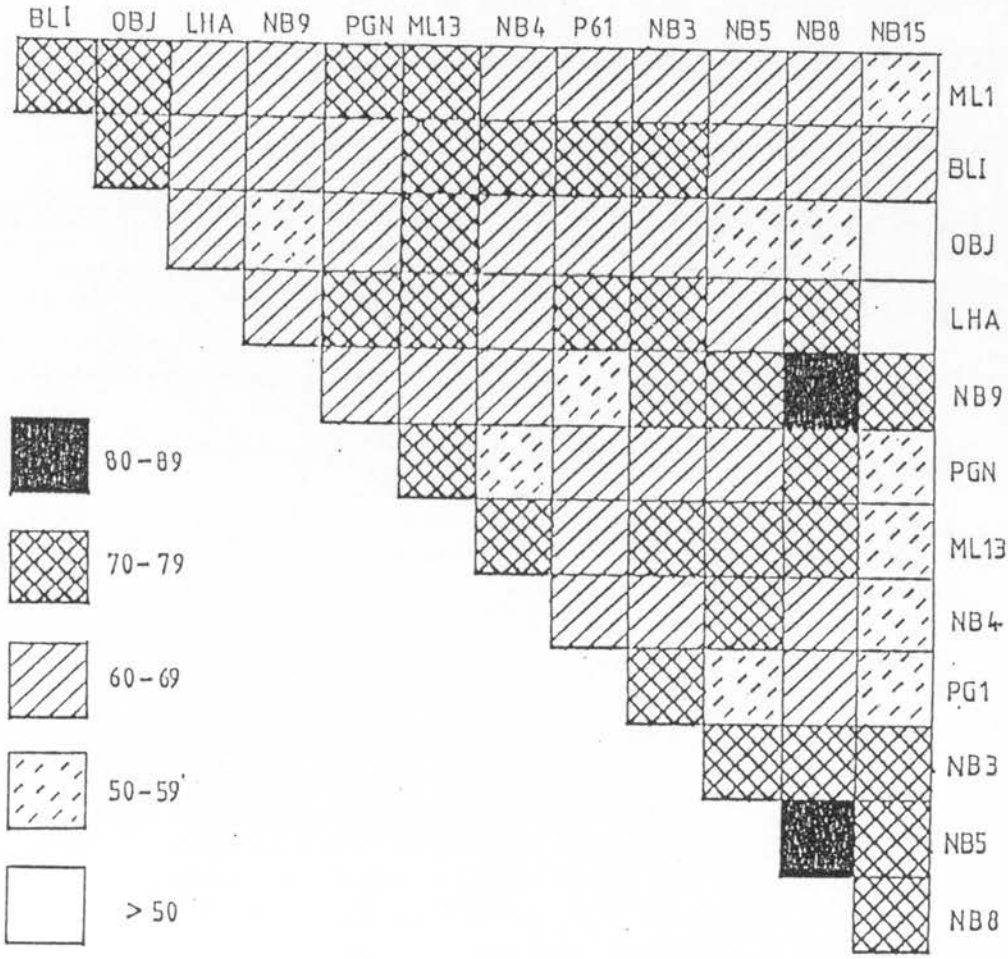


Figure 4-3 Similarity Matrix - Latte Assemblges

two-thirds of the values exceed .66 suggesting strong similarities between all assemblages. Only two values fall below .50 and both compare NB 15 having the smallest sample (1.1. cu.m) with the two largest samples (OBJ, LHA). In this one case, the difference in sample size is argued to account for the low similarity and does not suggest any functional difference.

Figure 4-3 presents a graphic display of the matrix with the values grouped into five intervals. Since the purpose of this analysis is to test propositions regarding possible variation in associated assemblages, two alternative patterns may be expected. Inspection of Figure 4-3 clearly indicates a random or ungraded pattern (Pielou 1979) refuting the proposition that assemblages from latte from the same size class more closely resemble each other than assemblages from other size classes.

The two 12 pillar latte have a high (.71) coefficient but both have even larger values when compared to small size classes. Ten pillar latte exhibit a mean of .74 $\pm$ .09 while the 8 pillar class is slightly less at .69 $\pm$ .09. Except in the case mentioned above, similarity is not correlated specifically with sample size. The four largest samples (OBJ, LHA, PGN, ML1) yield a mean of .70 $\pm$ .04, the only significant difference being a reduction of the standard deviation. The six latte assemblages from Nomna Bay reveal a higher than average (.74 $\pm$ .08) similarity.

No artefact class appears specifically associated with a particular size class although fishing weights and metal fragments are found only at 'large' latte (10+ pillars) in this sample. Metal is often difficult to specifically associate with these features since it is often found at or very near the surface. Given the impact of WWII in the southern Marianas Islands, this may be a spurious association though metal might be expected to occur in a random fashion. Perhaps constituent analysis of these metals may determine their antiquity.

Burials occur in only 43% of the latte though this may be more a reflection of different sample sizes. For example, Takayama and Intoh's excavation of 0.9 square metres at latte ML-13 at Mochong, on Rota, yielded no burials (Takayama and Intoh 1976) while a subsequent excavation at the same feature which opened up an only

slightly larger area (4 sq.m.) located three burials at various depths (Ward and Craib 1984). The presence of burials cross cut size classes. Graves noted (1985:Table 2) the presence of burials at Laulau House A but this is in error. While burials were found at Laulau rock shelter, Spoehr was quite explicit in stating that none were found during excavation of the latte (1957:46).

Although this analysis has served to quantify and specify Spoehr's observation regarding the 'debris of daily life' and refutes the hypothesis regarding specialised assemblages at any size class, it does not, indeed cannot, be used by itself to suggest that latte must be residences. While I am not opposed to this interpretation if it is to be convincing it must depend also upon data from other sources.

Burials are found at all size classes and are always mixed in terms of age and sex. Few, if any, grave goods are found. Hornbostel stated that males were buried deeper than females and children though this has yet to be demonstrated. The important implication is that it seems unlikely that if larger latte served as men's houses or meeting houses that they would have been the burial loci for females and or children.

That latte served as supports for canoe houses is not supported by the archaeological or ethnohistoric evidence. One final note should put this issue to rest, Thompson's argument regarding the occasional perpendicular alignment of latte indicates she either misread or misrepresented Hornbostel's observations. He, in fact, never argued the association of latte and canoe houses but rather stated that 'the long axis of latte is always...<u>parallel</u> with running water, in the case of upland latte, or with the beach' (n.d.:1). However, he noted one exception:

> Latte built at right angles to the shore occur only from a point south of Urunao Point on the northwest coast of the island [Guam] to a point south of Point Mergagan on the northeast coast...Latte parallel to the coast are found here also, the ratio being three to one in favor of those perpendicular to the sea.

Hornbostel (n.d.) proposed a romantic, ideological explanation for these alignments involving last bastions of Polynesian settlements

fending off waves of attacking Malays, never even implying any functional explanation along the lines that Thompson proposed.

While this observation, if accurate (it has not been reported by subsequent archaeologists), may pose additional questions about this specific regional pattern it does nothing to support the contention that latte served as supports for canoe houses. Thus, there is no class of data to support Thompson' proposition on this use of latte.

In summary, no significant variations exist among the assemblages from this sample of latte and it is argued that these assemblages represent most of the general 'household' activities expected from the protohistoric period. It is further acknowledged that this similarity is based on a comparison of the ranges of assemblage contents and thus cannot consider questions of relative frequencies of any particular functional classes within the assemblages. On a gross level it can be stated that there is no evidence to support the hypothesis that latte, of any size class, yield limited and/or specialised assemblages.

Dimensional Variation

While it has long been recognized that latte vary in the number of pillars per set, it has been only recently that dimensional variation has begun to be investigated in any detail (Craib 1983c 1984, Graves 1983). This section will explore dimensional variation of latte and the implications of such variation on the discreteness of size classes and the corresponding issue of energy expenditure.

Thompson (1940) identified three sizes of latte - 8 pillars (4 per row), 10 pillars (5 per row), and 12 pillars (6 per row) She separated these into classes of 'small, medium, and large', respectively, based upon the 'length of the ground plan'. Subsequent survey also indicated the presence of 6 pillar (3 per row) and 14 pillar (7 per row) latte sizes. Hornbostel (n.d.) reported the rumoured existence of a 20 pillar latte though no latte larger than 14 pillars has ever been recorded.

Working from Hornbostel's notes and maps, Thompson argued that a 'uniform pattern' was apparent in the layout of latte. The distances between the pillars of a single row were equal to the distance

between these rows - a spacing of roughly 3.5 meters (converted from Thompson's figure of 11.5 feet). Using these measurements as constants, Thompson states that each of the three sizes of latte have predictable area size. Table 4-4 presents the latte areas as derived from Thompson's constant of 3.5 m.

Thompson concludes by stating that latte vary in size according to a definite pattern in two directions, the height of the capped uprights and the length of the ground plan (1940:448, my emphasis); the larger latte were found to have taller pillars.

Table 4-4 Expected Area of Latte per Size Class

	L	W	Sq. M.
8 pillar	10.5	3.5	36.8
10 pillar	14.0	3.5	49.0
12 pillar	17.5	3.5	61.3

Recently Graves (1983) collected specific empirical data to test Thompson's proposition. Recognizing four groups of latte, Graves calculated areas from 61 latte derived from published reports and site forms (Table 4-5). His figures match Thompson's almost exactly. Graves uses the Student's t-Test to demonstrate that the mean for each latte size class was significantly different from all others, adding further support to Thompson's proposition.

Table 4-5 Latte Areas (Graves 1983)

	n	X	s	CV*
6 pillar	6	18.68	5.25	28.1
8 pillar	22	37.54	8.60	22.9
10 pillar	19	48.29	10.10	21.1
12 pillar	14	61.69	15.38	24.8

* Coefficient of Variance was not included in Graves (1985). Calculated specifically for this study.

However, an interesting problem arises from Graves' findings. While each latte group is distinct from all others, the internal variation is quite high. Given that the sample used by Graves was drawn from many different sites, the questions arises - is there any pattern to the distribution of area sizes within each size class? Although Graves argues that these classes are 'clearly differentiated' we are left with the problem of how best to account for the significant internal variation. Recall Hunter-Anderson's example of an intra-site hierarchy within a high status village on Yap (Hunter-Anderson 1983). Here distinct residential areas reflecting the Yapese system of intra-rank divisions were argued to be expressed archaeologically in the distribution and relative sizes of house platforms which also resulted in high coefficients of variance.

Since Graves' figures correspond exactly to those presented by Thompson they will be considered to represent the population (N) of latte areal dimensions from which a new sample can be statistically compared. While Graves' analysis was on a general, regional level discussion here is aimed at variation among and between size classes on both an intra and inter-site basis.

Unfortunately, the quantity and quality of latte plan maps from the entire archipelago is low. The bulk of acceptable maps come from the site records from sites on Guam and Rota.

While in the field in 1983, a series of measurement points on latte were identified in an effort to standardise the manner of measuring these features. Figure 4-4 illustrates these points and relevant measurements. Recording these measurements not only provide data for determining area but also allow for a general estimate of the volume of stone present at each latte (discussion of this latter point will be taken up later in this chapter).

The sample consists of 43 latte from nine sites (Table 4-6). While this is not an exhaustive list of latte sites they do cross-cut important categories such as coastal and inland sites as well as sites of differing sizes (defined by the number of latte).

Variation in area size among latte of the same size class from the same site can be quite pronounced. The CV ranges from 4.3 - 55.9. Focusing on specific size classes shows much intra-site

Figure 4-4 Latte Measurements

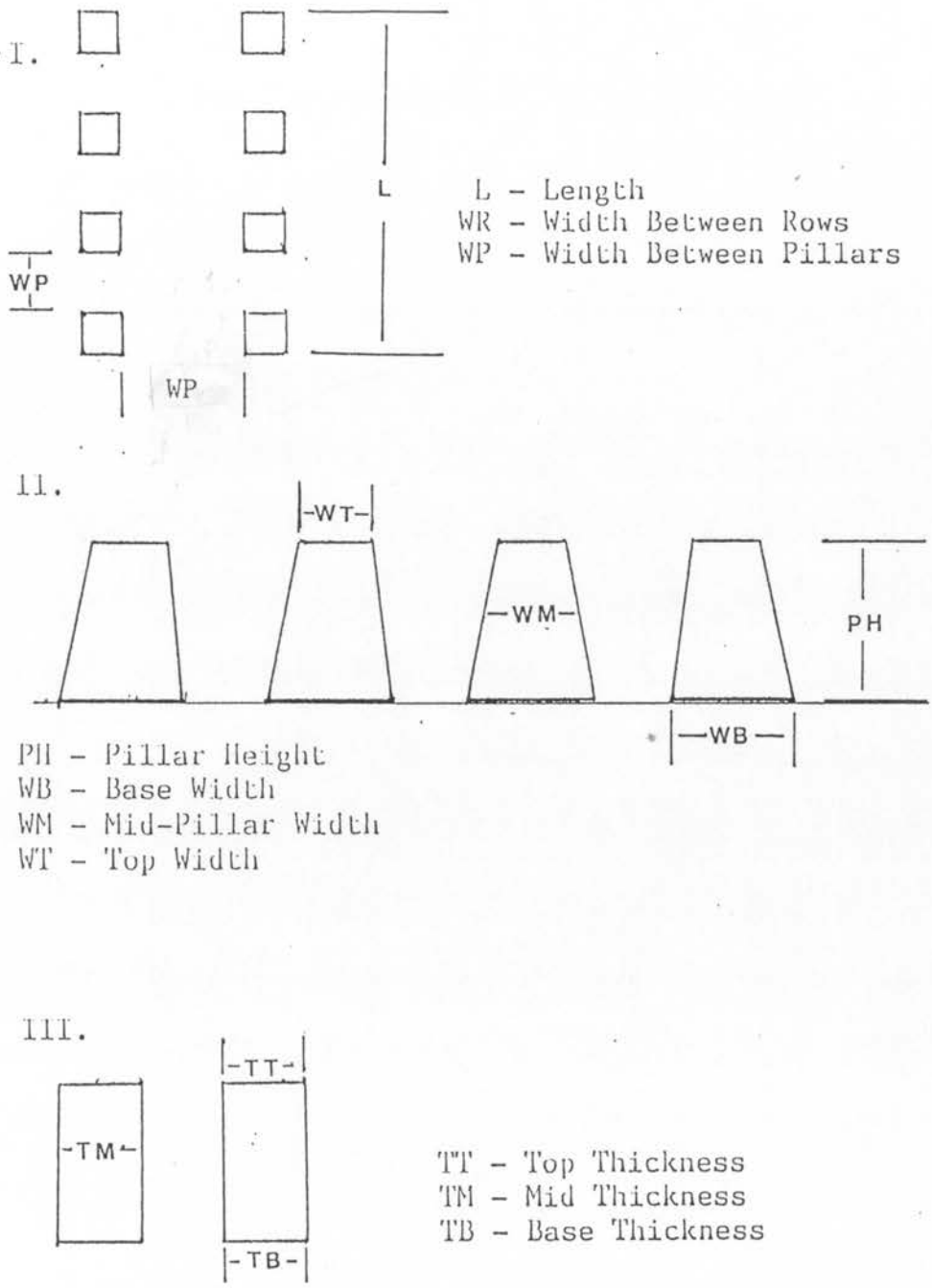


Table 4-6 Dimensional Data - Individual Latte per Site

ISLAND Site	Size Class	L	W	Sq.M	$\overline{X}$-PH*	Source
GUAM						
Mochom						
Feature 1	8	10.0	3.0	30.0	1.5	Site File (Guam Arch. Lab)
Feature 2	8	9.6	3.5	33.6	1.5	"
Feature 3	8	11.0	3.5	38.5	0.9	"
Feature 4	10	10.0	3.0	30.0	0.9	"
Feature 5	12	16.0	3.0	48.0	1.3	"
Feature 6	10	13.0	3.0	39.0	1.3	"
Nomna Bay						
Latte 2	10	11.5	2.6	29.9	0.9	"
Latte 4	8	10.0	2.5	25.0	0.8	"
Latte 5	8	8.5	2.0	17.0	0.7	"
Latte 6	8	9.2	2.5	23.0	1.0	"
Latte 8	8	9.5	2.2	20.9	0.6	"
Latte 9	10	13.0	3.3	42.9	1.0	"
Fafai Beach						
Feature 1	10	11.8	2.5	29.5	0.9	"
Feature 2	6	5.7	2.3	13.1	0.8	"
Feature 3	10	9.2	2.5	23.0	0.9	"
Feature 4	10	9.0	2.0	18.0	0.9	"
Umatac Ridge						
Feature 1	8	7.8	2.5	19.5	0.5	"
Feature 2	8	7.0	2.3	15.8	0.5	"
Feature 3	8	11.0	3.0	33.0	0.7	"
Feature 4	8	9.3	2.5	23.3	0.8	"
Inarajan Ridge						
Feature 1	10	14.0	3.2	44.8	1.0	"
Feature 2	10	11.0	2.8	30.3	1.0	"
Pagat						
Feature 1	8	8.0	2.5	20.0	0.9	"
Feature 2	12	9.8	2.2	21.6	1.0	"
ROTA						
Mochong						
ML 1	12	17.6	3.7	65.1	1.3	Craib 1983 Field Notes
ML 2	8	10.1	2.5	25.3	---	"
ML 3	8	8.3	3.0	24.0	---	"
ML 4	14	23.4	3.2	73.7	1.5	"
ML 5	8	10.4	3.1	32.2	0.9	"
ML 13	8	14.0	3.8	53.2	1.1	"
ML 18	8	8.8	3.8	26.4	---	"
ML 21	8	9.3	2.6	24.2	---	"
ML 25	8	9.0	3.0	27.0	---	"
ML 28	8	9.4	2.9	27.3	---	"
ML 31	6	7.4	3.1	22.6	---	"
ML 32	10	12.4	3.5	42.2	---	"
ML 36	8	10.3	3.4	35.2	0.9	"
ML 41	8	9.1	3.0	27.3	---	"
ML 42	6	6.3	3.1	19.5	1.0	"
ML 43	10	10.8	3.5	37.8	---	"
ML 46	8	11.2	3.5	39.2	1.1	"

Dugi							
	DL	5	8	8.7	2.8	23.8	0.8	"
	DL	7	10	12.0	3.7	44.4	1.2	"
	DL	8	8	6.1	1.7	10.3	0.7	"
TINIAN							
Unai Dangkulo							
	UD	1	8	8.7	2.5	21.8	1.0	Craib 1985 Field Notes
	UD	2	8	9.0	2.7	24.3	0.5	"
	UD	3	8	8.0	3.0	24.0	0.6	"
	UD	4	8	8.0	3.0	24.0	0.6	"
	UD	5	10	13.2	3.8	50.2	---	"
	UD	6	12	17.5	3.7	64.8	---	"
	UD	7	12	17.2	4.0	68.8	1.9	"

*Mean Pillar Height

Table 4-7 Dimensional Variation of Latte Area (sq.m.)
Summary Statistics

	n	$\bar{X}$ s	CV	Mean + s.d per Size Class	CV
6 pillar					
Fafai Beach	1	13.1		16.3 ± 4.53	28
Mochong	2	21.1 ± 2.2	10.4		
8 pillar					
Dugi	2	17.0 ± 9.5	55.9		
Pagat	1	20.0			
Nomna Bay	4	21.5 ± 3.4	15.8		
Umatac Ridge	4	22.9 ± 7.4	32.3	26.72 ± 9.49	36
Unai Dangkulo	4	23.2 ± 1.2	5.2		
Mochong	11	31.1 ± 8.7	28.0		
Mochom	3	34.0 ± 4.3	12.6		
10 pillar					
Fafai Beach	3	23.5 ± 5.8	24.7		
Mochom	2	34.5 ± 6.4	18.6		
Nomna Bay	2	36.4 ± 9.2	25.3	35.35 ± 9.91	28
Inarajan Ridge	2	37.6 ±10.3	27.4		
Mochong	2	40.6 ± 4.0	9.9		
Dugi	1	44.4			
Unai Dangkulo	1	50.2			
12 pillar					
Pagat	1	21.6			
Mochom	1	48.0			
Mochong	1	65.1		53.66 ± 19.65	37
Unai Dangkulo	2	66.8 ± 2.9	4.3		
14 pillar					
Mochong	1	75.0		73.7	

variability. In fact, in only three cases is the CV below 10.0 (Unai Dangkulo 12 pillar and 8 pillar, Mochong - 10 pillar). There is no apparent correlation between intra-site sample size and its CV.

When the means of similar size classes are compared between sites (Table 4-7) the general trend suggested by Graves is again apparent. However, once again the CV values are quite high for each size class suggesting a significant amount of variation around the mean.

The Student t-test was used to investigate the Null hypothesis that no significant difference existed between the latte areas on two levels - 1) between size classes; 2) among similar size classes at different sites In this analysis a two-tailed test is required in that either larger or smaller values can potentially negate the Null hypothesis (Thomas 1976:211).

Six pillar latte are generally rare and occur at only two sites in this sample - Fafai Beach and Mochong. With such a small sample the results of the t-test are tenative at best. Nonetheless, a significant difference in areas between these two sites ($t=5.14, p> 0.001$). In fact, as will be seen Fafai Beach latte are significantly smaller in all size classes from all other sites.

A large sample (n=29) of 8 pillar latte exists from seven different sites. Statistical comparison indicates some significant variation between mean areas on an inter-site basis (Table 4-8). Mochom varies from nearly all others in having larger areas enclosed by the 8 pillar latte. In this regard, Mochom is similar only to the sites of Mochong and Dugi on Rota. Other sites are shown to vary somewhat (0.1 level) but not as statistically significant. There is no pattern of similarity/dissimilarity; coastal latte of the 8 pillar variety are neither generally smaller or larger than inland nor do larger sites tend to have larger latte. This comparison refutes Thompson's argument regarding the standardisation of measurement employed in the construction of a latte. Not only does variation exist around this pattern but often this variation can be quite pronounced.

Table 4-9 provides the result of the t-test using mean areas of 10 pillar latte. The sample consists of 13 latte which exhibit much more uniformity than did the 8 pillar sample. Only a single site, Fafai Beach, is observed to vary significantly from all others,

TABLE 4-8 Comparison of 8 Pillar Latte Area
t-Values

Dugi	Mochong	Nomna Mochom	Umatac Bay	Ridge	Pagat	
0.65	0.90	2.42*	0.44	0.04	2.66+	Unai Dangkulo
----	1.09	1.63	0.45	0.49	0.32	Dugi
	----	0.83	2.10+	2.08+	1.28	Mochong
		----	31.25**	2.87*	11.67**	Mochom
			----	0.43	0.44	Nomna Bay
				----	0.39	Umatac Ridge

Significance Levels
+ 0.10
* 0.05
** 0.01

TABLE 4-9 Comparison of 10 pillar Latte Area
t-Values

Mochong	Mochom	Nomna Bay	Fafai Beach	Inarajan Ridge	
0.95	1.55	0.87	3.60**	0.66	Dugi
----	1.40	0.59	4.16*	0.34	Mochong
	----	0.41	4.10*	0.54	Mochom
		----	5.51*	0.37	Nomna Bay
			----	2.04	Fafai Beach

Significance Levels
* 0.05
** 0.01

having consistently smaller latte.

A sample of only five 12 pillar latte are included here and display a wide range of areas (21.6 - 66.8 sq.m.). Two of this size class were recorded within a single site, Unai Dangkulo, and these exhibit nearly identical areas (X=66.8 $\pm$2.9).

In his comparison of latte areas and size classes, Graves demonstrated a statistical difference in areas between size classes (1985, Table 6). From this and a strong linear relationship (r=.99) between these two variables, Graves argued that these represented an ordered set of spatial dimensions. However, the sample considered in this thesis is much more variable. When the mean areas for each size class (Table 4-7) are statistically compared (Student t-Test), the results (Table 4-10) indicates that the Null hypothesis,stating no significant difference,cannot be rejected.

Table 4-10 Results of t-Test Comparing Mean Areas Among Size Classes

Size Classes	t	df	p	Ho
6-8	0.990	23	>0.2	Accept
8-10	0.628	33	>0.5	Accept
10-12	0.832	16	>0.4	Accept
12-14	1.021	3	>0.2	Accept

Thompson noted another general trend in dimensions: as latte expand in area (i.e. size class) the height of the pillars increases. However, the strength of this correlation is questionable. Graves (1983) initially argued a clear trend but later reconsidered and stated that height increases only slightly and is not statistically significant (1985). Like the other variables, the mean pillar heights vary considerably throughout the sample though the general trend supports Thompson's argument. However, as indicated in Figure 4-8 there is the same kind of significant overlap as observed by Graves. Results of the t-Test indicated no significant differences between the means. Thus the possibility is not precluded that some larger latte resulted from 'adding on' additional pillars, though this must have been done rarely.

Variability in pillar height is also observed within each size

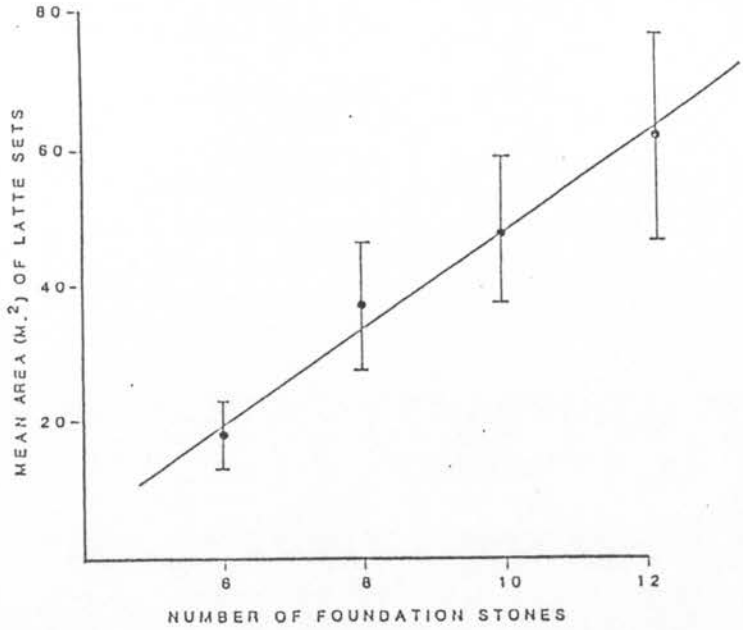


Figure 4-5 Relationship Between Latte Area and Size Class (from Graves 1986)

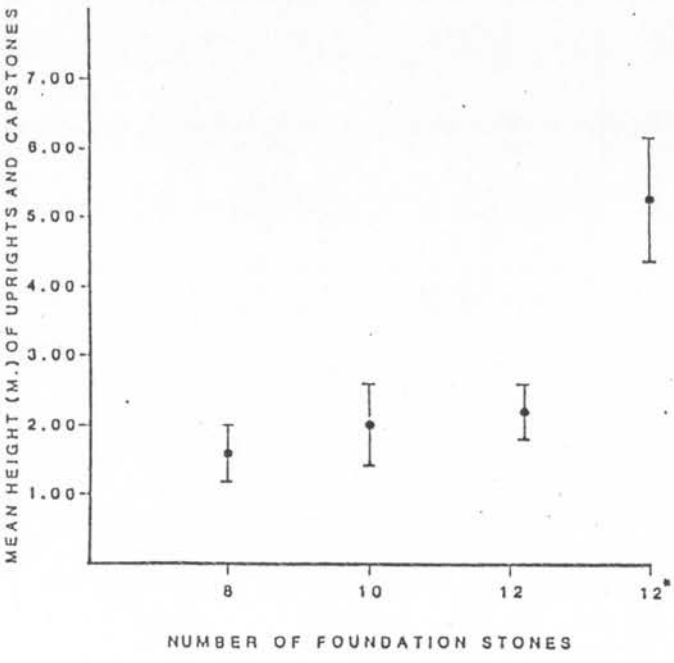


Figure 4-6 Relationship Between Mean Height of Pillars and Size Class (from Graves 1986)

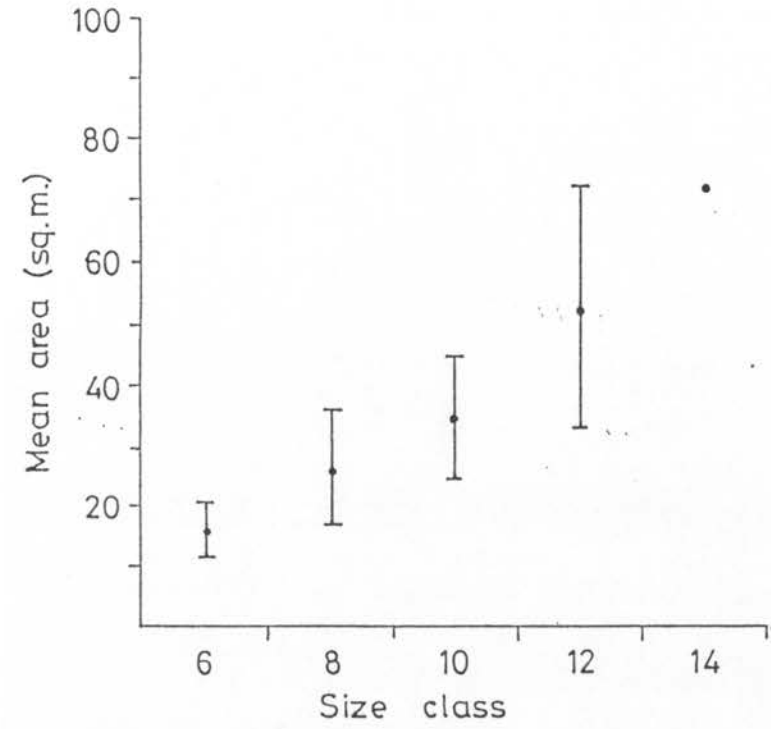


Figure 4-7 Variation in Mean Area per Size Class

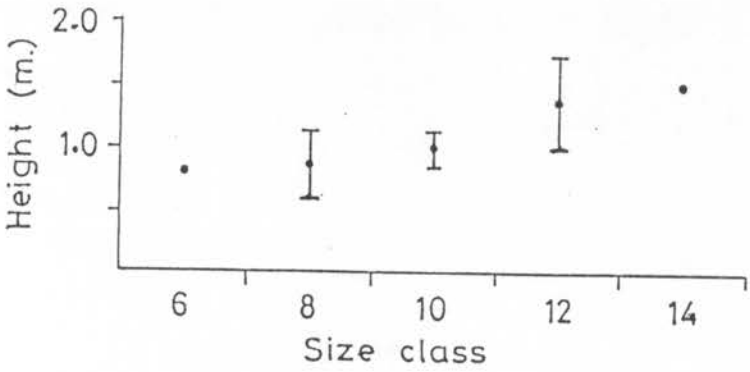


Figure 4-8 Variation in Pillar Height per Size Class

class on both an inter and intra-site basis. That is, pillar height is not a consistent marker of latte size class within a site or between sites. Pillar heights of 8 pillar latte are the most variable with a CV of 32%. This is followed closely by the 12 pillar latte (27%) with the 10 pillar class being the most consistent at 14%.

The best indicator of differentiation between latte is simply the number of pillars. While there is a general correlation between number of pillars and dimensional variables, it as not strong as argued by Thompson and Graves. This analysis has shown that significant variation exists between many of the dimensional variables and that this variation does not appear to occur in any regular fashion.

Volume of stone increases per size class. This is primarily due to the obvious fact that larger latte have more components (i.e. pillars and capstones). Additionally there is a tendency for these components to increase somewhat in size as size class increases. Calculation of stone volume within a latte is quite problematical but general estimates for comparative purposes can be derived. In this instance, mean volume of pillars per latte were calculated for 18 latte from three sites (Table 4-11). Capstones were not considered in this calculation due to difficulty in obtaining suitable measurements. They were often missing or found broken or in poor condition. Additionally whole capstones were not moved because to do so would may jeopardise site integrity.

The figures listed in Table 4-11 should not be considered as absolute but rather should be taken simply as relative figures for rough comparison. A simplifying assumption used here is that there is a relatively consistent ratio between the volume of a pillar and its capstone.

Figure 4-9 illustrates the variation among and between size classes. There appears to be great overlap in all but the very largest. This of course does not consider the volume of latte components from either the Taga site on Tinian or the As Nieves quarry on Rota. To include these would significantly skew these figures and these sites must be dealt with separately.

The mean values follow the same trend as witnessed in latte area.

TABLE 4-11 RELATIVE STONE VOLUMES

Site	Size Class	Pillars measured	$\bar{X}$ s
Mochong			
ML42	6	2	0.18 ± 0.09
ML31	6	3	0.11 ± 0.02
ML 3	8	7	0.24 ± 0.06
ML 5	8	7	0.22 ± 0.03
ML28	8	7	0.16 ± 0.02
ML36	8	5	0.15 ± 0.04
ML46	8	6	0.39 ± 0.09
ML 2	10	3	0.39 ± 0.06
ML25	10	2	0.13 ± 0.02
ML34	10	1	0.22
ML 1	12	6	0.50 ± 0.09
ML 4	14	11	0.80 ± 0.19
Dugi			
DL 8	8	1	0.11
DL16	8	2	0.20 ± 0.04
DL 4	10	3	0.20 ± 0.03
DL15	10	4	0.34 ± 0.08
Pagat			
PGT1	8	7	0.15 ± 0.05
PGT2	12	12	0.30 ± 0.08

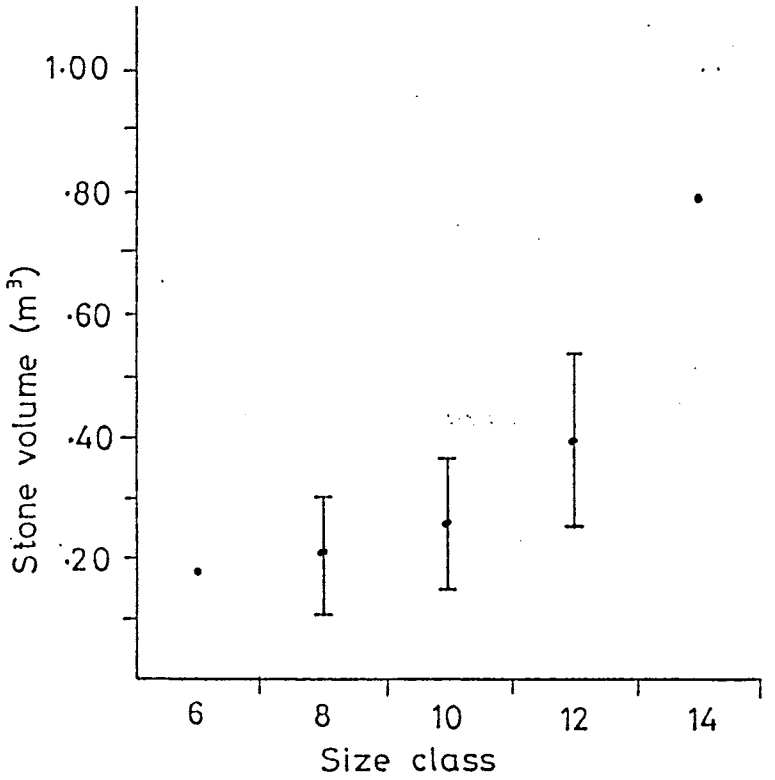


Figure 4-9 Relationship of Estimated Stone Volume and Size Class

That is, while there is much overlap between size classes, the general pattern suggests that as the number of components in a latte increases so does the volume per component. This, coupled with the the fact that larger latte have more pillars substantially increase the volume of stone. However, some significant variation is found. The 12 pillar latte at Pagat, for example, is much smaller than the average and in fact is smaller than many 10 pillar. Taga on the other hand reaches massive proportions but the largest latte is a 12 pillar rather than a 14.

The argument that the differential access to labour is a measure of social differentiation is generally accepted among archaeologists (cf. Rathje and McGuire 1982, Cordy 1981c, 1983b, Lightfoot & Feinman 1982, Peebles and Kus 1977). Following from this is the idea that relative amounts of energy expenditure, as expressed in the archaeological record, is indicative of sociopolitical ranking. However, in terms of archaeological measurement there is a fine line when this argument becomes dangerously close to tautological. The idea that 'monuments' are physical expression of chiefly power is commonplace but once we leave the realm of the spectacular and begin to investigate the more subtle, fine-grained levels, problems arise in both measurement and explanation. For example, Cordy would have us believe that on Kosrae simply the addition of three sakau pounding stones demarcates a social stratum and that an additional dozen more warrants a separate decision-making level (see Figure 2-1).

Graves has argued that 'considerable additional energy [was expended] even for small latte sets (1985:16) relative to 'wood-based' dwellings (1985:17). He offered a series of variables - quarrying, shaping, transporting and erecting. No mention of activity relating to any of these variables is found in the ethnohistoric accounts. This section will discuss each of these variables in an attempt to evaluate the utility of latte as markers of energy expenditure.

Hornbostel conducted a series of experiments in an attempt to understand some of the possible quarrying methods used by the protohistoric Chamorro. He noted that cutting limestone directly from bedrock with basalt adzes were unlikely given that adzes would

chip badly along the cutting edge after only a few blows (1926:21). However, by controlled burning, the limestone 'would become soft making it possible to work it with stone and shell implements' (1926:21). This, he argues, is how the As Nieves quarry on Rota was formed. The Chamorro must have been familiar with burning limestone for lime to use with betel nut chewing.

The fire and water method appears likely at As Nieves but whether this relatively labour intensive method was the primary technique is unknown. Certainly given the massive size of the pillars and capstone at this quarry it can hardly be used as a 'typical' example of any aspect of latte.

Limestone has been a source of building material in many parts of the world and studies have been undertaken which explore the various methods of quarrying (Kopper and Rossello-Bordoy 1974) and estimating the time/energy involved in quarrying and shaping (Erasmus 1964). Their findings may prove instructive in investigating this aspect of latte building.

In a study which appears relevant to the situation in the Marianas, Kopper and Rossello-Bordoy (1974) note that quarrying activities of megalith builders in eastern Spain often took advantage of natural features of limestone. Common to karstic areas (rugged limestone formations) are lapies surfaces formed from natural weathering. Channels formed by the dissolution of the limestone can delineate 'flat-topped blocks like paving stones, standing in rows' (Kopper and Rossello-Bordoy 1974:163). Hornbostel (n.d.) comments on this type of formation in Guam and suggested that these were used by the Chamorro for sources of latte stone.

Figure 4-10 illustrates three quarrying techniques, described by Kopper and Rossello-Bordoy, two of which are appropriate to latte. Technique 3, the fire and chisel method, follows Hornbostel as discussed above. Technique 1 involves detachment of the lapies block along natural fissures. This would be less time-consuming than the firing method but could result in less control over the size of the pillar and/or capstone.

A variation of this latter technique is suggested from some latte which have been observed to contain pillars of unmodified reef rock. These appear to have been simply detached from the reef with little,

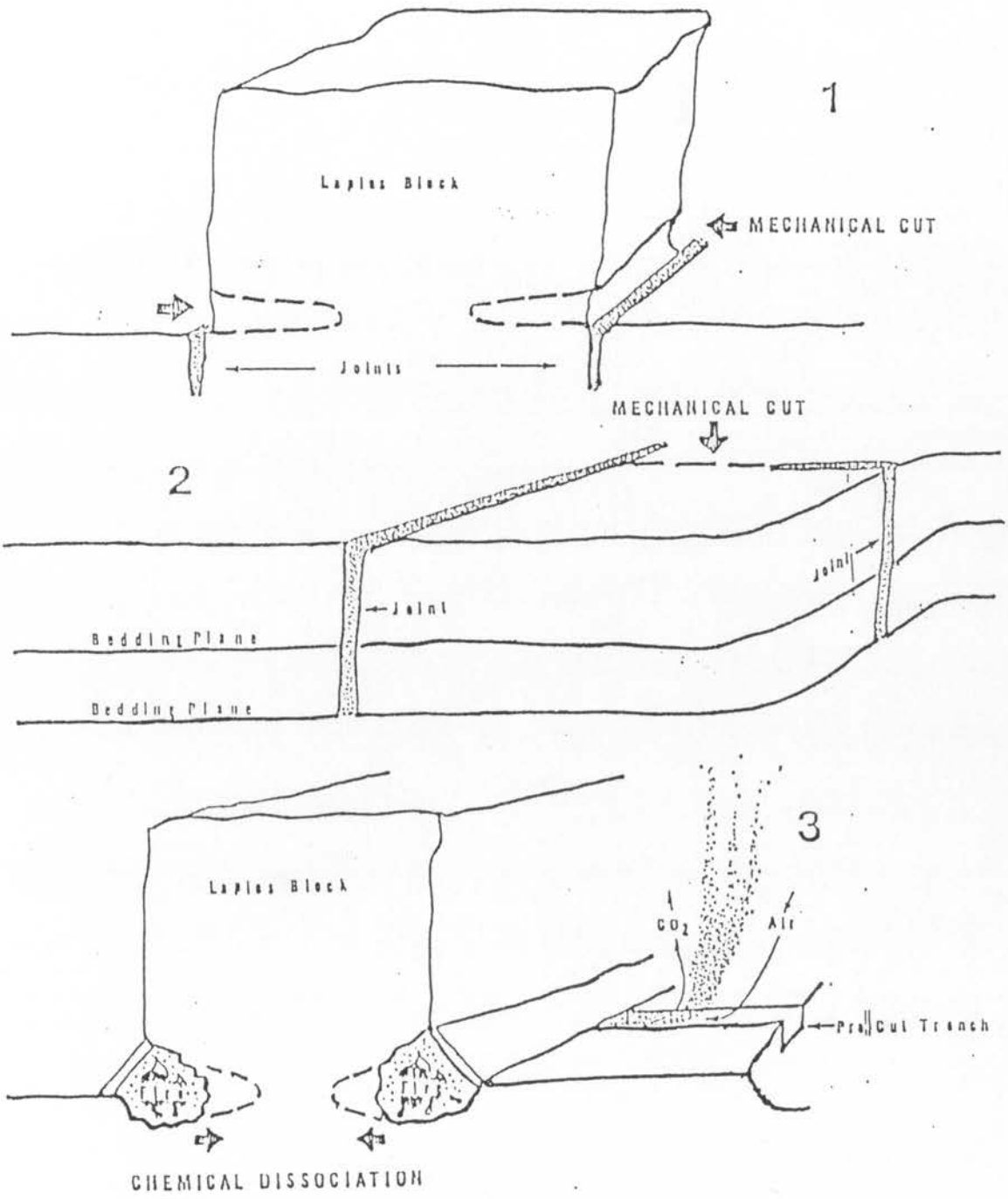


Figure 4-10 Three Methods of Quarrying Dimensional Stone
(from Kopper and Rossell-Borday 1974)

if any, subsequent modification as most of the corners still exhibit a water-worn appearance.

An experiment performed to determine the labour involved per cubic metre of limestone masonry in Mayan building resulted in an estimate of nearly 30 man-hours per cubic metre (Erasmus 1964). His estimate included all tasks (e.g. quarrying, transportation, shaping). How this figure may specifically relate to latte is uncertain but the volume figures in Table 4-11 suggest that few latte consist of more than three cubic metres of stone. Thus, even a small task group would be able to establish a latte in a relatively short time. Furthermore, if they were able to remove pillars as 'preformed' (lapies) blocks then this task may be shortened considerably.

The amount of labour expended on shaping the pillars appears to be quite variable ranging from largely unmodified pieces of reef rock to highly worked, squared pillars. Unfortunately, the differential weathering of limestone precludes any systematic, objective measurement of this variable. However, amount of shaping can be roughly gauged by the presence of smoothing/facing of one or more sides. In some cases this work will result in a pillar having well defined corners. The better shaped pillars are usually found within larger latte.

There is no reason to suppose that latte components were moved over long distances. No extensive quarries have been found indicating centralised limestone resource areas. It is more likely that pillars and capstones were quarried from areas in the immediate environs of any given site. Certainly, the general availability of limestone within the southernmost islands makes this a distinct possibility.

Concluding Remarks

The function of latte is becoming clearer. The results of the similarity analysis of artefact assemblages associated with latte refute the proposition that these were specialised activity loci. However, the general functional range of the artefact inventories do not, in themselves, argue that latte necessarily served only as

residences though this seems likely. Only through the collection of more representative samples, which would allow analysis beyond mere presence/absence determinations, can this situation be clarified.

Certainly other structures did exist in most if not all settlements but these have left no architectural evidence. That latte served as supports for canoe houses is refuted using both archaeological and ethnohistoric sources. Thompson's interpretation was based on a series of errors, notably her reliance upon a mistranslation of an sixteenth century Spanish account and her misreading of Hornbostel's field notes.

It is argued then that latte most likely served as areas of residence and thus these features are useful in identifying at least a portion of residential groups. The missing components are non-latte dwellings the existence of which is assumed by all previous authors. This assumption is explored in Chapter Five and Seven.

That latte exist in definite size classes is not a new idea but the ancillary proposition that these size classes imply standardised construction measurements (i.e. area, pillar height and stone volume) are not supported by the data presented here. The amount of variation in all dimensional variables is considerable. Though the general trend supports the conventional view, this thesis has demonstrated that variation can be statistically significant even within size classes.

The 'costs' of building a latte may not be as great as previously argued. Or at least that the relative differences in energy expended between the different size classes may have been minimal. Certainly in terms of stone volume the differences in energy expenditure may only have equated to an additional day or two. As Graves has (1985) correctly pointed out the latte is but one level of energy which was involved in the construction of a residence. But as the sole archaeological expression of these dwellings our attention must be paid to the structure and variation in these features.

CHAPTER FIVE - LATTE: PATTERNS OF DISTRIBUTION

Ethnohistoric and archaeological data examined in Chapters Three and Four strongly support the proposition that latte served exclusively as residences. However, these findings, in themselves, do little to suggest status relationships or define corporate residential groups in Protohistoric Chamorro society beyond the division of latte into size classes (cf. Graves 1985).

Recognition and delineation of residential groups must initially involve the identification of relevant components. In the Marianas this must also include identification of non-latte dwellings and, subsequently, examination of the composition, and spatial configuration, of residential groups. While the existence of this type of structure is assumed by all previous arguments regarding the Protohistoric period, no evidence has ever been presented that non-latte dwellings exist and, indeed, no one has ever looked for them in any systematic fashion.

Archaeological research in the Marianas, until recently, has been characterised by a rather myopic treatment of latte. Excavations and site plans often treat these features as separate 'sites' and discuss them as separate entities. While at one level of analysis this is appropriate, latte must also be examined in larger settlement contexts. For example, attention must be given to the distribution of latte about the landscape and within sites. Because of the attention given to individual latte, few intra-site maps giving locations of latte are available. However, those that do exist indicate often extensive clusters of latte. Nucleated settlements characterise the pattern of Protohistoric Marianas settlement.

In this chapter, patterns of latte occurrence and their distribution is investigated in three spatial contexts. First, regional distribution of latte sites is examined with special attention given to the question of non-latte habitation sites. Next, the presence and relative frequencies of size classes within individual sites will be analysed and several sites are compared. The third aspect involves a detailed examination of the organisation of latte placement within individual villages.

Regional Distribution

To examine patterns of latte occurrence in a regional context also involves the search for non-latte dwellings. As emphasised earlier, traditional views all suggest either an intra-site spatial segregation of latte/non-latte dwellings and/or separate non-latte habitation sites but provide no detail. Based on Zamora's remark about a regional separation of villages according to rank and current thinking, a logical inference is that inland sites are less likely to contain latte.

Much survey work of varying coverage has been undertaken in the Marianas, almost exclusively in the southern islands. Though coastal zones have received most attention, extensive surveys have been performed in inland areas on these southern islands with Guam receiving the greatest coverage.

The existence of archaeological sites without some evidence of latte is rare. Hornbostel (n.d.) noted that pottery existed in largest quantities only around latte though occasionally small amounts were found in caves and along the shores. Reinman, after his extensive survey of Guam in 1965-66 stated that most sites have latte or indications that they formerly existed (1968:43). To be sure, rockshelters and isolated pottery scatters have been recorded but as yet no site has been specifically identified as a non-latte habitation area.

No explicit criteria for identifying site types in the Marianas have been proposed. This may be due to the apparent lack of variation in site configuration and content; few special activity sites have been identified (but see McCoy, Craib and Price 1978). The following characteristics will be used to define a habitation area; 1) an artefact assemblage exhibiting a wide range of functional classes; 2) formation of midden deposits; 3) having a variable but relatively large areal extent; 4) the presence of latte (representing a permanent dwelling). To avoid a circular definition, this last trait is, of course, variable. That is, for sites to be defined as habitation areas they must exhibit the first three traits but, by definition, any site containing latte is a habitation area.

A few sites lacking latte come close to having these habitation attributes. Spoehr (1957:31) described the site of As Teo, on Saipan, an extensive pottery scatter covering an area of roughly 1.6 hectares ('4 acres'). Although he stated that the site was located in an area long subjected to cultivation, he did not discuss the possibility of latte formerly existing at the site, the presence of midden or the range of artefacts, if any, beyond pottery.

The Fanunchuluyan mortar site on the coast of Saipan consists of eight basalt mortars, one estimated to weigh about 200 kilograms. No latte have been recorded from this area. Whether the absence is real or the result of destructive forces is unknown. Spoehr (1957) states that the 12 latte recorded by Hornbostel at Agingan along the Saipanese coast were completely gone when he visited the site in 1949.

Other extensive sherd scatters have been recorded from the interior of Guam (Reinman 1977, Dye, Price and Craib 1978, Dye 1979) though these are often adjacent to latte sites (as discussed below). However, sites like these usually consist of light scatters of a very limited range of artefacts. It does not seem likely that they represent areas where the 'majority' of the population resided but more probably were special-use sites.

On a general level, the idea that inland sites represent habitation areas for people of lower status is not supported if the presence of latte is taken as a specific and exclusive marker of high status. Latte sites are well known in many inland areas. As Osborne (1947:49) observed, 'some of the archaeologically more complex, largest, and spectacular sites are inland.' For example, the Pulantat site in south-central Guam may have been one of the largest latte sites in the Marianas with its estimated 34 latte (Reinman 1968). Reinman's survey of the interior uplands of Guam resulted in the recording of 15 latte settlements. Four of these sites (including Pulantat) had 10 or more latte, seven sites contained at least two to five latte, and the remaining four sites each had at least one. There is no question that interior sites contained latte, often in considerable numbers. The question which still remains is whether non-latte settlements may have existed in these areas.

The Talofofo Drainage - A Case Study

In order to examine the inland pattern in more detail, a portion of the Talofofo drainage is examined. The drainage is defined by a series of streams in south-central Guam. The study area extends from Talofofo Bay along the east coast to the headwaters of the Ugum river, an area of roughly 25 square kilometres (Figure 5-1). This area was selected for consideration because it cross cuts a number of microenvironmental zones, has been more intensively surveyed than most other areas, and is known to contain numerous recorded sites (Reinman 1977, Dye, Price, and Craib 1978).

The Talofofo drainage is a well-watered region with a series of small streams feeding into the larger Talofofo river. As a result, the general region is composed of narrow river valleys surrounded by high, narrow ridges. Except for a few areas along the Talofofo river, the development of river terraces is absent. As a result, most sites are found along the ridges.

A total of 24 sites have been recorded from this area (Table 5-1) with about 30% (n=8) apparently lacking any evidence of latte. No excavations have been undertaken in any of these sites nor have any surface samples been taken. Comparisons here will be based on survey descriptions of observable surface materials.

The latte sites (n=13) are characterised by their large areal extent (<600 - 60,000 sq.m.) with most (70%) covering in excess of 5000 sq.m. These sites contain from one to 10 latte and exhibit heavy concentrations of pottery, stone tools and the presence of mortars. Midden deposits have been observed at all of these sites. In content and organisation, they are largely indistinguishable from coastal latte settlements.

Only two of the 11 non-latte sites exceed 600 sq.m., MaGI-9 and MaGI-28, both of which are described as being disturbed. The former is a 'heavy' (unquantified) concentration of pottery and some stone tools situated in a 'field cleared' area of approximately 2500 sq.m. (Reinman site forms). MaGI-28 is a heavily eroded knoll containing a light scatter of pottery along with portions of stone bowls and grinding tools. The availability of basalt in the area and the

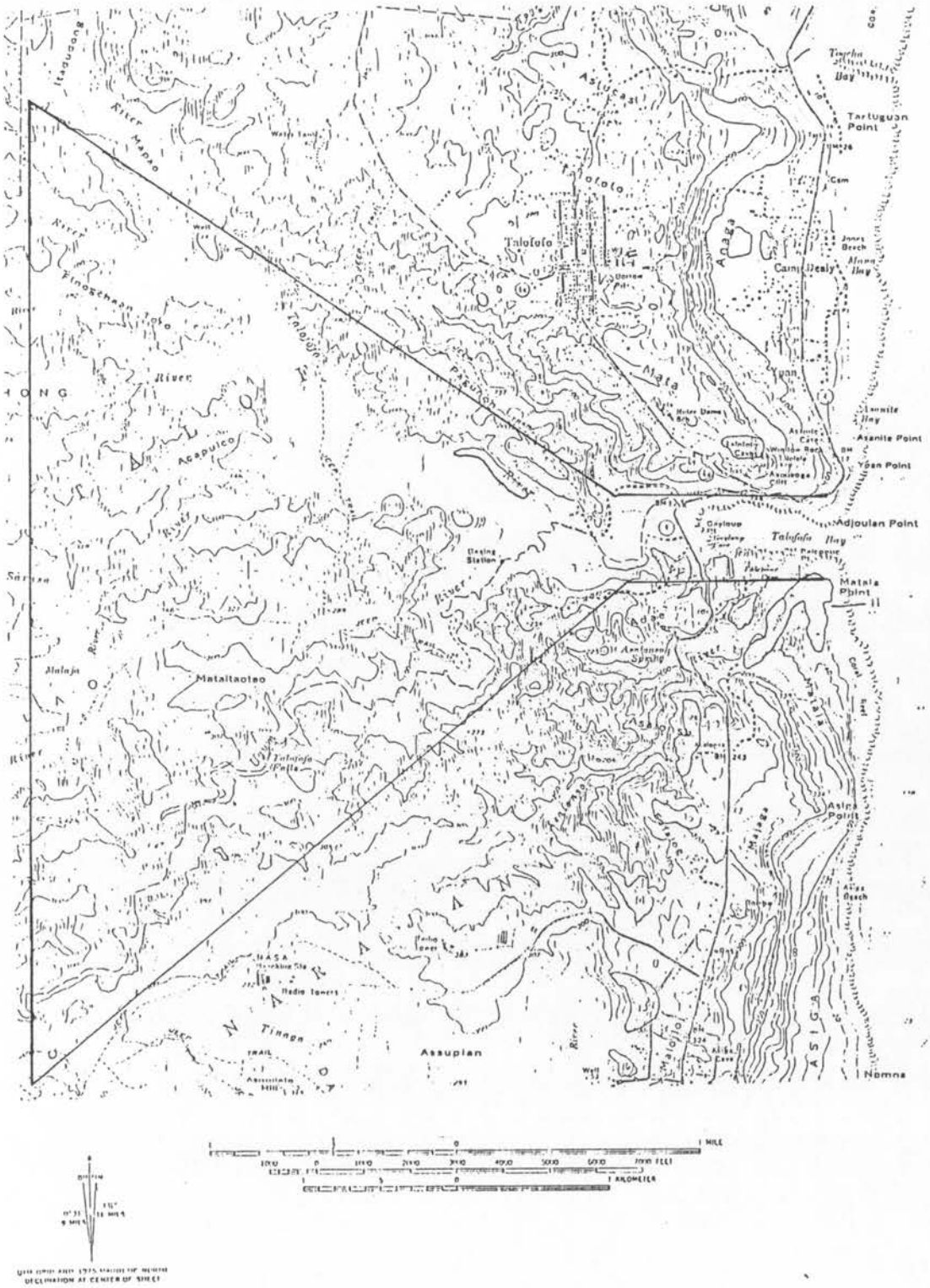


Figure 5-1 Talofofo Drainage (from U.S.G.S. Talofofo Quad 1:24000)

Table 5-1 Recorded Sites in the Talofofo Drainage

Site No.	Area (m2)	Latte Present	Associated Artefacts	Midden Present	Source
MaGT-8	25,000	+(x)	pottery ('considerable') stone tools mortars	+	Site File
MaGT-9	1,250	+(^1)	pottery mortar	x	Site File
MaGT-10	250	+(^1)	pottery	+	Site File
MaGT-11	1,250	+(1)	pottery stone tools mortar	+	Site File
MaGT-12	600	-	pottery stone tools	-	Site File
MaGT-13	625	^	pottery	-	Site File
MaGT-14	1,250	+(1)	pottery stone tools	+	Site File
MaGT-15	7,500	+(3+)	pottery	x	Site File
MaGT-16	600	-	pottery	+	Site File
MaGT-18	12,500	^	pottery ('light scatter')	+	Site File
MaGT-19	100	-	pottery Stone flakes ('few')	- -	Site File
MaGT-20	250	-	pottery	+	Site File
MaGT-21	10,000	+(2+)	pottery stone tools mortar	x	Site File
MaGT-22	5,000	+(x)	pottery ('light')	x	Site File
MaGT-23	12,500	+(4)	pottery stone tools mortar	x	Site File
MaGT-25A	1,000	+(10)	pottery stone tools shell tools mortar	+	Dye, Price & Craib 1978
25B	500	-	pottery	-	
25C	1,000	-	pottery	-	
MaGT-26	200	+(1)			Dye, Price & Craib 1978

MaGI-28A	400	-	pottery		Dye, Price & Craib 1978
28B	15,000	+(5)	pottery stone tools		
28C		-	pottery		
MaGI-7	60,000	+(5+)	pottery ('heavy') stone tools mortars	+	Site File
MaGI-8	12,500	+(9)	pottery stone tools mortar	+	Site File
MaGI-9	2500	-	pottery ('heavy')	+	Site File
MaGI-10	600	-	pottery ('heavy')	+	Site File
MaGI-28	5000	-	pottery ('light') stone tools ('grinders') stone bowls	+	Site File
MaGI-29	300	-	'few pounder fragments'	+	Site File

+ - present
^ - possible latte remains
x - not reported

unfinished appearance of some of the bowl fragments led Reinman to interpret this area as a possible manufacturing site (Reinman 1977).

The remaining areas averaged only 400 sq.m. and most were found close to latte sites. For example, MaGT-25 B,C and MaGT-28 A,C are small loci in direct association with latte sites containing 10 and five latte, respectively (Dye, Price and Craib 1978).

Size alone would argue against the proposition that non-latte pottery scatters represent habitation areas. At best, they would represent a single dwelling. However, there are other factors which also refute the proposition that these sites represent non-latte habitation areas. Based on observation of surface debris, there is a limited range of cultural materials found in association with these sites.

The sherd scatters usually sit atop and down the slopes of eroding ridges often in apparent secondary deposits; a pattern also observed among inland sites in the Inarajan District (Dye 1979). No excavation has been undertaken in these kinds of sites nor has any detailed examination been made of their contents other than for survey recording purposes. However, examination of erosional cuts indicate very shallow deposits.

It is highly likely that these small sites functioned as small, special-use, satellite activity areas (e.g. dumps, garden areas) rather than non-latte habitation areas. Based on current evidence it would be difficult to refute the proposition that these were not habitation areas and more likely represented specialised activity loci. While it is acknowledged that no detailed examination of these areas have been undertaken it seems highly unlikely that they will be shown to represent former habitation sites.

Irrespective of the actual population numbers, all previous authors have argued or implied that non-latte residences housed the majority of people during the protohistoric period. Very few potential habitation sites have been recorded without some evidence of latte. The few that have been noted here are situated in areas where clearance activities have taken place, leaving them subject to speculation regarding previous existence of latte. Even if these areas were to have been residences it is unlikely that they could have contained more than a single dwelling. It would be difficult to

sustain the argument that the majority of people resided in a series of small, single dwelling, isolated sites.

Within the Talofofo drainage there is no clear evidence of non-latte habitation sites despite the existence of numerous sites without latte. At this, admittedly, cursory level of analysis it seems highly unlikely that any of these sites supported non-latte residences. Given the small areal extent, lack of midden deposits and limited range of cultural remains, these areas conform more to the expected pattern of specialised activity areas, perhaps associated with gardening and/or collecting.

In 1979, Dye conducted an intensive survey of a portion of the Inarajan River valley located about 7 kilometres south of the Talofofo valley. He recorded three sites, all situated along ridge tops and slopes overlooking the Inarajan River. These were extensive pottery scatters; few other artefacts classes were noted. Only one site (Site B) had evidence of latte.

Dye argued that subsurface testing provided evidence of erosion along these ridges and that the 'patterns of pottery distribution...appear to be artifacts of the severe erosion that has taken place subsequent to pottery deposition' (Dye 1979:12). Thus, it is unlikely that these areas represent extensive habitation areas but rather may have originally resembled the small pottery scatters reported from the Talofofo area. Dye does not attach any functional label to these sites, but rather correctly points out that these scatters 'demand fuller characterization and description' (1979:14).

Problems of Latte Preservation

Sites like As Teo (Spoehr 1957) and the Merizo site (Reinman 1977) also sit in areas which are extensively cultivated and though midden deposits are present no latte are observed. In situations such as this the probability of latte stones being removed or destroyed is extremely high. The tricky problem becomes differentiating true non-latte habitation sites from sites such as these.This raises the more general question regarding the reliability of latte numbers. That is, how reliable is present day counts of these features? Certainly Thompson chose to accept Hornbostel's figure of 270 latte as

representing nearly 100%. More recently, Graves has suggested that perhaps a figure of 600 may be more accurate but offers no basis for this figure. Obviously, the numbers are difficult to judge.

Destructive agencies are numerous and include both cultural and natural factors. This may account for Reinman's statement that the largest number of latte were usually found in 'better locations' and/or areas 'less accessible to modern activities' (1977:7). Farming, construction activities, weathering of the limestone and the general devastation of World War II have contributed significantly to the depletion of latte. On Guam, for example, some important contrasts in latte counts can be drawn from the field observations of Hornbostel, Osborne, Reed and Reinman which span a period of only forty years. Similarly, Spanish accounts speak of large villages in areas where subsequently few, if any, latte have been recorded by archaeologists.

Perhaps the most dramatic example involves the area around Agana. Here was the Chamorro village which Sanvitores described as having over 150 houses, 53 of which belonged to the Principals. Assuming that only the latter group of houses were supported by latte, the fact that only two latte have ever been recorded from this general area (Hornbostel n.d.) suggests a destruction of at least 96% of latte from this village alone.

With Spanish presence most pronounced along the southwest coast of Guam, similar loss of latte may be expected from areas such as Cetti Bay, Sella Bay, and Umatac. As Reinman (1977) noted, evidence of the Spanish presence on Guam is commonly encountered on the west coasts, especially from Umatac to Agana.

Typhoons, flooding, and earthquakes may have each had a significant impact upon latte. Depending upon the quality of the limestone used in the construction of these features, deterioration proceeded at different rates.

The last argument regarding the total number of latte on Guam is derived from observations on the other southern islands. On Rota, for example, the number of recorded latte nearly equals that of Hornbostel's figure for Guam yet the land area of Rota is 85% smaller. A similar situation may exist on Tinian and Saipan. Hornbostel (n.d.) stated that 'latte were more numerous on Saipan

and Tinian than on Guam' though current data makes this determination difficult to substantiate.

Intra-Village Patterns

Size Class Occurrence

Although size classes of latte have long been recognised, few attempts to account for these variations have been made and these largely argued for functional differentiation. No attempt has been made to document and account for patterns of occurrence (i.e. presence and relative frequencies of size classes) on either an inter-site or intra-site basis. Even Graves' recent analysis of latte did not directly address this point. Analysis of this kind is hindered by the different state of preservation of latte. Often when the existence of former latte can be identified it is not possible to determine the original size class. At worst, it is often difficult even to identify the number of latte which may have existed at a site.

Also hindering this kind of analysis has been the fact that until now questions have not been asked which would require these kind of data. Indeed, I often found it most frustrating to read through some field reports and monographs only to find that while the presence and often the number of latte present at a site was given, no mention of the size classes was present. Additionally, there has been a tendency to deal with latte as a general group of features rather than paying attention to patterns of occurrence (e.g. Graves 1985).

Data used in this section (Table 5-2) were gathered from site files, unpublished reports, and field survey undertaken by the author. A total of 19 sites are listed, representing latte sites from the southern islands and including coastal and inland areas. These sites were selected on the basis that a majority of latte were sufficiently intact that determination of size classes could be made with some measure of accuracy.

From this sample, a general trend in site size may be argued; inland sites tend to be smaller (defined by the number of latte)

TABLE 5-2 Size Class Frequencies

	6	8	10	12	14	n	N*	Source
GUAM								
coastal								
Nomna Bay	-	4	2	-	-	6	17	Reinman 1977
Haputo Point	-	4	1	-	-	5	15	
Fafai Beach	1	-	3	-	-	4		
Gogna	-	3	2	2	-	7	12	
interior								
Umatac Ridge	-	4	-	-	-	4		
Maloles	-	2	-	1	-	3		Osborne 1947
Bonya	2	1	-	-	-	3		Osborne 1947
Mogfog	-	2	1	-	-	3		Osborne 1947
Acapulco	-	3	1	2	-	6	10	Osborne 1947
MaGT-8	-	3	-	-	-	3	3	
ROTA								
coastal								
Mochong	6	31	7	2	1	47	50	Field Notes 1983
North Shore+	1	6	4	-	-	11		Site Forms
interior								
Dugi	-	10	4	-	-	14	16	Field Notes 1983
Gampaya	2	6	4	-	-	12		Site Forms
TINIAN								
coastal								
Taga	-	9	4	4	-	17	17	Hornbostel n.d.
Tachogna	-	8	1	1	-	10	10	Spoehr 1957
Unai Dangkulo	-	8	2	2	-	12	14	Field Notes 1985
SAIPAN								
coastal								
Agingan	1	8	3	-	-	12	12	Hornbostel n.d.
Laulau	-	2	2	-	-	4		Spoehr 1957
Totals	13 (7%)	112 (61%)	41 (22%)	14 (8%)	1 (<1%)	184		

*estimated total number of latte per site
+ my designation for clusters of latte given separate site numbers (RT CP- 49,51, 52, 53, 55, 56).

than coastal sites. This supports early Spanish observations (see Chapter Three) However, recall that the Pulantat site in the interior of Guam has an estimated 34-35 latte while many others in the interior are represented by 10 or more latte.

Table 5-3 provides evidence to refute the hypothesis that size class occurrence is random among sites. Both the sample totals and individual site percentages of each size class shows remarkable consistency. The most dominant trend is the widespread occurrence of 8 pillar latte. Not only does it generally occur more often (61%) than any other size class, but it usually forms the most numerous size class within each site. This generally supports the observations of Hornbostel (Thompson 1932:16) and Reinman (1968:43) that 8 pillar latte are the most numerous size classes found. This pattern is unlikely to be a function of different preservation; large latte are not more susceptible to deterioration or destruction. Rather, similar percentages of the 8 pillar latte are found in sites of significantly different sizes (e.g. Haputo Point, Mochong).

Table 5-3 Relative Frequency

Size Class	Percentage of occurrence 1-20%	21-40%	41-60%	61-80%	81-100%
6	4	1	-	1	-
8	-	1	6	9	2
10	5	9	1	1	-
12	3	3	-	-	-
14	1	-	-	-	-

The 10 pillar latte is the next most common size class and also tends to occur in similar frequencies within sites. There also appears to be a generally consistent ratio with the 8 pillar class. That is, they are usually found in a ratio of 3:1 (8:10 pillar).

As mentioned in the last chapter the site of Taga on Tinian is quite anomalous in its proportions. The same is true for the size classes present. As indicated in Table 5-2 the emphasis is again on the larger than average latte this time in terms of size classes

present; 10 and 12 pillar latte predominate.

As illustrated in Tables 5-4 and 5-5 similar frequency patterns occur irrespective of environmental location. Given the small sample size only general statements can be proposed with the emphasis on trends rather than specific numbers. With one exception, there is some consistency between the percentage of occurrence for each size class in coastal and inland sites. The single exception to the pattern is the 10 pillar latte. While found at 100% of the coastal sites it has been recorded from only 38% of inland sites. Given the consistency of even larger size classes, this is rather confusing. Nevertheless, although the numbers are small,the important point is that 10, 12, and 14 pillar latte have been found in inland sites. (The inland site containing a 14 pillar latte is not included in the sample here).

The remaining size classes are relatively rare. Only a single 14 pillar latte (Mochong) is represented in the sample and perhaps no more than two have ever been recorded in the Marianas. The other is reported from an inland site in the Inarajan district in southcentral Guam (Reinman 1968, n.d.). Six and 12 pillar latte are found in a few sites and, when present, comprise a very small percentage (7% and 8%, respectively).

In light of the proposed hypotheses the following major points must be emphasised. First, there is a repetition in the relative frequencies of size classes within sites; 8 pillar latte form the nucleus of most sites with 10 and/or 12 pillar latte also present. This pattern is present in both coastal and inland sites. It is also important to note that 12 pillar latte occur in both coastal and inland sites. The larger (10+ pillar classes) latte were not built within a few, select sites but have a general distribution. When present they form a small percentage of the latte present. No site hierarchy could be established on the basis of the presence of larger size classes alone.

With the 12 pillar forming a small percentage we might hypothesise that these represent the residences of district leaders. To examine this we need to look at their occurrence in a regional context. If this is what they were then some spacing within an island would be expected as each represents a central place within

Table 5-4 Occurrence of Latte in Coastal Sites By Size Class

N = 11

Size Class	No. of Sites	%
6 pillar	4	36
8 pillar	10	91
10 pillar	11	100
12 pillar	5	45
14 pillar	1	9

Table 5-5 Occurrence of Latte in Inland Sites By Size Class

N = 8

Size Class	No. of Sites	%
6 pillar	2	25
8 pillar	8	100
10 pillar	3	38
12 pillar	2	25
14 pillar	0	0

any given 'district' (Christaller 1933) or occupies an environmental advantageous position assuring economic autonomy (Peebles and Kus 1977).

However, there are immediate problems with this hypothesis; first, over half of the sites containing a 12 pillar latte have either two or more of these strucures (Taga, Unai Dangkulo, Gogna, Acapulco, Mochong) or exhibit a 12 and 14 pillar (Mochong). Secondly there does not appear to be any regular spacing between sites containing these latte. Lastly, 12 pillar latte are not strictly correlated with optimal environmental zones. The site at Pagat, along the northeast coast of Guam contains a 12 pillar latte. As discussed in Chapter 6, this is one of the more marginal areas on Guam.

Spatial Organisation

Although many latte sites have been recorded within the Marianas, very few detailed site maps exist. As a result, no detailed analyses of village patterns has been undertaken. Village patterns are characterised by a linear layout with the largest latte being in or near the center of the line (Spoehr 1957:172).

As discussed in Chapter Two, intra-site patterning can often provide information regarding social distinctions. To briefly summarise, if protohistoric Chamorro society was a vertically differentiated society it might be expected that a site would be dominated by the presence of a single large latte or perhaps clusterings of larger latte representing a high status area (i.e similar to the intra-village pattern described from Yap, Hunter-Anderson 1983). Alternatively, a segmental, horizontally differentiated system, may be characterised by a recurring pattern of size classes within and between sites.

Data discussed in the preceding section indicate that the relative frequencies of size classes at individual sites do recur in a regular fashion. Sites contain more than one size class and in larger villages there are numerous examples of larger size classes. There especially seems to be a consistent ratio between the 8 pillar and 10 pillar latte. Recall also the brief mention by Legaspi that

Chamorro villages were divided into 'barrios'.

An examination of available site maps suggest that two types of sites may be delineated, based on variation in spatial configuration. The first type fits the 'classic' configuration, a roughly linear alignment of latte arranged end to end. Sites of this type can exhibit a single series of latte as seen at the Tinian sites of Taga (Figure 5-2) and Tachogna (Blue) (Figure 5-3) or two parallel rows of latte such as seen at Dugi (Figure 5-4) on Rota and Agingan (Figure 5-5) on Saipan.

The second type of settlement configuration lacks the uniformity of the first. The linearity is either restricted to certain areas within the site such as at Mochong (Figure 5-6) or is completely lacking and replaced by clusters of latte across the site (i.e. Nomna Bay, Figure 5-7 and Talofofo River Valley site, Figure 5-8, both on Guam).

The overall spatial configuration is much more variable than the traditional view suggests. While linear alignment is characteristic of some sites it is far from a standard settlement pattern. It might be suggested that as a settlement grows it would eventually experience a disintegration of pattern as the population density reaches a critical threshold and that it is size rather than simply duration of occupation which would affect intra-settlement configuration. There is some suggestion of this occurring at Mochong which represents the largest remaining latte settlement in the Marianas.

At first glance, the settlement configuration of Mochong (Figure 5-6) appears to have little organisation beyond the slight circular shape shape with the latte along the west and east edges situated obliquely to the shore while those in the central area are more parallel. Indeed, the central portion of the site exhibits a somewhat linear arrangement comprised of at least two rows.

Mochong also deviates from the classic pattern by the lack of the large latte occupying a central place. In fact, the largest latte in the site, ML-4 (14 pillar), sits towards the eastern edge as does ML-1 (12 pillar).

However, this non-linear pattern also shows up in much smaller sites. Nomna Bay (Figure 5-7) contains less than half the number at

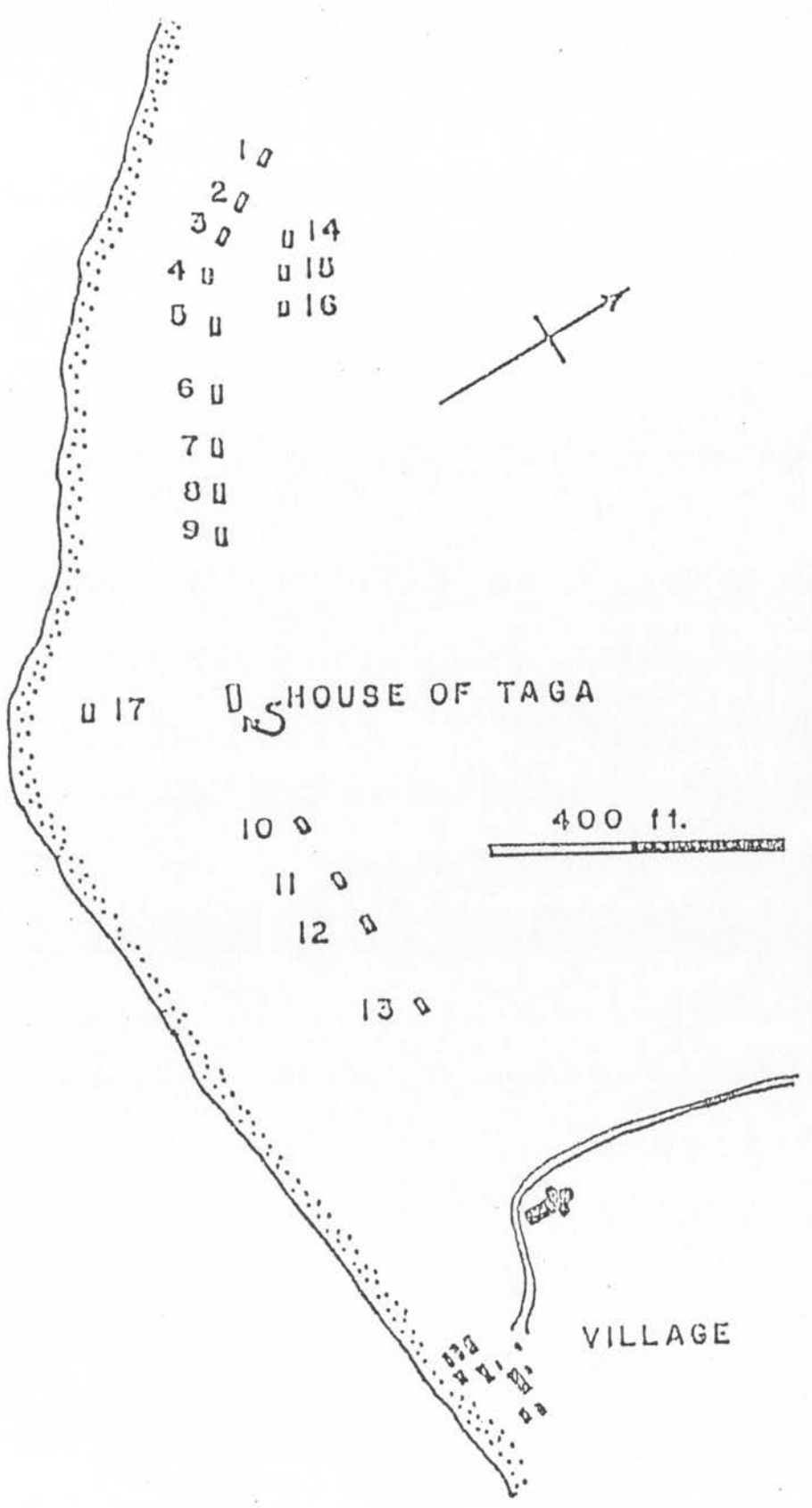


Figure 5-2 Taga, Tinian (from Thompson 1932)

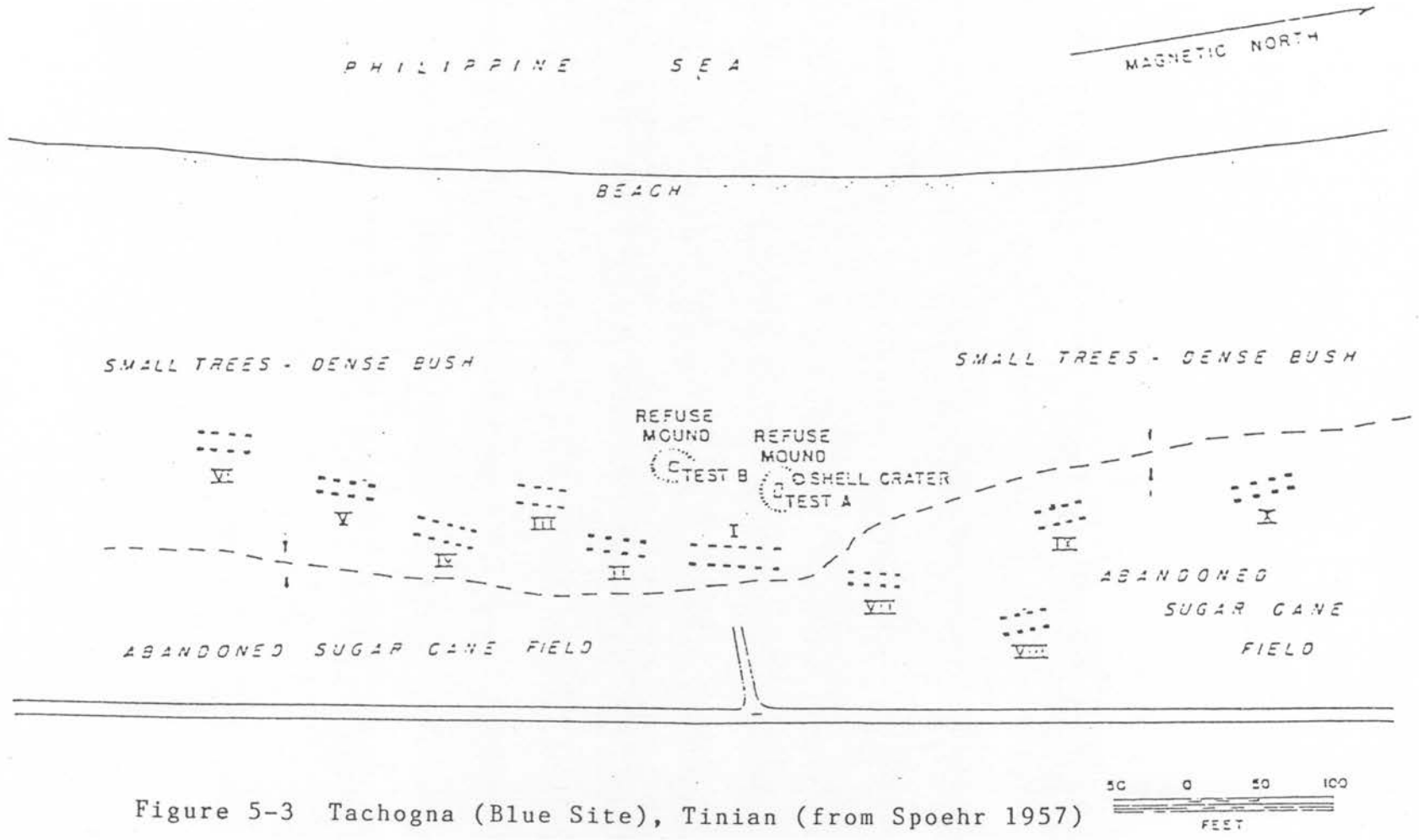


Figure 5-3 Tachogna (Blue Site), Tinian (from Spoehr 1957)

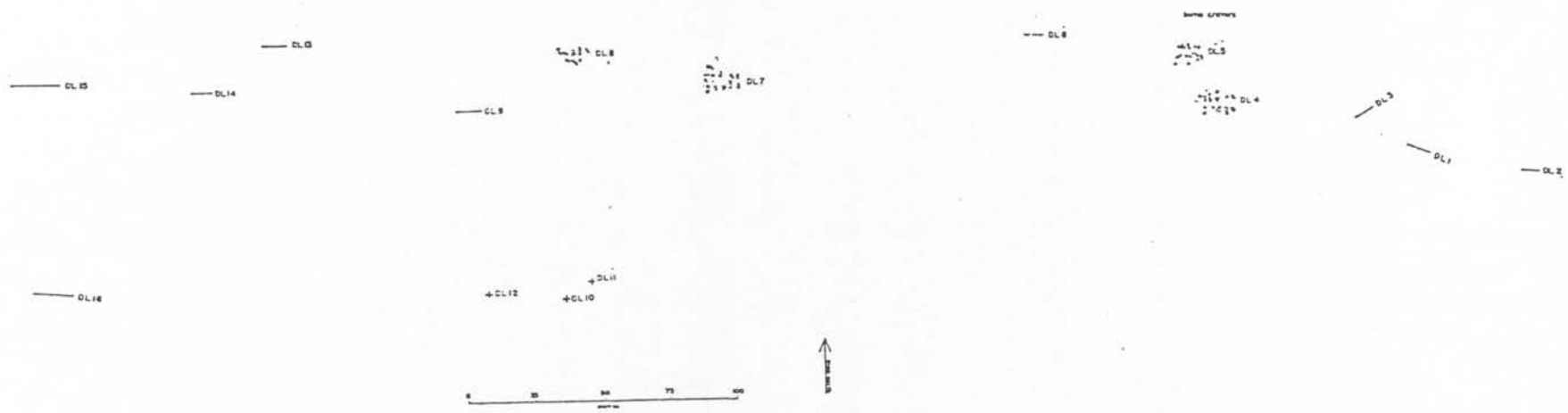


Figure 5-4 Dugi, Rota (from Ward and Craib 1983)

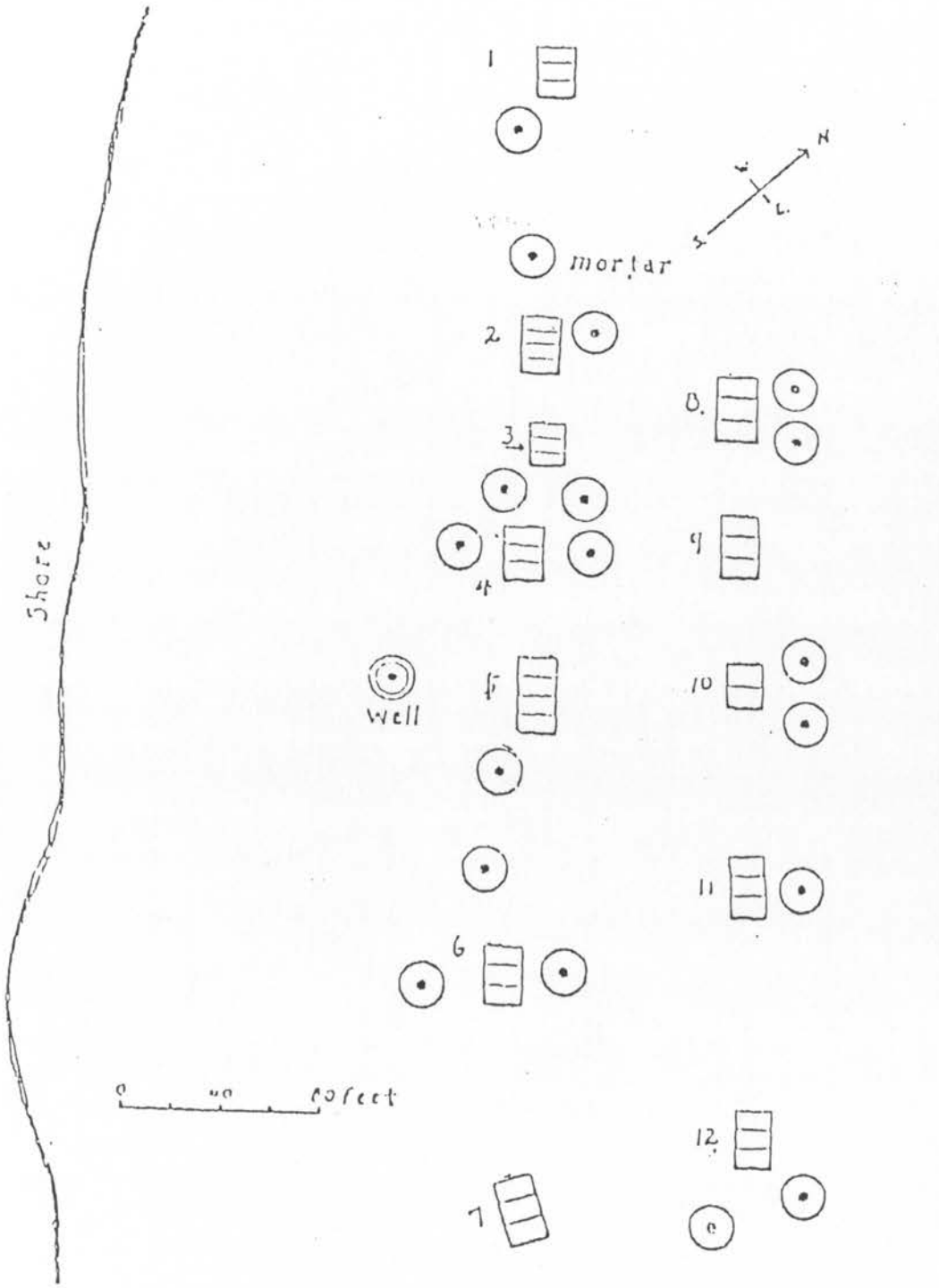


Figure 5-5 Agingan, Saipan (from Thompson 1932)

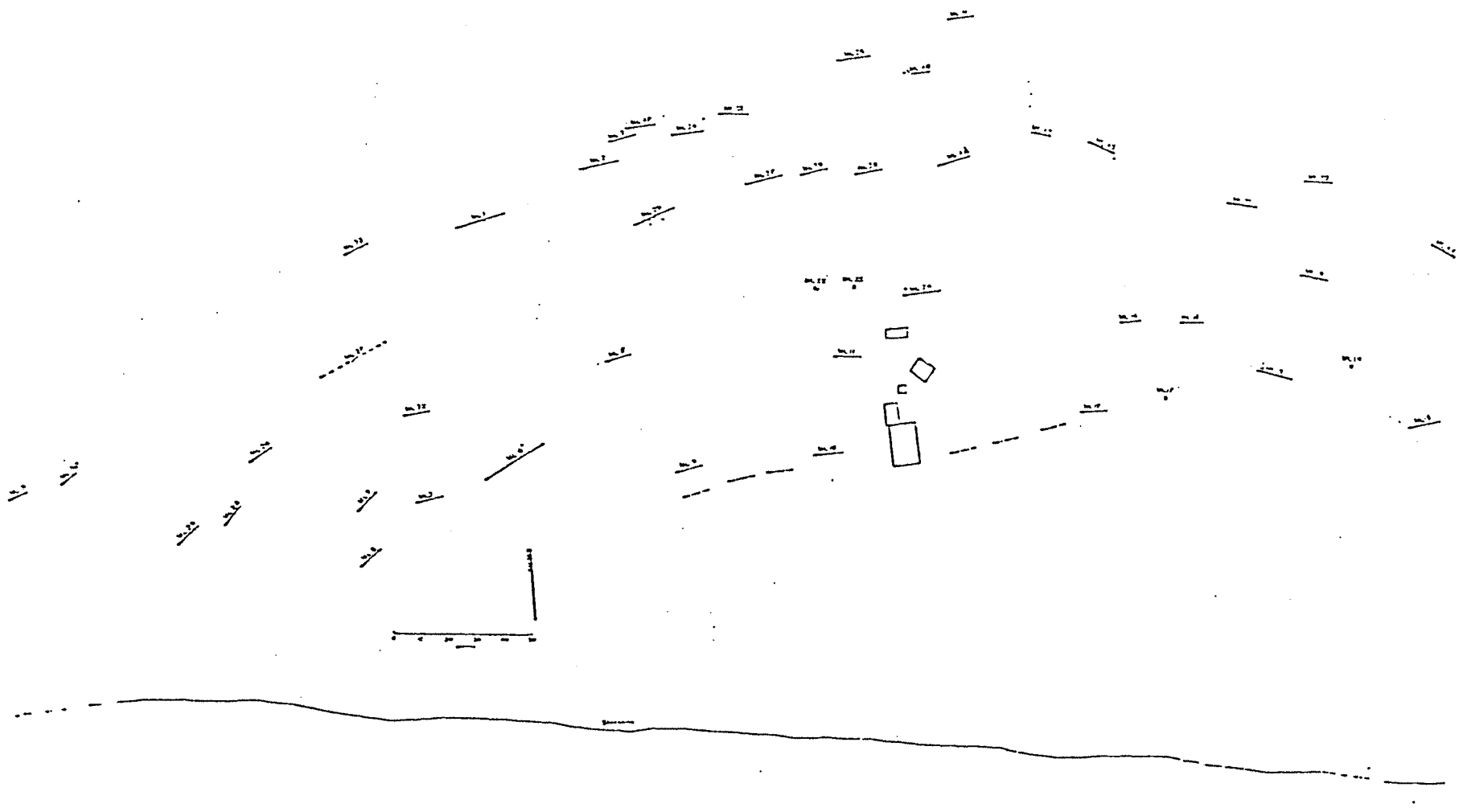


Figure 5-6 Mochong, Rota (from Ward and Craib 1983)

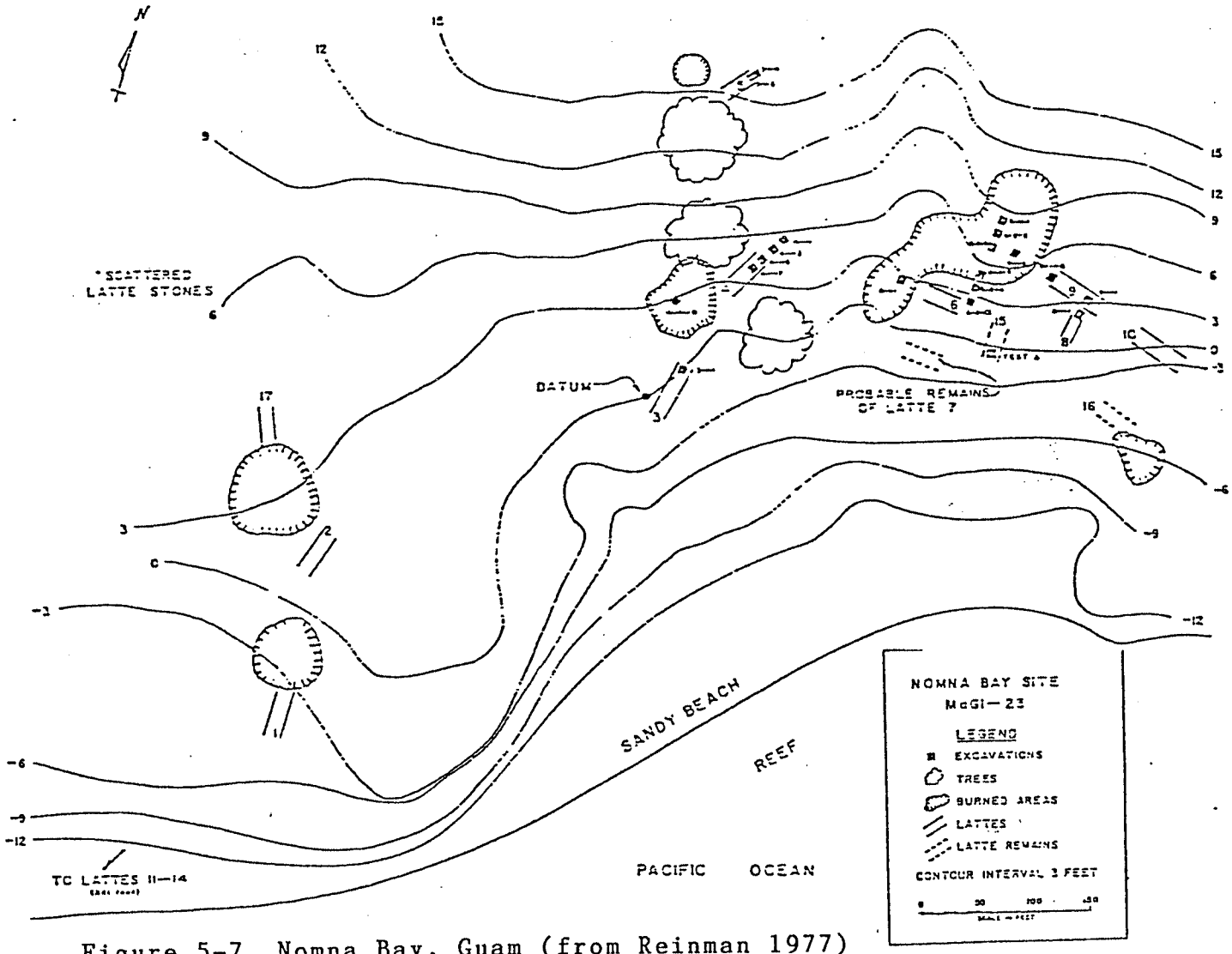


Figure 5-7 Nomna Bay, Guam (from Reinman 1977)

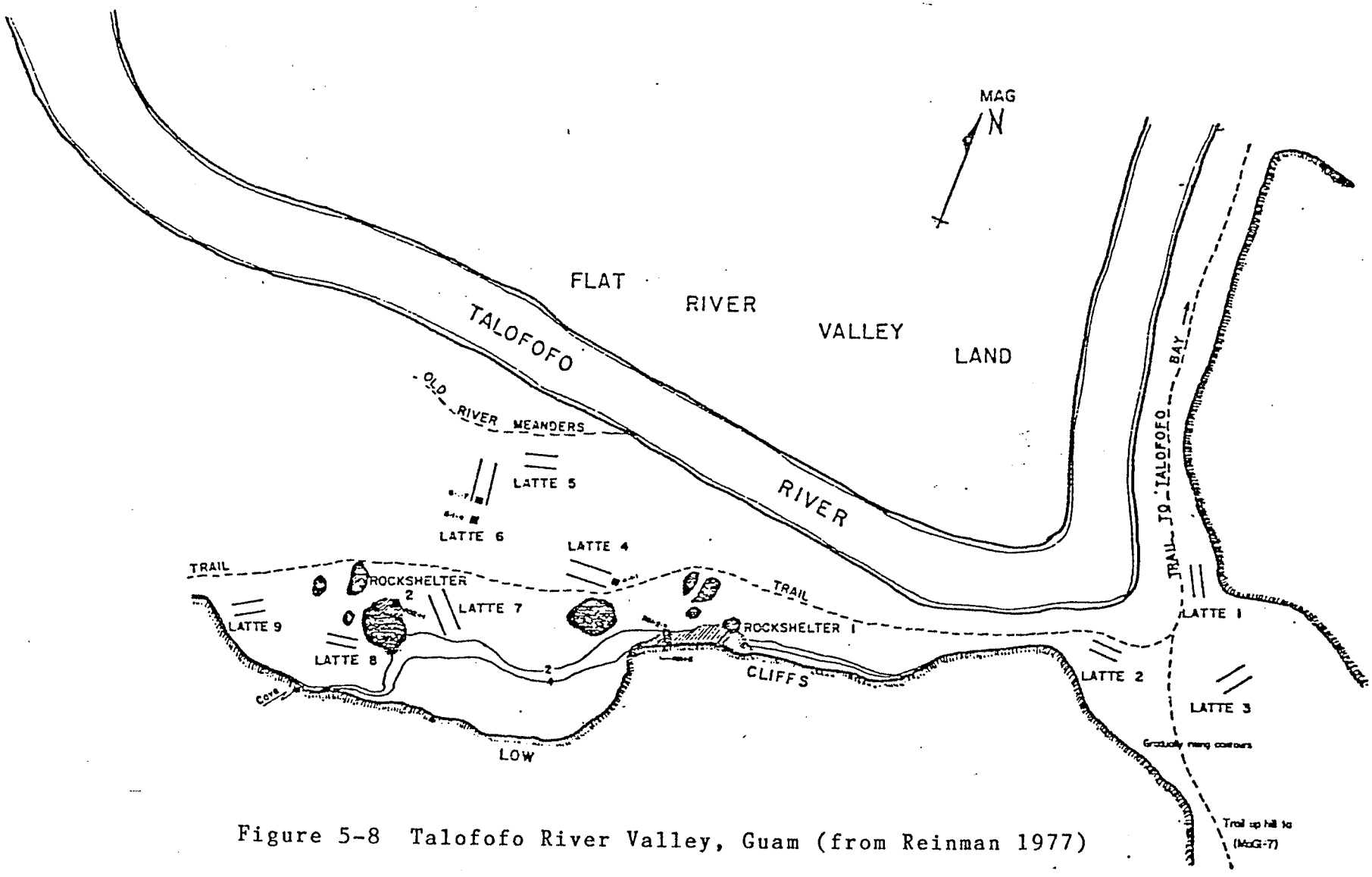


Figure 5-8 Talofofo River Valley, Guam (from Reinman 1977)

Mochong (about 17, of which 13 are mapped) which are found in separate clusters across the site. Though some are parallel and/or perpendicular to each other, the overall settlement pattern is non-linear. Though documentation of each latte to size class is not complete for the site, indications are that each cluster has at least one large latte.

The Talofofo River Valley site also consists of latte clusters (Figure 5-8). In this settlement none of the nine mapped latte appear to be oriented in any systematic fashion. While the previous two sites (Mochong and Nomna Bay) had portions of the settlement aligned in parallel fashion, the Talofofo River Valley site does not appear to have ever been set out in a systematic fashion.

Similarly, other large sites (though not approaching Mochong in size) still retain their linear configuration. Dugi, for example has, perhaps, 20 latte and exhibits a double parallel design. Taga, which appears anomalous in so many aspects already discussed, consists of at least 17 latte aligned in a systematic fashion. Likewise, Tachogna is set out in a systematic fashion if not strictly linear design. In fact, this site appears to have served as the type-site for the 'classic' configuration (see Spoehr 1957).

The Yapese pattern described by Hunter-Anderson (1983, 1984) is in a context of clearly differentiated socio-political statuses and as such the internal divisions appear to primarily demarcate political space. Households of higher status groups tend to be clustered together within a site.

Another important misconception in the traditional view of intra-site patterning is that large latte occupy a central position. Indeed, there is rarely a site which contains a single large latte; the usual pattern of occurrence involves 8 and 10 pillar latte.

In an initial attempt to analyse intra-site patterns of latte, the Nearest Neighbour statistic was employed. This proved unsatisfactory given the linear alignment of many latte arrangements (see Porter 1960 for arguments against the usefulness of this approach when items are linear in arrangement). However, the data (i.e distances to nearest neighbour) generated in this exercise revealed a regular spacing among the larger latte (those having 10 or more pillars). This contradicts recent comments by Graves

(1985:15) to the effect that spacing of latte is neither random nor regular though he was referring to all latte within a site. As Orton (1980:197) has suggested visual inspection can easily discern linearity but is not as good at picking up aggregated, random or regular patterns. In fact, many (perhaps most) latte sites do not fit this classic linear pattern.

No physical boundary markers are found within latte settlement indicative of internal divisions. This analysis sought to test the idea that if latte settlements were comprised of more than one residential group then large latte (10+ pillars) may have served as central places within a barrio and this pattern should be found to be duplicated if horizontal differentiation was occurring. A single central place should be found if vertical village-wide organisation was occurring.

Central Place theory was originally formulated by the geographer Christaller (1933). At its simplest the theory predicts that if centres can be identified some regular spatial pattern will be observed between these centers. Of the three types of centers Christaller identifies the relevant one here is administrative centre.

If large latte served as the residence of lineage head and this latte served as the administrative center for that kin group then the smaller latte of that kin group should all fall within the 'area' (as defined by the polygons) of that large latte. This would be roughly analogous to Renfrew's kinship space (1981). Conversely we might expect to find a large latte dominating a settlement at the middle as suggested by the statements presented above. In this situation especially within a large village a more centralised political organisation may be argued.

Although the application of this method on an intra-site basis is limited, the use of Thiessen polygons to delineate intra-site polities has provided interesting results. Blanton (1978) identified 15 areas within the extensive Zapotecan capital of Monte Alban. Each division was defined by the distribution of civic and/or elite buildings forming large mound groups. Each division was argued to represent barrios (Blanton 1978:21). Though Blanton considers the possible arbitrary nature of these division he notes that at Monte

Alban, some of the polygon boundaries follow walls and other physical features. This, he argues (1978:21), suggests that the polygon boundaries reflect actual internal divisions.

In order to investigate potential intra-village patterning of latte, a series of Thiessen polygons were drawn. These polygons are constructed by measuring a point midway between the large latte and then drawing a perpendicular line which serves as a boundary. Within the area enclosed by the polygon all latte are closer to the large latte within the area than to any other.

It is acknowledged that a set of significant problems may beset the application of this method to intra-site data. First, differential destruction may result in a portion of the larger latte no longer being visible which would skew the pattern considerably. Secondly, the identification of the size class of a latte in poor condition may also result larger latte being misrepresented. Lastly, mapping inaccuracies may lead to the erroneous placement of latte further skewing the pattern.

Two crucial variables are determination of size class for each latte and an accurate location within the site. Degree of preservation can be critical, latte do not have to be still standing for either of these variables to be recorded given that a sufficient numbers of the pillars or capstones remain. Unfortunately there are very few published sites maps which would be amenable to this type of analysis. The initial data set to be analysed in detail here comes from recent detailed mapping projects at two sites on Rota, Mochong and Dugi.

Mochong

Mochong is a large (c. 11 ha) coastal village on the northern coast of Rota. Forty-seven latte were identified and mapped and the approximate positions of six more were provided by the land owner (Figure 5-6). The site is in a remarkably good state of preservation though it received some disturbance during World War II as attested to by the presence of defensive trenches (Denfeld pers comm). During this time approximately six latte were bulldozed (Mendiola pers comm).

Due to its size and non-linear configuration, the spatial analysis of Mochong is quite complex. A Nearest Neighbour analysis was performed and yielded an Observed:Expected ratio of 1.08682 which indicated a tendency towards a clustered distribution. Nine large latte were identified in the sample from Mochong including ML-44, ML-15 and ML-27 which are tentatively identified as large. There appears to be a somewhat regular spacing of all large latte within Mochong, but especially among the five easternmost sets (Table 5-6). Among the nine latte there is a mean distance of 62±16 m. Only a single distance, between ML-25 and ML-34, varies significantly, these being closer together - 31m. When this distance is deleted the deviation becomes significantly smaller at 69±8 m.

Table 5-6 Spacings Between Large Latte Eastern Portion - Mochong

	ML-1	ML-4	ML-25	ML-27
ML-1	--			
ML-4	84	--		
ML-25	64	80	--	
ML-27	70	60	96	--
ML-34	64	114	31	122

If we accept ML-27 as a 12 pillar latte then the four largest latte at Mochong are aligned with each other. ML-1 and 4 are situated in the eastern half of the site on a nearly due north-south axis. The line between other 12 pillar latte (ML-24 and 27) bisects this axis on an east-west plane. The long axis of each of the four latte varies in angle so that there is no 'complete' alignment of these features. The area defined by the placement of these latte is nearly devoid of other latte.

If we assume that only ML-1 and ML-4 are the largest then the argument might be made that Mochong was divided into a northern and southern half. However, this would be in contradistinction to most village divisions in Micronesia which are usually divided so that each section has direct access to the sea. It would also produce a confusing pattern in that the southern (inland) portion of the village would contain six of the nine large latte at Mochong. The northern, coastal section although having the largest latte (ML-4)

would only contain three others, assuming the placement of ML-27 is actually north of the line.

An additional experiment was conducted using all large latte as central places and constructing Thiessen polygons from each. Figure 5-9 shows the configuration obtained. Perhaps significantly, no latte was cross cut by the boundary lines; all latte fit within each area though some are close to these boundaries.

Nine areas were produced, four of which have unobstructed access to the coast. Seven of the nine areas have roughly the same number of latte. No internal pattern is readily discernible within these boundaries. Of interest is the separation of ML-1 from the rest of the site. Although this is not the largest latte at Mochong, it is unusual in its construction. Instead of having two rows of pillars it contains one row of six pillars and massive coral slabs sit along its southern side. This latte was excavated by Takayama and Egami in 1971 and a typical latte assemblage was uncovered along with burials including women and children. There is nothing to suggest that it was used for any special purpose or represented anything other than a large residential structure. Nevertheless it is spatially distinct.

With the relatively tight cluster of large latte in the eastern half of the site, the areas enclosed by the polygons are smaller in this part of the site than in the west. The area enclosed around ML-25 is the smallest within the site and contains only two latte which suggests that this division may be in error.

None of the methods presented above yield a clear picture of latte distribution at Mochong though the use of polygons suggests a partial pattern which is quite intriguing. Smaller latte do not appear to form any discernible pattern within any other areas; they do not cluster around nor are at regular intervals from, the large latte of that area. I would suggest that this may be the result of the loss of latte within the site, most probably one or two large ones. To test the usefulness of this method it was applied to a series of other sites; these are presented below.

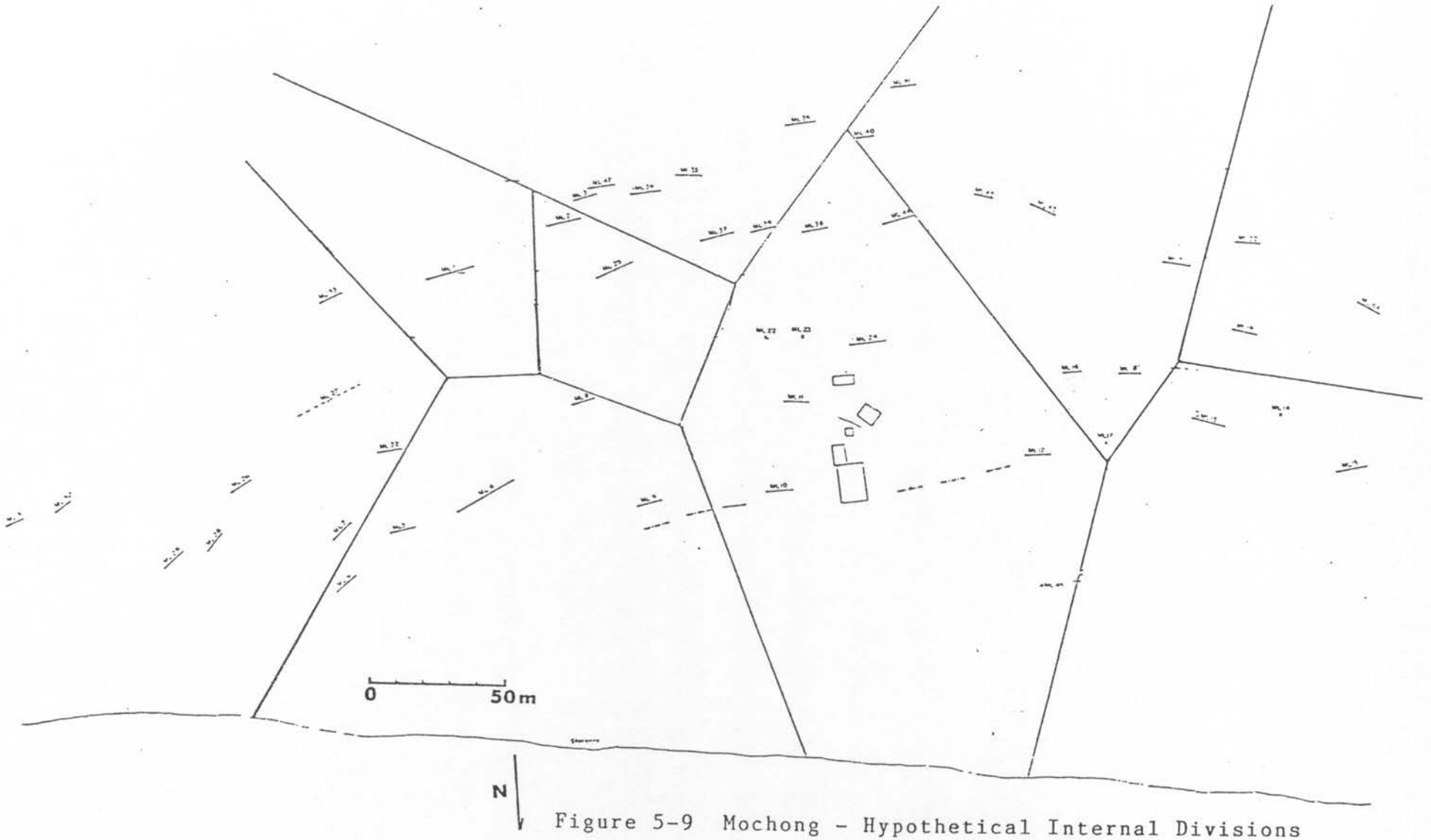


Figure 5-9 Mochong - Hypothetical Internal Divisions

Dugi

The site of Dugi sits atop a ridge approximately 3 km inland, overlooking the northwest coast of Rota. Approximately 15 latte existed here and were arranged in a linear fashion; ten of the latte are aligned along an east west axis, following the bluffline. A second line of latte, badly disturbed, sits immediately south. No excavations have been undertaken at the site thus no dating of these structures is available.

It does not fit the 'expected' pattern which would see the central latte as the largest. In fact, four 10 pillar latte are found at Dugi and all are regularly spaced except for DL-7 and DL-10 (Table 5-7). However, this apparent anomaly may in fact be part of the general pattern of spacing. As noted in Mochong, the single exception to the regular spacing was a distance measuring nearly half the regular distance (i.e. ML-25 - ML-34). The distance between DL-7 and DL-10 is also nearly half the mean distance. What significance if any this may have is still unclear but the point is that at least in these two sites there appears to be a systematic pattern emerging from an apparent anomaly.

Table 5-7 Spacing of Large Latte - Dugi

	DL 4	DL 7	DL 10	DL 15
DL 4	--			
DL 7	27	--		
DL 10	38	15	--	
DL 15	xx	37	31	--

xx - no measurement

Additionally, the layout is only generally linear. While there is a east-west orientation to the site and even to specific latte, there is significant variation to this pattern as exhibited among latte in the eastern end of the site (DL-1, D1-3)

Three of the four areas defined were along the 'line' of latte. Figure 5-10 shows that even along the linear alignment there were breaks between clusters of latte.

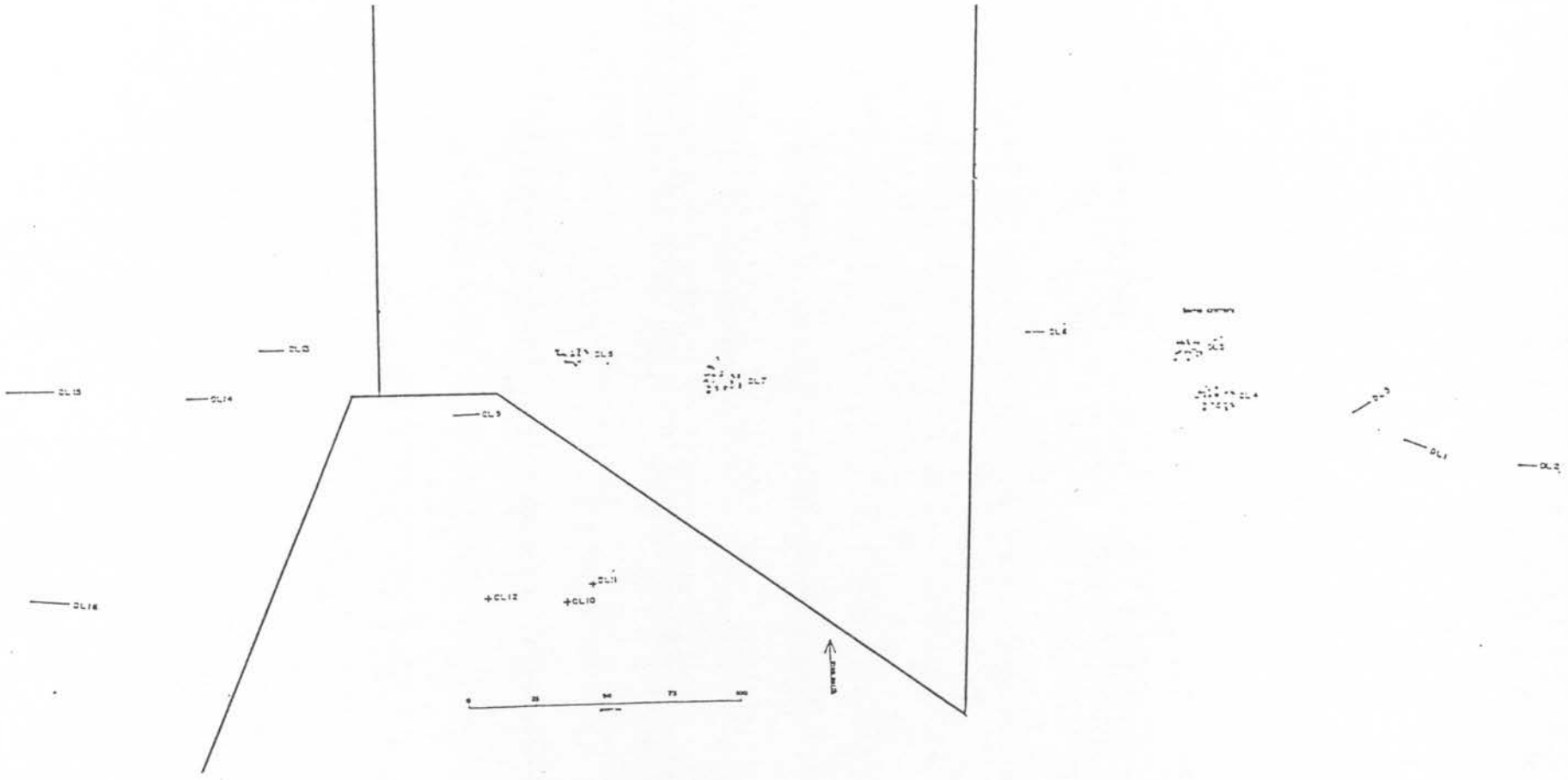


Figure 5-10 Dugi - Hypothetical Internal Divisions

The analysis of spatial distribution of latte at Mochong and Dugi provide a series of important observations. Only a few of the other site maps appeared to contain sufficient data and accuracy for this technique to be applied. The two other sites examined here are Agringan on Saipan and Tachogna (Blue) on Tinian.

There appears to be a pattern of regular spacing between the large latte within any given site. The Tachogna (Blue) site does fit the 'classic' latte orientation (Figure 5-11). Not only are the latte in a general linear alignment but the largest (in this case a 12 pillar) sits near the centre of the cluster. The next largest latte, a 10 pillar set (Blue IV) is found approximately 30 metres to the west. According to Spoehr's map, if these two latte were used as central points a clean break could be made which would divide the settlement nearly in half.

The site at Agingan contains two 10 pillar latte both situated towards the center of the site along the seaward alignment. The distance here (assuming Hornbostel's map is somewhat accurate) is also roughly 30 metres. Dividing the distance between these two latte in half neatly separates the site in two (Figure 5-12).

Nomna Bay, consisting of clusters of latte, cannot be divided up in this manner however, there is some suggestion that each cluster contains at least one large latte and thus represents a different configuration of the same pattern regarding frequencies.

Once again, the Taga site runs completely counter to the established pattern. As illustrated in Figure 5-2, the largest (perhaps in terms of height) latte ('The House of Taga') is found in the centre of a rather linear alignment but two other 12 pillar latte are located at the northern end of the alignment.

An important point here is that even though many latte sites are roughly linear in configuration, there is not a simple arrangement with the 'largest' necessarily in the middle. Though the specific distances may vary from site to site, there appears to be a pattern of regular spacing between the larger latte within the sites examined here. At present no apparent pattern or spacing has been found to occur between smaller latte and the larger features nor among the smaller latte themselves.

Combining the findings of this section with those from the

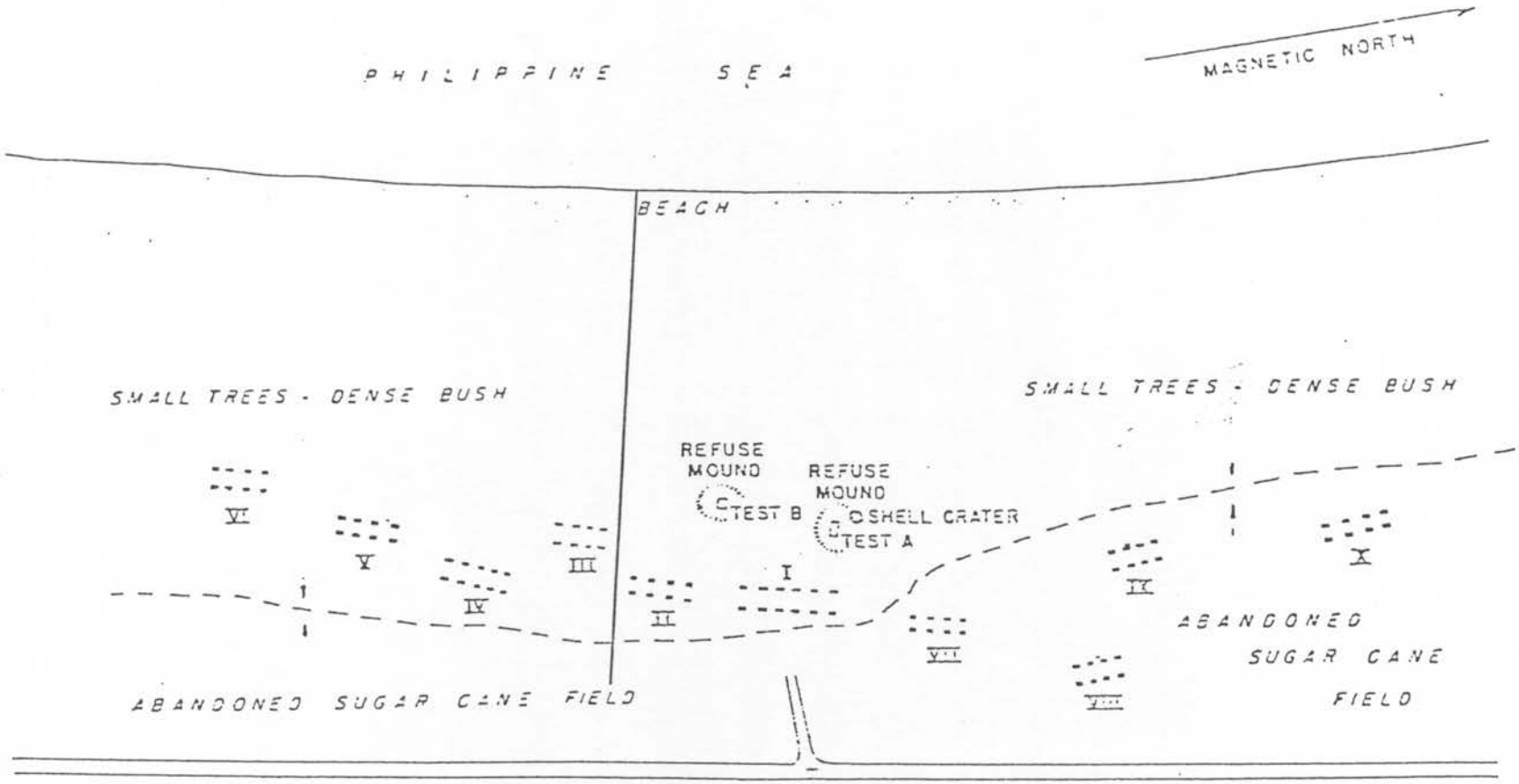


Figure 5-11 Tachogna - Hypothetical Internal Divisions

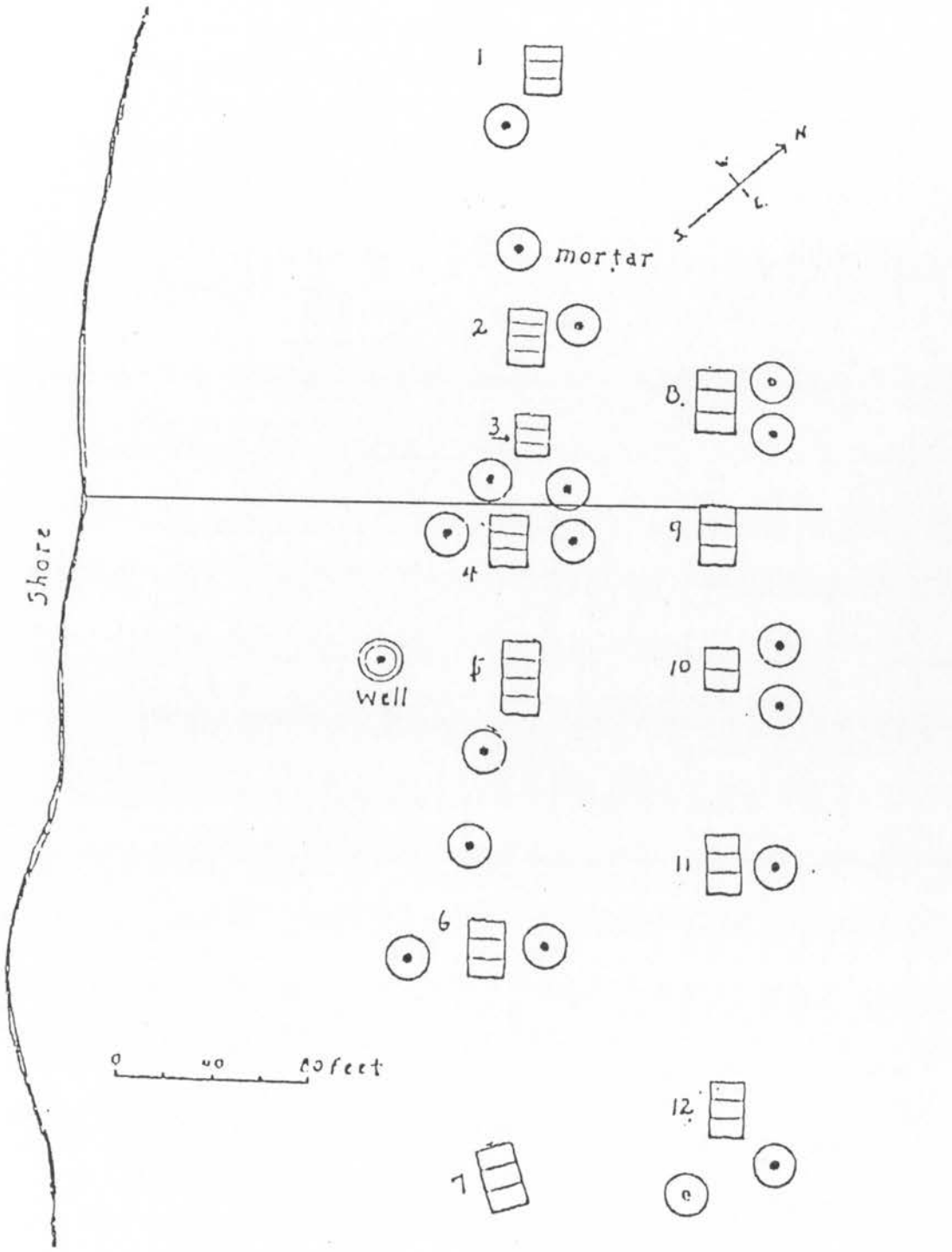


Figure 5-12 Agingan - Hypothetical Internal Divisions

preceding section, it can be argued that the unequal occurrence of size classes is not random and that the larger latte are spatially dominant within a site and serve to divide settlements into smaller segments. It is also noted that these segments are similar to each other in composition; each containing a large 'central' latte associated with a group of smaller latte. Perhaps barrio is too specific a term to apply to divisions within a latte settlement.

Certainly there are practical problems with arguing these internal divisions too far. First it assumes that all or nearly all latte have been recorded and accurately mapped and, perhaps most importantly, that they are contemporaneous. In some sites the first condition can be argued relatively easily but we have has yet little temporal control over unexcavated latte.

Given the relatively small spaces involved and the problems outlined above it would be unwise to argue that the polygons represent exact boundaries. The most important point in this section is that larger latte are regularly spaced within settlements and while the distances may vary the regularity appears to be consistent among sites. At the very least this exercise raises some interesting possibilities and points out the need to further investigate spatial orientation and placement of latte within settlements.

If large latte are analogous to administrative centres, serving as the residences of senior kin headmen, then the smaller latte within the same section would represent the subordinate, administered units. According to Johnson's (1978, 1982) proposition, there should be a relatively consistent ratio between the centres (large latte) and administered units (smaller latte) of about 1:6. A consistent occurrence has already been suggested in the observation made earlier in this chapter regarding the regular occurrence of 10 and 8 pillar latte (1:3) within a site. Table 5-8 demonstrates a remarkable consistency among ratios from a number of sites, all corresponding to Johnson's figure. This supports the idea of a non-random occurrence of size classes within sites and that large latte do not form a distinct class on their own but rather are related to smaller latte in regular fashion.

Table 5-8 Large Latte:Total Latte ratios

Site	Mean Per Section	Mean Entire Site
Mochong	1:4	1:5
Dugi	1:4	1:4
Tachogna	1:4	1:5
Agingan	1:6	1:6
Nomna Bay	1:5	1:4
Totals	1:4.6	1:4.8

The consistency throughout the, admittedly small, sample suggests that intra-site sections do have some validity as organisational units. The small number of settlement sections per site would imply relative autonomy on, at least, an intra-site basis. If so then this would partly answer the question regarding the existence and degree of dominant and subordinate areas within a site. That is, are the sections containing the largest (i.e. 12 or 14 pillar latte) dominant over those with 10 pillar latte as central places? There is no indication from the spatial placement of the largest latte in terms of central placement or other kinds of spatial dominance. Additionally, it is rare for the largest latte in a site to be the only one of its size class present. Recall that in over 50% of the sites which contain 12 pillar latte, more than one exists. The multiple occurrence of 10 and 12 pillar latte within a settlement suggests that no matter how these size classes may reflect social differentiation, the intra-site pattern is strongly suggestive of a mosaic of small, similar, autonomous groups.

Unfortunately, the extant sample of sites is too incomplete to adequately consider the next level of analysis, regional comparison. In fact, it may prove to be impossible to investigate in any detail the question of regional organisation at least in terms of spatial distribution of largest latte. It may be expected that if regional integration was developing there should exist a spatial pattern in terms of the distribution of largest latte (assuming they represented the highest level of control within and among settlements) similar to that found on an intra-site basis.

Concluding Remarks

An examination of the regional distribution of latte sites demonstrates that they exist in all major physiographic regions at least within the southern islands. At the same time, there is no convincing evidence for separate non-latte habitation sites. It would be difficult to argue that poor preservation alone would account for the lack of archaeological visibility of non-latte dwellings. If they exist we must now look within latte settlements.

Neither is the coastal/inland separation of social ranking reflected in distribution of latte, if the latter are argued to be exclusive markers of high status. Inland latte sites are known to be common, are often extensive, and may contain all size classes.

The examination of the presence and relative frequencies of size classes has produced some interesting results. Intra-site size class occurrence appears to be non-random among all sites with 8 and 10 pillar being the most common. The intra-site contents of habitation sites, in terms of latte, appears to be consistent among settlements in the Marianas. They are characterised as a consistent set of equivalent groups rather than forming any site hierarchy based upon the presence of large latte. Equally, there are no site (with the exception of Taga) where a majority of latte consist of the large variety.

Larger latte (10+ pillar) appear to have served as central places within a settlement and most likely as the focus of residential groups. There is now some suggestion that large latte served to spatially organise intra-site configuration. Their multiple occurrence within, and regular spacing across, a site are new observations which do not fit the previous views in any way. That habitation settlements may consist of equivalent segments may have important implications about what these features may signify about Chamorro social divisions. Irrespective of how sites may be divided the consistent ratio of nearly 1:5 and its similarity to Johnson's figure argues for some form of internal structure within latte settlements. This also implies that non-latte residences, if they exist at all, would not be found within these intra-settlement sections since the addition of more residence groups would confuse the situation considerably. It is now crucial to examine a Proto-

historic site in some detail and investigate how the distribution of features and other cultural materials are organised.

The picture of latte is beginning to be clearer. Some old ideas have been dispelled and others supported and/or clarified. The spatial configuration of villages represents important new information. But in order to more clearly delineate residential groups we still need to investigate the existence of the non-latte residence. To do this will now require examination of a Protohistoric latte settlement.

CHAPTER SIX - PAGAT: Background and Current Research

In this chapter a detailed examination of the Protohistoric component of the site at Pagat, along the northeast coast of Guam. This is done in order to examine a Protohistoric site on two levels. The first is in terms of site content. Simply, the questions under consideration here concern the range of artefactual types (in functional terms) within the site and the range of behaviour responsible for these remains. From this, statements regarding site type are made. It differs from the kind of analysis in Chapter Four in that here cultural materials from latte and non-latte areas of the site are examined. Most analyses of artefactual variation from sites in the Marianas have focussed on temporal variation through stratigraphic succession. In this chapter, the emphasis is upon functional variation within an assemblage. Chapter Seven incorporates the findings here into an analysis of how these materials are distributed throughout the site.

As discussed below, Pagat sits in a relatively marginal environment. Thus the second level of investigation concerns the question of how they supported themselves in such a setting. Were they self-sufficient or was an influx of goods necessary to maintain the settlement?

The only know specific mention of this general part of Guam in the Sanvitores narrative. He mentioned 'Pagat' on two occasions. The first is in regards to a church which was built in the area and the second relates a story about two priests hiding out in a cave. Given the relatively difficult access to the present Pagat site it seems unlikely that it was on this limestone bench that the church was constructed nor is there any archaeological evidence of a structure though it is probable that the site was occupied in the early contact period.

It is unclear when this site was first visited by archaeologists (e.g. Reed 1952), but it was initially recorded in 1965 by Fred Reinman who returned in 1974 and conducted test excavations (Reinman n.d.). Reinman (n.d.:1) describes the Pagat site as a 'relatively large latte village' containing numerous surface features. In addition to latte, stone mortars, rockshelters and 'mounds of living

debris' were recorded. The 'main area' of the site (containing all the surface features and the 'heaviest concentration of site remains') extends eastwards from a large sinkhole for about 500 metres. With the maximum site width estimated about 75 metres, the total site area, identified by Reinman, would be about 38,000 square metres.

Between 15 and 20 latte structures were estimated to have existed within the site though only two sets are still upright with an additional four pillars standing towards the eastern end of the site (Reinman n.d.:2). Reinman observes that the orientation of these structures follow the pattern he found elsewhere on Guam; placed parallel or perpendicular to natural features. At Pagat these are the northern cliffline and the coast.

A predominant feature of the site topography at Pagat is the presence of 50 'distinctive mounds'. These mounds were defined on an impressionistic basis and often represented suspected areas of artefact concentrations as much as observed topographic variations (Reinman pers comm). These mounded areas are similar to those recorded elsewhere in the Marianas and will be discussed in Chapter Seven.

A series of further test excavations were performed sporadically at Pagat by the Guam Territorial Archaeology Laboratory. During this time, nine additional 1 x 1 metre units were excavated, yielding a total of approximately 5.35 cubic metres. No summary report was written but field notes (when available) suggest a pattern of artefact concentration and stratigraphic division nearly identical to that described by Reinman.

My work at Pagat ran from October 1981 to May 1982, in conjunction with the Guam Territorial Archaeology Lab. During this period, site mapping, intensive surface collection, and further excavations were conducted. Subsequent to my participation, the Territorial Lab performed additional excavations, however data generated from this activity will not form a part of this thesis.

Physical Environs

The Pagat area is situated within the most extensive

physiographic region on Guam - the northern limestone plateau (Tracey et al. 1959). This area is a long, slightly undulating mesa with steep cliffs dropping almost vertically to the sea 100 metres below. At the base of the plateau are narrow limestone benches characterised by rugged karstic topography, and lack of beach development; this is found especially along the northeastern coast.

The northeastern coast of Guam is an exposed, high-energy area with virtually no reef development. This coastline extends for approximately 31 kilometres from Pago Bay northeastwards to Pati Point (Randall and Holloman 1974); the Pagat site is located about midway along this coast, immediately south of Pagat Point (Figure 6-1).

The northern area of Guam is also characterised by a lack of surface water; the porous limestone allows for little runoff. Yet the area is not devoid of water given the massive water lens under the limestone in the form of water-filled caves.

The immediate environs of Pagat conform well to the above description; no beach exists along the foreshore and the limestone bench drops sharply from a height of between 10-20 metres above the sea (Figure 6-2). The seaward edge of the site is found from 60 - 80 metres from the shore. This intervening area consists of a rugged limestone terrain covered by low-lying, salt-resistant vegetation such as Scaevola (Figure 6-3).

A large sinkhole sits at the western end of the Pagat site; openings to two large caves are found at the bottom. One cave has been nearly filled by roof fall while the other contains two caverns both containing large pools of fresh water, one of which is nearly 5 metres deep. Artifacts found within and around both of the water-filled caverns suggest their presence and use during occupation of the site.

The soils of the north have been described as lithosolic latosols and labelled as Guam clay (Tracey et al.1959). This is a generally shallow, slightly alkaline soil developed from decomposing coral and local organic debris.

The Mixed Limestone Forest community is characteristic of the northern limestone plateau. Currently, much of the plateau is covered in Tangan-tangan (Leucaena leucocephala), a result of

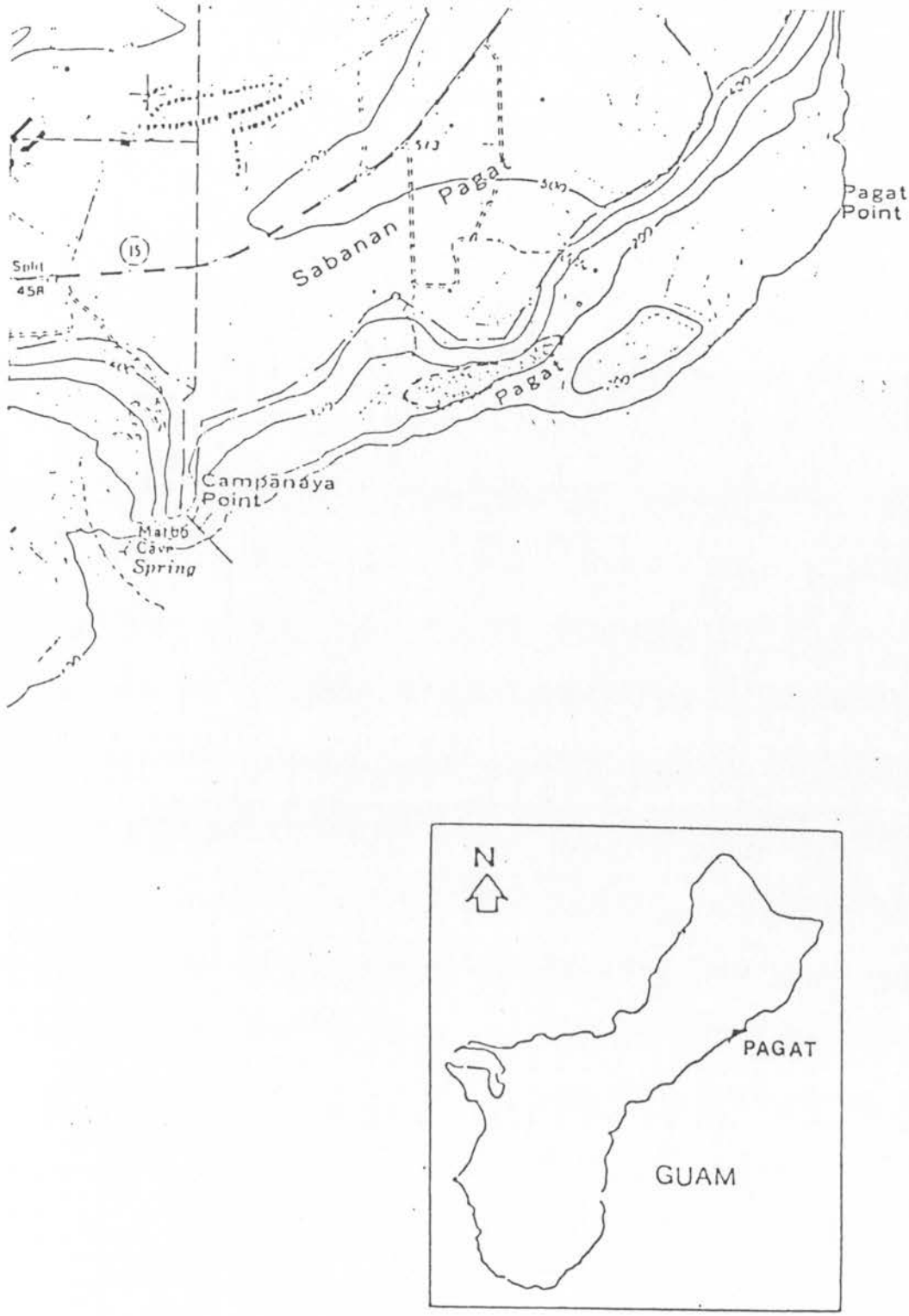


Figure 6-1 Location of Pagat (U.S.G.S. Dededo Quad 1:24000)

Figure 6-2 Coastline at Pagat

Figure 6-3 Heavily Weathered (Karstic) Area Between Site and Sea





seeding by the U.S. after World War II. However, Safford (1905) includes this area in his discussion of 'forests' of Guam so the distribution must have previously been across the top of the plateau where, now, it is largely confined to the cliff areas along the edge top and the lower coastal benches.

The forest is dominated by Artocarpus spp. (primarily marienensis), Pandanus spp., Intsia, and Elaeocarpus; all but the last are known to be used by the Chamorro (Safford 1905). Also present in dense clusters is the Federico Palm (Cycas circinalis) (Chargulaf 1981), the nut of which was extensively used by the Chamorro historically. The exposed east coast is one of the few areas of the island where the coconut palm (Cocos nucifera)is rare.

A specialised component of the Mixed Limestone Forest community is the Chopag (Mammea ordorata) forest which occurs on the eastern escarpment and covers the Pagat site area. This distribution was initially noted by Fosberg (1960) and later studied in detail by Moore (1973). The Chopag tree reaches a height of about 10 metres and the wood is hard and durable; historically it was used for housebeams and may have served a similar purpose prehistorically.

The next most common tree within the Pagat site is an introduced species, Lemon de China (Triphasia spp.), a rather thorny hardwood found throughout the site. Other trees include Cycas palms, Barringtonia sp., Ficus spp., Pandanus spp., and Hibiscus tiliaceus.

The range of marine resources adjacent to Pagat is relatively poor. Virtually no reef development exists along the northeast coast from Pago Bay to Pati point (Randall and Holloman 1974). Very narrow rock ledges, exposed at low tide (Figure 6-2) exist at the seaward edge of the limestone bench on which Pagat sits. Topographic maps indicate that the sea floor is nearly 15 metres immediately offshore and slope away sharply. This is a high energy coastline with surging tides predominating. One result of this has been a lack of detailed marine research along this stretch of coast.

However, a study was performed at Fadian Point, approximately 5 km. to the south of Pagat which is argued to be representative of the northeast coast (Stojkovich 1977). The immediate offshore topography was divided into four zones (Figure 6-4); zones 1, 3 and 4 are present at Pagat.

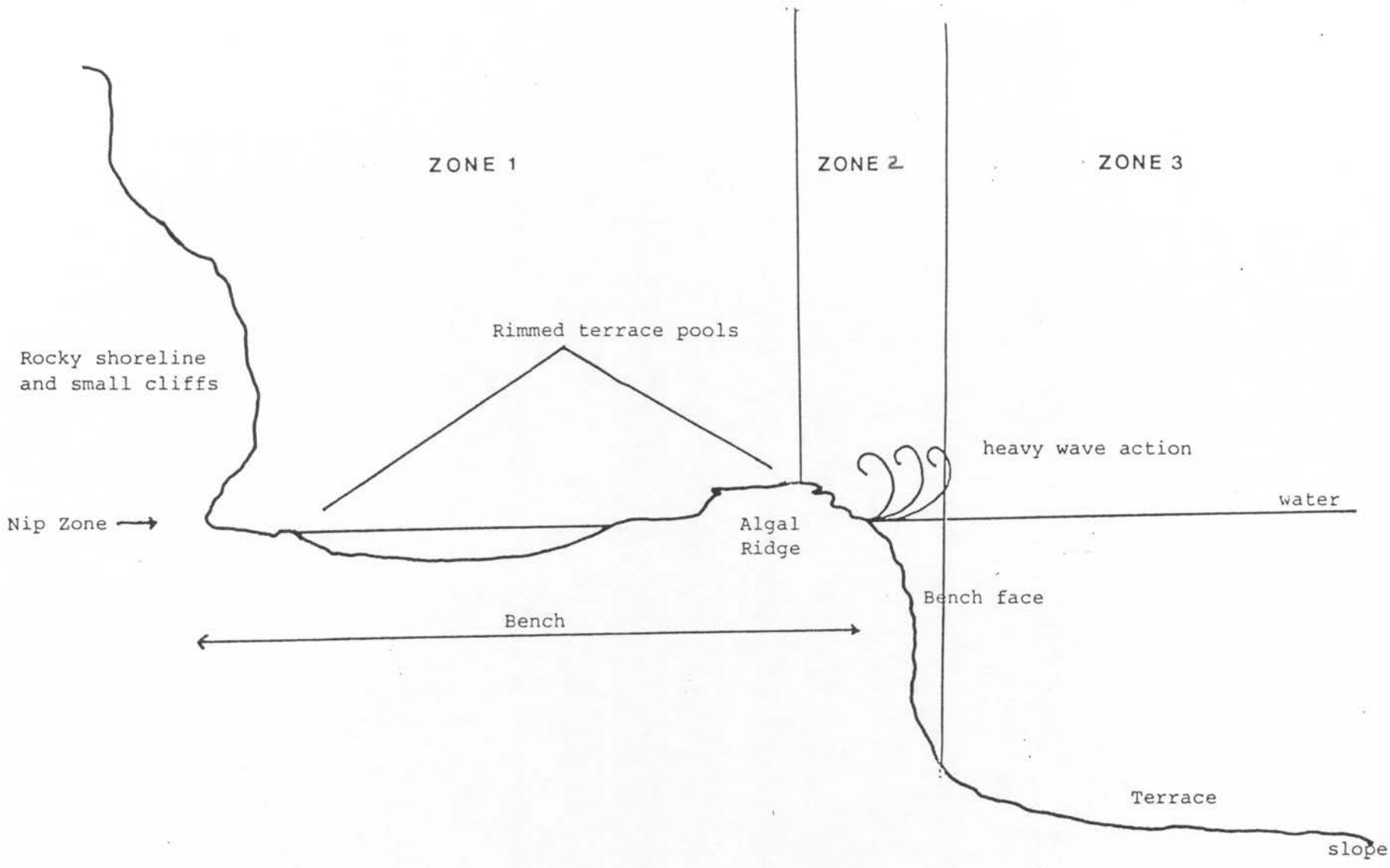


Figure 6-4 Generalised Profile of Typical Windward Cut Benches and Rimmed Pools (from Stojkovich 1977)

Gastropods are abundant along the rock ledges (zone 1) but offer little species diversity. Fish are found in largest numbers in zones 3 and 4 but also exhibit a relatively narrow range of species. As described more fully in Appendix C, most of the shellfish and fish identified from the Pagat midden sample are the same as those found in the checklist from the northeast coast by Stojkovich (1977).

The environs of the Pagat area appear to be relatively stable, exemplified by the fact that it is one of the few places on Guam exhibiting a primary forest (Fosberg 1960). Given the low relief of the Pagat site (Figures 6-5, 6-6), the dense forest cover, and its porous limestone substrate, most erosional processes would appear to have little effect upon the cultural deposit.

As Fosberg (1960: 168) has pointed out, 'a long history of disturbance by the Guamanians, by frequent typhoons, and by the destructive effects of World War II and subsequent military activities, have left little undisturbed primary forest on the island.' However, he notes that if any primary forest still exist on Guam it is along the northeast coast in an area which includes the Pagat site.

Though on the 'dry' side of Guam, the northeast coast averages about 2000 mm of rain per year. However, a major characteristic of the entire northern plateau of Guam is the permeability of the limestone substrate and the total lack of streams or creeks. No evidence of erosional channels or slope wash at the Pagat site has been noted.

Sitting along the open, unprotected northeast coast, Pagat would be vulnerable to typhoons having the potential to topple trees and latte sets but having little direct impact on surface and subsurface deposits.

Among the series of processes of soil mixing (pedoturbation) described by Wood and Johnson (1978) was 'tree-fall' which created a 'cradle-knoll' topography; a low relief topography characterised by a series of mounds and depressions common in many forest lands of the world (Wood and Johnson 1978: 329). An important observation, relevant for the Pagat site, is that, 'where root development is shallow because of closeness to bedrock...trees will have a high susceptibility to windthrow, other things being equal' (Wood and

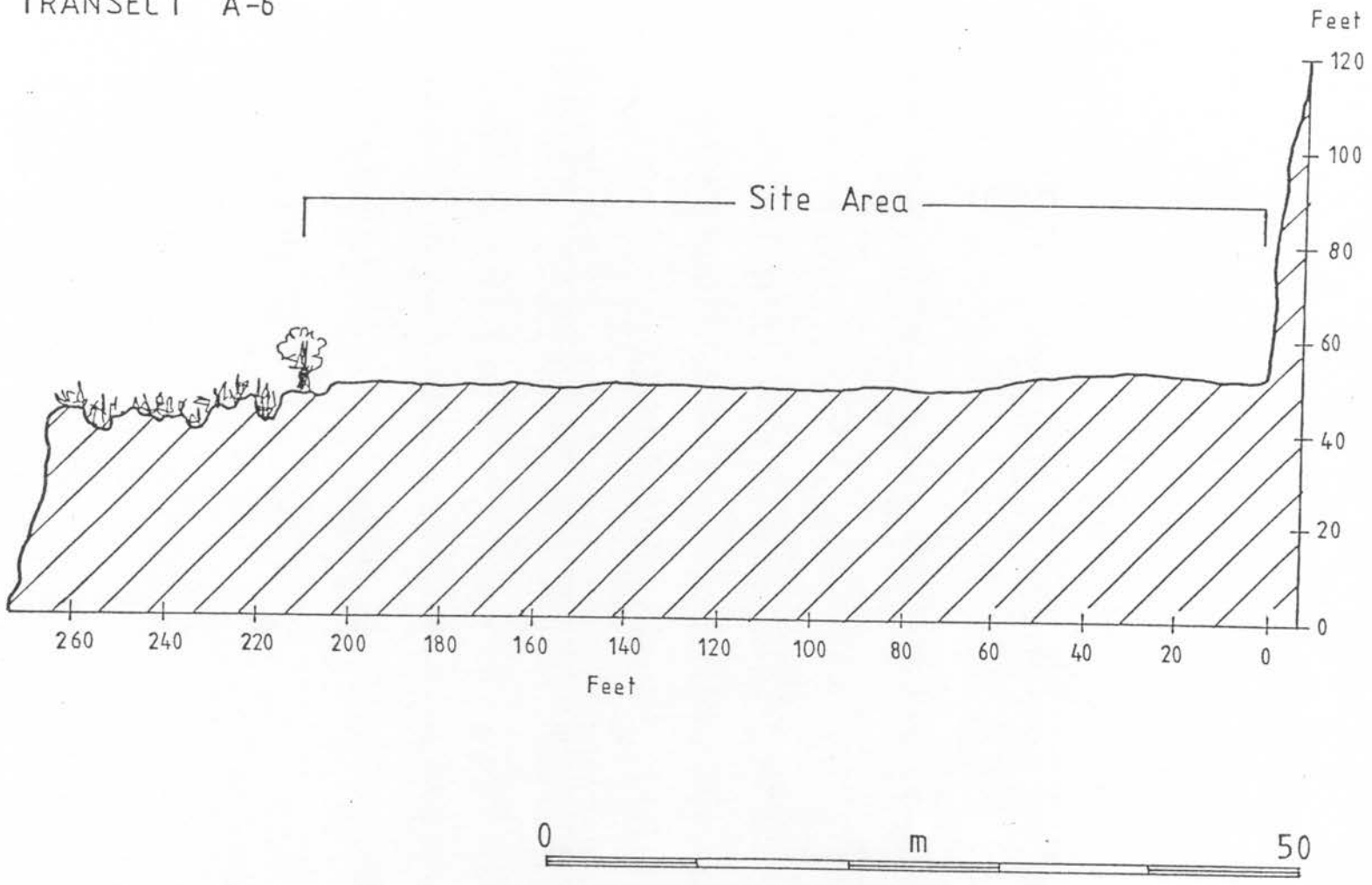


Figure 6-5 Pagat Cross-Section at A-6

TRANSECT B-3

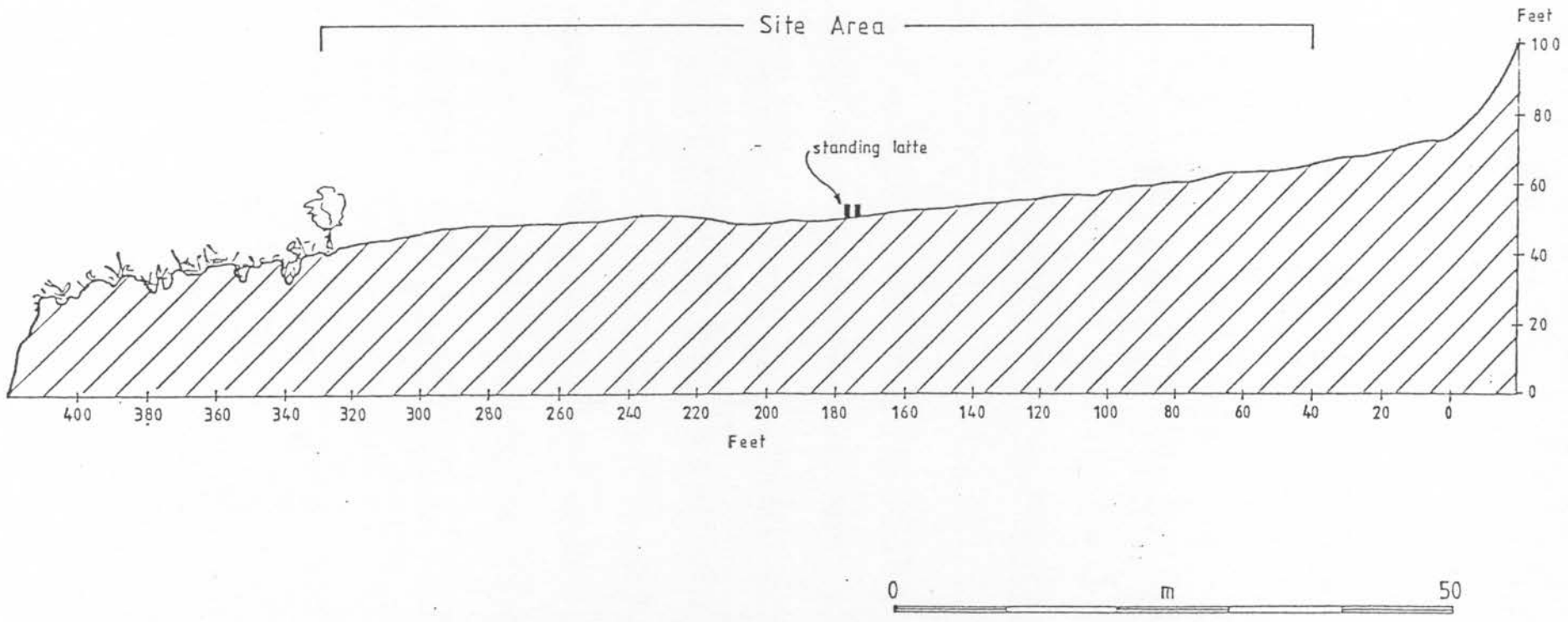


Figure 6-6 Pagat Cross-Section at B-3

Johnson 1978: 331). Pagat and other sites in the northern plateau area, recorded as containing a series of mounds associated with living areas (Reinman 1977; n.d.).

Natural disturbance to the deposit and features at the Pagat site appears to be largely due to the extensive and thick vegetation across the site. In addition to 'tree-fall', the destructive potential of root growth must be considered. Large, extensive root systems from the few Ficus and Barringtonia trees are prominent. With the generally shallow soil development (roughly 1 metre) within the site, the long, narrow roots are found at or near the surface. Disturbance and displacement of materials in this situation would be expected to be primarily be vertical rather than horizontal.

Soil mixing caused by animals appears to be minimal at Pagat for at least two reasons. First, there are few burrowing animals on Guam and secondly, those that do exist would not likely be found in the Pagat area. Shells of various land snails (Gonaxis sp.) have been recovered from the site, attesting to some amount of disturbance but, again, primarily vertical.

Wild pigs (an historic introduction) are hunted in the Pagat area and evidence of their activities (rootings) were observed during the 1981-82 field season. These disturbed areas are shallow (c. 2 - 6 cm) and formed a roughly circular area about 1 - 2 metres in diameter. It appears likely that lighter items could be moved around or tossed out of the disturbed areas but not necessarily moved any great distance.

Post-occupational cultural disturbances appear to have been minimal at Pagat. No records of the site area being used for habitation or cultivation have been found. Even the extreme destructive aspects of World War II, so evident in many portions of Guam, were virtually absent at Pagat. Evidence that the area was visited by Japanese during the war has been noted. Yet no bomb craters (as recorded elsewhere on Guam, see McCoy, Craib, and Price 1978) are apparent at Pagat nor do military records specifically mention shelling of the northeast coast.

Despite the fact that the northern plateau accounts for roughly 55% of the land area of Guam, less than 40 sites (i.e. <30%) have been recorded in this area. Most of these northern plateau sites are found along the narrow coastal fringe. Hornbostel's map indicates latte were found in only a very few places on top of the northern plateau. Later, Osborne (1947) observed latte at four areas (Mataguac Hill, Mogfog, Yigo, and Mt. Santa Rosa) which corresponds with Hornbostel. Subsequent development in this portion of Guam has heavily impacted archaeological sites. To illustrate, in the mid 1960's Reinman recorded only two remaining sites.

The coastal sites on the west and north coasts are situated along sandy beaches and are characterised by linear arrangements of latte (Reinman 1977). None of the west coast sites have been satisfactorily dated but the presence of latte at virtually all sites and the recovery of CST and Lime-filled ware suggest that at least some areas have been occupied for most of the prehistory of the island. As will be discussed below, the dated sequence at Tarague on the far north coast supports the antiquity and continuity of settlement in optimal areas of Guam.

Twenty sites have been recorded along the northeast coast between Pago Bay and Pati Point. Most are relatively small midden deposits more often associated with rockshelters than latte sets. Reinman noted that 14 of the 20 sites were lacking any evidence of latte. However, two large latte villages have been found along this coast - Pagat and Mochom (not to be confused with Mochong on Rota).

Only two sites have been reported in any detail in the northern half of Guam - Pagat and Tarague. A third site, Mochom, was tested but no report was written. A salvage excavation was carried out at Ypao beach along Tumon Bay but no detailed analysis has been reported. Hornbostel excavated a latte at the site of Orono along the northwest corner of Guam but this too has not been reported.

The Mochom site is located about 10 kilometres south of Pagat. It covers an approximate area of 4 hectares and may have contained as many as 20 latte sets; only seven sets are sufficiently intact to be measurable. In 1965, a test pit was excavated,to a depth of 80

cm, under the direction of W.S. Wilson of the College of Guam; all materials are housed at the Field Museum in Chicago.

Along the northernmost coast of Guam, about 13 kilometres north-northwest of Pagat, is Tarague. Situated on a long stretch of beach facing a wide fringing reef, Tarague sits in perhaps the richest (ie most productive) environment in the northern plateau zone.

Excavations have occurred at Tarague since the late 1960's. The most recent series of excavations have revealed a stratigraphic profile to a depth of 6.2 metres where it sits upon a pavement of Merizo limestone (Kurashina and Clayshulte 1983). Cultural horizons identified within the profile extend to a depth of nearly 3 metres and appear to represent the known span of Marianas prehistory. A basal date of 3060 $\pm$ 350 BP (UCR-1475B) was obtained on fishbone recovered at a depth of 2.7 metres. A date, arguably associated with the latte component, of 1150 $\pm$ 80 BP has been reported (Kurashina and Clayshulte 1983).

A detailed description of the assemblage recovered from earlier excavations (Ray 1981) reveals a wide array of artefactual and ecofactual material. Though the provenience of some portions of the assemblage is problematic given the disturbance to the site, this report remains as the best documented assemblage from the Marianas. Analyses from the more recent work are beginning to be written (e.g. Moore (1983).

The Pagat Point site, a large (24 hectares), extremely disturbed site sits on a limestone bench above and immediately to the northeast of the Pagat site. Reinman (1974 Inventory Data Form) states that the site 'has been largely destroyed through farming activities which resulted in extensive land clearing...a few concentrations of midden and pottery still exist, primarily in the northeastern part of the site.' No latte or mortars were recorded from this site, though given the amount of tillage the area has received the removal of these features seems likely. The area contains an extensive scatter of limestone rocks possibly remnants of pillars and capstones. As will be described below, preservation of latte at Pagat was very poor making identification difficult; latte sets could often be identified by the presence of a few portions of pillars or capstones, though their general orientation,

number of pillars, and dimensions could not be ascertained.

Occupation of the northern plateau region of Guam is characterised by a concentration of population along the narrow coastal fringe well below the plateau top. Very few sites have been recorded from the plateau top (Hornbostel n.d., Osborne 1947). Occupation of this general portion of the island has great antiquity as revealed at Taraque. Whether or not early settlement was restricted to the prime location at Taraque or extends to other northern sites is currently unknown.

Fieldwork Activities at Pagat

Mapping

A field map was drawn in 1974 using compass and tape. Measurements were derived from a series of metal stakes established at random (haphazardly) across the site (Figure 6-7). In 1981 attempts were made to relocate these stakes with a metal detector but this was largely unsuccessful.

During the 1981-82 field session, it was decided to create a new, more detailed map of the site. A series of three baselines were established, aligned east-west, extending throughout the site. The initial baseline (A) begins at the eastern edge of the site and runs roughly midway between the cliff base and the edge of the forest which marks the seaward edge of the site. Data points along each transect were numbered sequentially beginning with the easternmost point. The westernmost end of Transect A (A-11) lies at the base of the cliffline. Transect B begins (B-1) 30 metres south of A-11 and continues for 150 metres, also terminating at the cliffline. The western portion of the site is covered by Transect C which begins 20 metres south of B-6 and ends immediately south of the sinkhole at the western edge of the site.

Data points were placed at 30 metre intervals along each baseline. These were used for both mapping purposes and also for marking the width of surface sampling blocks (see sampling strategy section for details).

The baselines extended across the site for over 500 metres (Table 6-1).

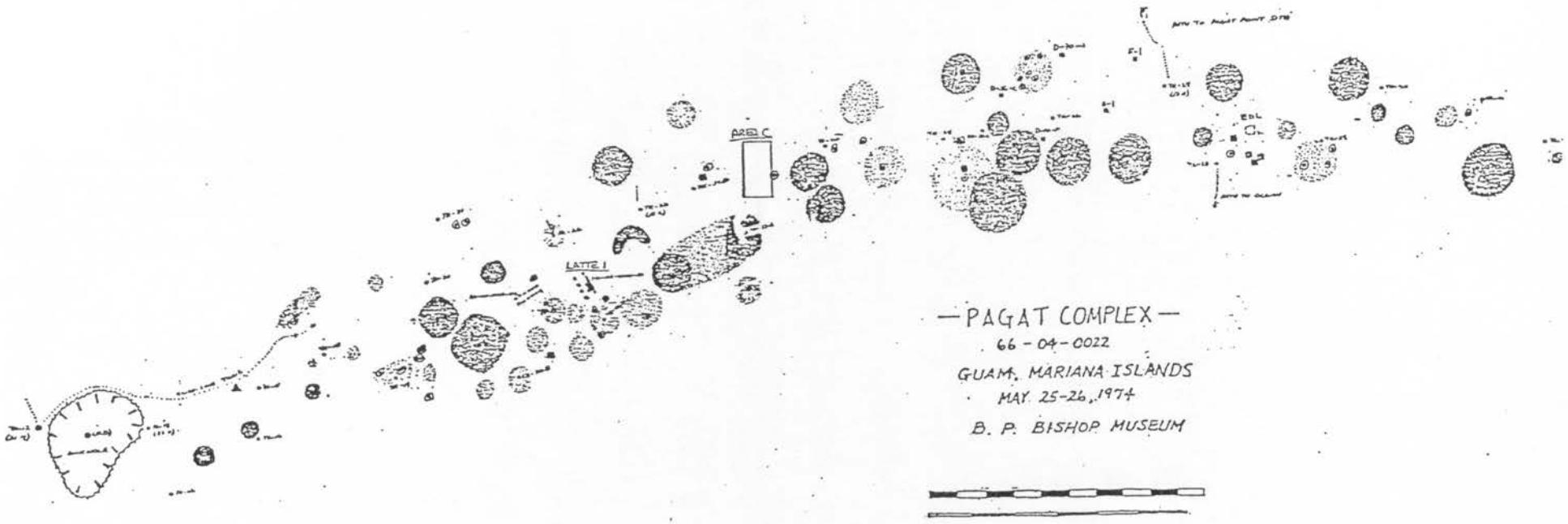


Figure 6-7 Reinman's Site Map - 1974

Table 6-1 Pagat Transect Dimensions

Baseline	Length (m)	Number of Data Points
A	300	11
B	150	6
C	60	3
Total	510	20

All cultural features were mapped in relation to these data points. Cultural features at Pagat included latte sets (defined as having some or all pillars erect),latte components (overturned and/or displaced pillars and capstones), portable and bedrock mortars.

In an effort to be able to correlate this map with Reinman's 1974 map, an attempt was made to relocate the original metal stakes. Two of these stakes (TR-12, TR-22) were still clearly visible and was mapped in. However, the remaining stakes were a problem. Deriving the angles and distances between these stakes from the 1974 map we attempted to locate general areas where these stakes should be found and, with the help of a metal detector, establish the presence of these stakes. However, only one additional stake, TR-20, was relocated. Consequently,all locations of 1974 excavation areas, relative to the current map, are approximations only.

Anyone who has attempted to undertake detailed mapping of sites within thick tropical vegetation (Figure 6-9) can appreciate the amount of effort involved in both mapping and subsequent surface collection. Mapping activities alone at Pagat site required a period of one month, involving more than 1000 person-hours.

Site Layout

The area of the site, as defined by the extent of the surface features, covers roughly 26,000 square metres (2.6 hectares) (Figure 6-8). While this figure appears to vary considerably from Reinman's estimate of 38,000 sq m, it must be pointed out that Reinman's

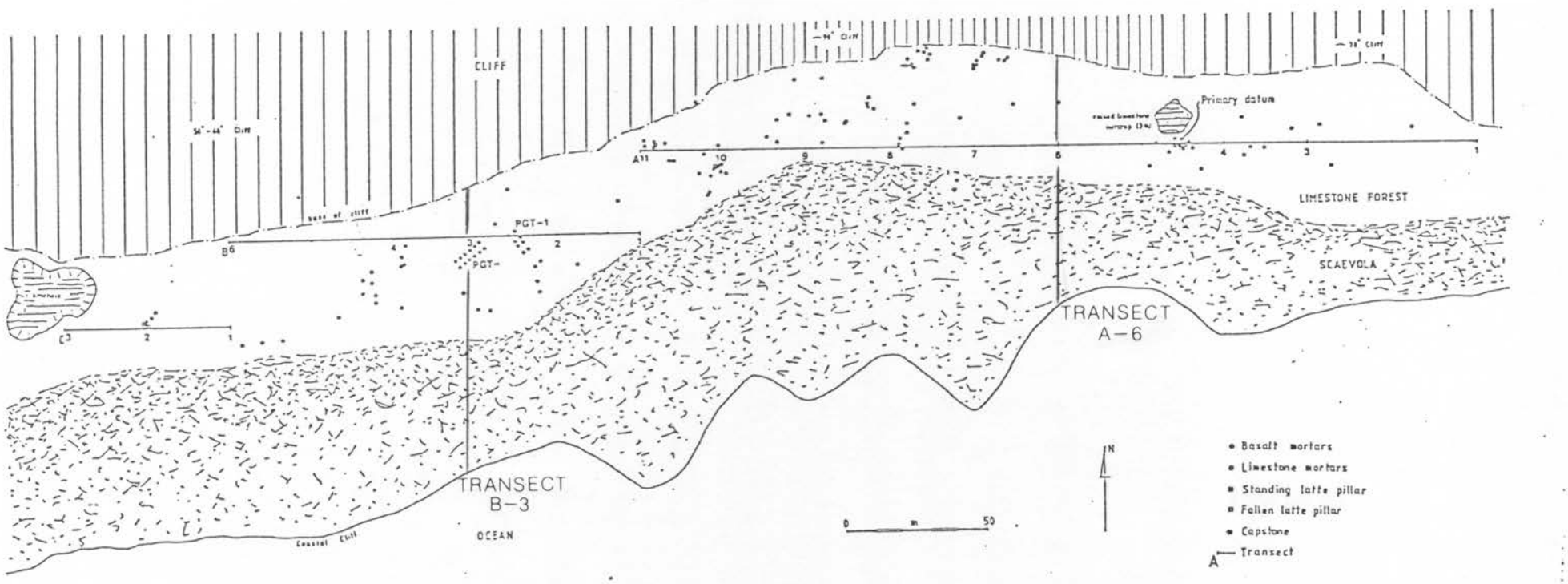


Figure 6-8 Pagat - 1982

figure was derived from his estimate of the total length and width of the site. Based on a more detailed field map, the site area was determined using a Hewlitt-Packard 9874A Digitizer. I maintain that this is a more reliable estimate of the areal extent of Pagat.

Surface materials continue beyond the features but there is a significant decrease in the density of materials beyond the feature distribution (quantification of this observation will be presented in Chapter Seven). The seaward (southern) edge of the site is correlated with the interface of the Limestone Forest community and the low-lying, salt-resistant community consisting almost entirely of Scaevola. Immediately seaward of this interface soil is almost non-existent and the surface is characterised by a karstic topography.

The generally rugged landscape in and around Pagat also produced rock overhangs which served as shelters. Two such features were found within the confines of Pagat. These are in addition to the two caves found at the bottom of the sinkhole.

Surface features within the site consist of two kinds, latte components (pillars and capstones) and mortars. Two standing latte are found near the center of the site. The first, designated here as PGT-1, is an 8 pillar latte oriented perpendicular to the shore, cliffline, and the nearby 12 pillar latte, PGT-2. The latte is oriented along a rough east-west axis. Towards the eastern end of the site four pillars, probably from a single latte (EDL), are still erect.

Identification of surface features, particularly latte components, was often difficult. Given the geologic setting of the site, local limestone was used to form pillars and capstones. Since this limestone is porous and weathers considerably, few disturbed latte sets could be readily identified. Toppled pillars were usually broken and blended into the geologic matrix (Figure 6-10). Three classes of identification were made: definite - standing pillars or those exhibiting definite signs of shaping; probable - usually unbroken, exhibiting typical dimensions; possible - broken and/or badly weathered pieces found among probable pieces exhibiting some typical dimensions. The other class of surface features, 'portable' mortars were more readily identifiable (Figure 6-11).

Figure 6-9 Vegetation Along Portion of Baseline A

Figure 6-10 Weathered Pillar and Partial Capstone





Figure 6-11 Basalt Mortars and Broken Pillar

Figure 6-12 Stratigraphic Break Between Horizon I and II in Southeast Corner of P82-1





These two classes of surface features tended to cluster together and formed spatially distinct concentrations. These are identified as Latte Areas; an area defined by drawing a line around latte components (pillars, capstones) where the original number of pillars, length and orientation cannot be discerned (Figure 6-13). Eleven Latte Areas, in addition to two standing latte, were defined within the site, totaling 13 latte. This probably represents a maximum number in that the clusters of Latte Areas towards the center of the site (i.e. Latte Areas 3-6) may actually be segments of the same latte. This varies from the 15 - 20 sets estimated by Reinman however, examination of the 1974 field map reveals that the dark squares identified as probable latte are parts of larger latte sets.

The configuration of latte at Pagat may have resembled the 'clustered' type rather than the linear alignment (see Chapter Five). The 12 pillar latte (PGT-2) occupies a rather central position within the site; whether this was the only 12 pillar at the site is unknown.

Fifty stone mortars were located at the site, the majority (n=35) were made from basalt while the remaining 15 were made from limestone outcrops (further descriptions of mortars are provided in Appendix B). Most mortars are proximal to Latte Areas.

Sampling Strategy

Given the research questions relating to intra-site patterning and the identification of non-latte areas discussed in Chapter Two, a large scale, systematic surface collection of the Pagat site was made during the 1981-82 field season. Reinman's 1974 fieldwork provided a valuable data set with which to assess the potential usefulness of intensive surface collection at the site in order to investigate questions relating to the internal organization and to determine the presence of non-latte structures within these villages. First, his site map indicated that Pagat was a moderately large latte village with open areas occurring between latte sets. Second, surface visibility was sufficient to allow the observation (though unquantified) that artefacts appeared to form discrete

clusters across the site. Lastly, the subsurface deposit was largely characterised by a single, relatively shallow, and temporally discrete cultural horizon.

As Redman (1975:150-151) has argued, 'The most productive research designs utilizes both the previous knowledge of the archaeological remains and some form of probabilistic sampling. In this way, it is possible to take advantage of available archaeological expertise while guarding the possibility of "creating" what one seeks.'

No large-scale, systematic surface collection had previously been undertaken in the Marianas largely due to two factors - the emphasis on chronology thereby focussing interest on vertical, stratigraphic variations and the energy (person-hours) required to clear thickly overgrown sites.

Five separate sampling 'Areas' were defined across the site, each given a Roman numerical designation (I-V) (Figure 6-14). Within each, a series of quadrats were established relative to the three baselines. The datum points along these lines served to delineate the width of the Sampling 'Block' (a single exception to this pattern is found in Areas IV and V). The north-south extent of the Blocks was determined by the natural and cultural topographic factors. Thus, the size of the sampling blocks varied from 300 square metres to 1400 square metres. Each Block, identified by a letter preceded by the Area designation (i.e. IA, IID), was then divided into a series of 5 x 5 metre sampling 'Units'. Collection was made from these Units.

Within each Block, alternate Units were collected, resulting in a 50% sample from each Block. All cultural materials visible on the surface were collected; no sieves were used during this task. The 'surface' was defined by the top of the soil after all vegetation had been removed. Care was taken to minimise the disturbance of the surface; often extensive roots and other firmly attached items were left in place. Sherds, shell, and bone were collected and counted per Unit. All other materials (e.g. chipped stone, worked and unworked igneous rocks, artefacts) were mapped in two-dimensionally within the Unit before being collected, ensuring some measure of spatial control within the large (25 square metre) sampling Units.

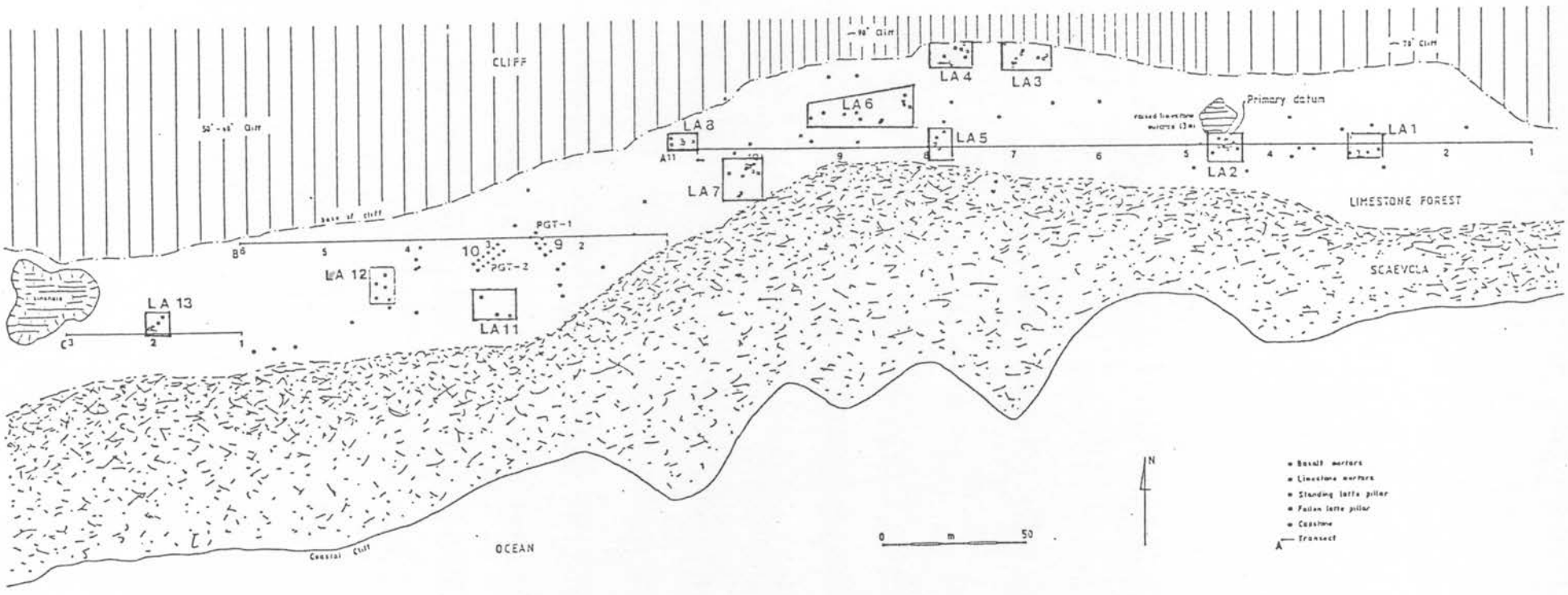


Figure 6-13 Proposed Latte Areas

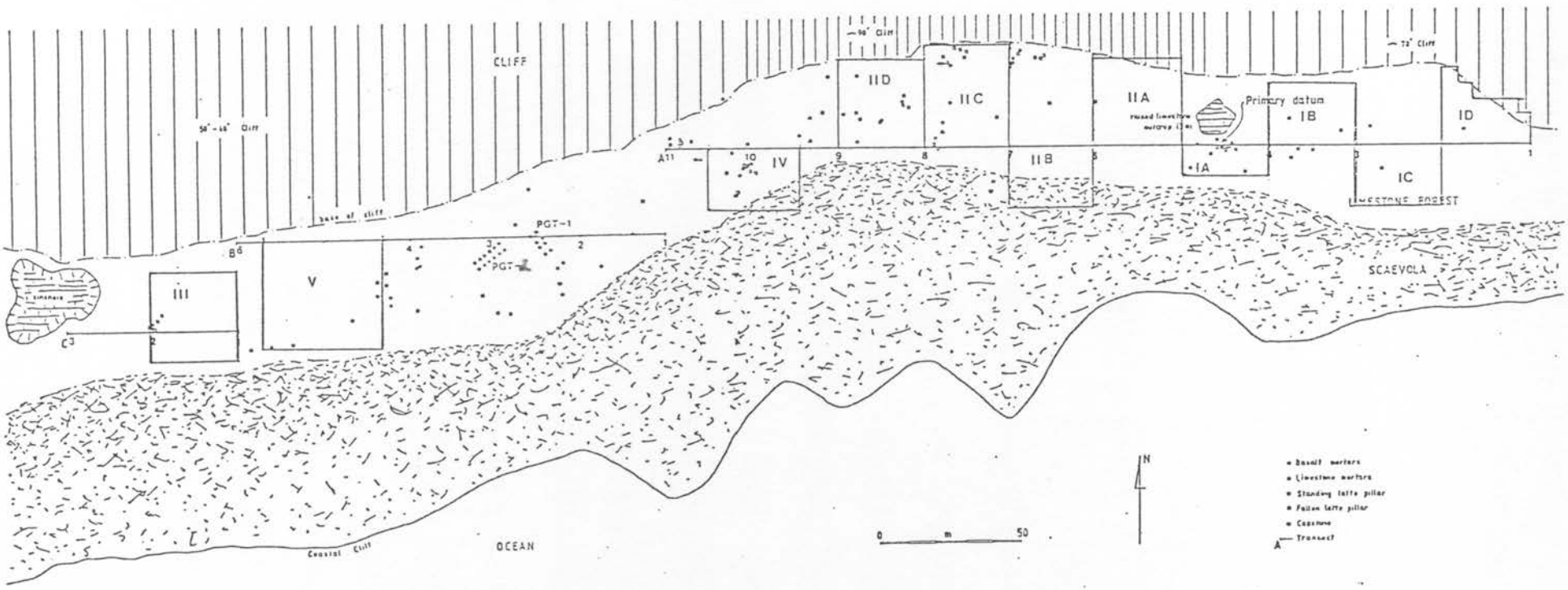


Figure 6-14 Surface Collection Areas

Table 6-2 provides the breakdown on areal data relating to the surface sample at Pagat. The total area collected was 4225 square metres or roughly 16% of the entire site area.

The amount of time involved in the collection and recording of each Unit depended upon the vegetation in the portion of the site being collected. In the more overgrown areas, the average time spent on a Unit was one person-hour; this was significantly shortened in the more open areas.

Excavation

A series of test excavations have been made at selected points across the site. All but the P82 area were excavated prior to 1982 with most being under the supervision of Reinman. Pits were dug in areas representing a cross-section of cultural features (Table 6-3).

All excavation units at PGT-1 were dug between the pillars of this 8 pillar latte. Skeletal material was recovered from most pits. Area C is in a 'mound' located immediately north of Latte Area 7 at Data point A-10. The rockshelter sits along the base of the northern cliffline towards the western end of the site near Data Point B-6. The pits in the 'Open' area consist on individual 1x1m units scattered haphazardly in the area between A-5 and A-8 having no discernible Latte Areas. Additional pits, designated EDL, were excavated between 1974-1976 in and around Latte Area 2. However, the lack of field notes from these excavations preclude the calculation of areal or volumetric data.

A final report of these excavations is being completed by the Guam Territorial Archaeology Laboratory but is not yet available. Reinman does offer some important summary observations. The majority of the deposit at Pagat is relatively shallow (X=50 cm, range 25 - 75 cm) and consists of a single cultural and geological stratum. However, in nearly 30% of the units, a second, lower stratum was observed and excavated to a maximum depth of 1.5 metre (Figure 6-15).

Table 6-2 Area Samples

Area	Total Sq.m.	Units Sampled	Area Sampled
IA	300	6	150
IB	400	12	300
IC	400	12	300
ID	500	11	275
IIA	750	18	450
IIB	400	12	300
IIC	1050	21	525
IID	750	18	450
III	750	18	450
IV	400	12	300
V	1400	29	725
Total	7100	169	4225

Table 6-3 Volumes of Excavated Areas

Area	Sq.M	Cu.M
PGT-1	7.75	4.50
AREA C	13.00	10.35
ROCKSHELTER	1.00	0.60
OPEN	3.00	2.55
P82	4.00	2.00
	28.75	20.00

Stratigraphy

Reinman identified two distinct strata with the second, lower level occurring in only a few excavation units. Stratum I is a black friable clay soil containing the majority of artefacts. Ceramics associated with this layer are identified as VST ware. Stratum II consists of a yellow brown sandy gravel of limestone pebbles and beach debris (Reinman n.d.:4) (Figure 6-15 and 16). Few artefacts other than pottery were found in this layer. The ceramics are distinct from those found in Stratum I and are identified by Reinman as belonging to his CST ware category.

Excavations in 1982 supported Reinman's earlier observation. Two distinct strata are present in some areas of Pagat with Stratum II having a limited distribution. No evidence of Stratum II has been noted in excavations further to the east nor have any CST sherds been found in this area. It was located in only 4 units suggesting an areal extent of about 2000 square metres. The distribution extends from Area C eastwards to P82-1.

Given the variation in pottery types and range of artefacts between these strata, I discuss them in terms of occupational horizons and will hereafter refer to Stratum I as Horizon I and Stratum II as Horizon II.

Problems in bag labeling from the 1974-76 excavations and damage to bags while in storage at the Guam Territorial Archaeology Lab has necessitated the deletion of some materials from consideration. However, these are small amounts and sufficient samples from each major sampling area exists.

Horizons I and II can be further defined largely by the significant variation in relative densities (materials per cubic metre) of cultural materials (Table 6-4). As discussed later, the variation is due primarily to the nature of site utilisation. This vertical distribution of materials also holds important implications for the usefulness of the analysis of surface spatial arrangements discussed in Chapter Seven.

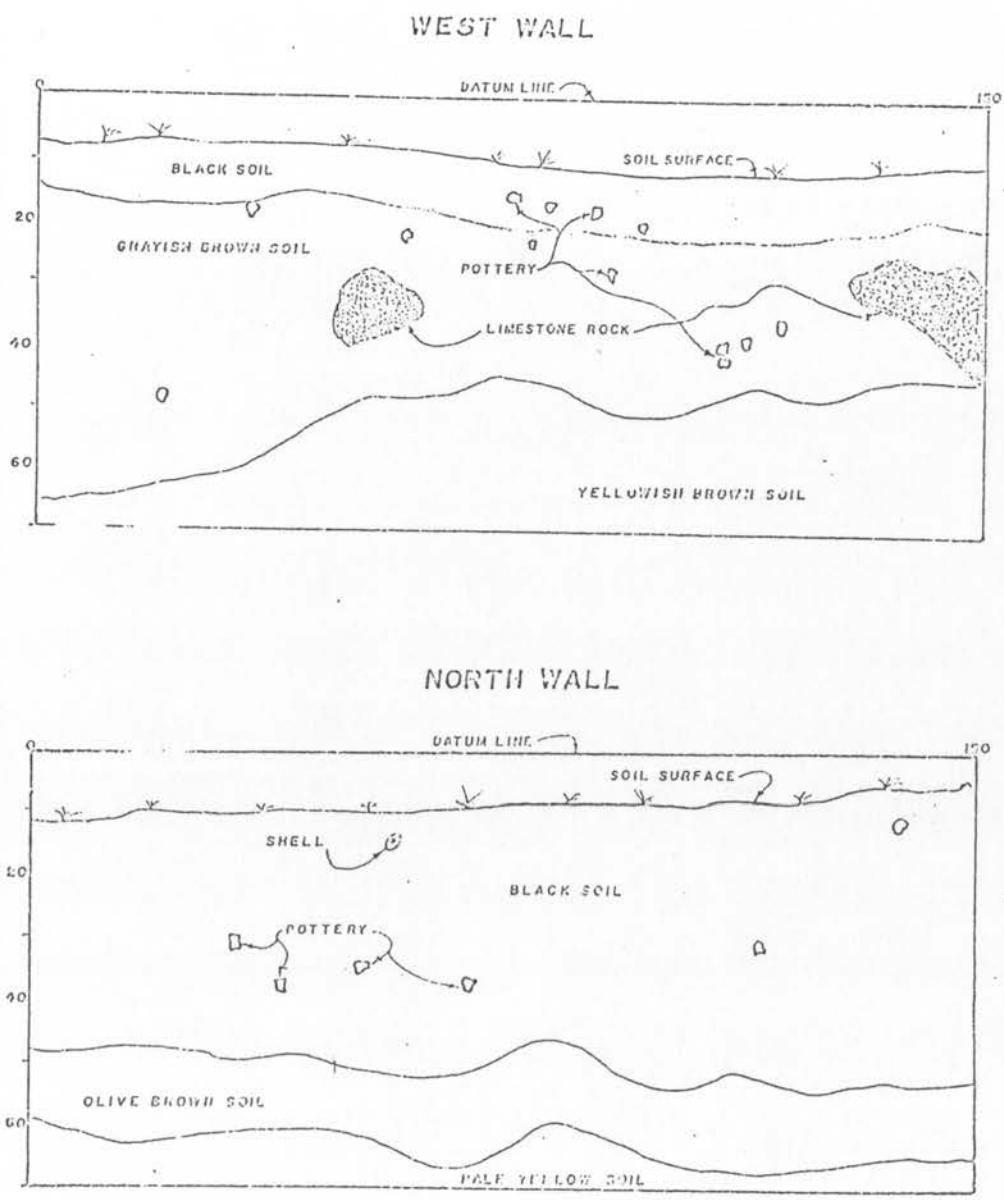


Figure 6-15 Stratigraphic Profile P82-2

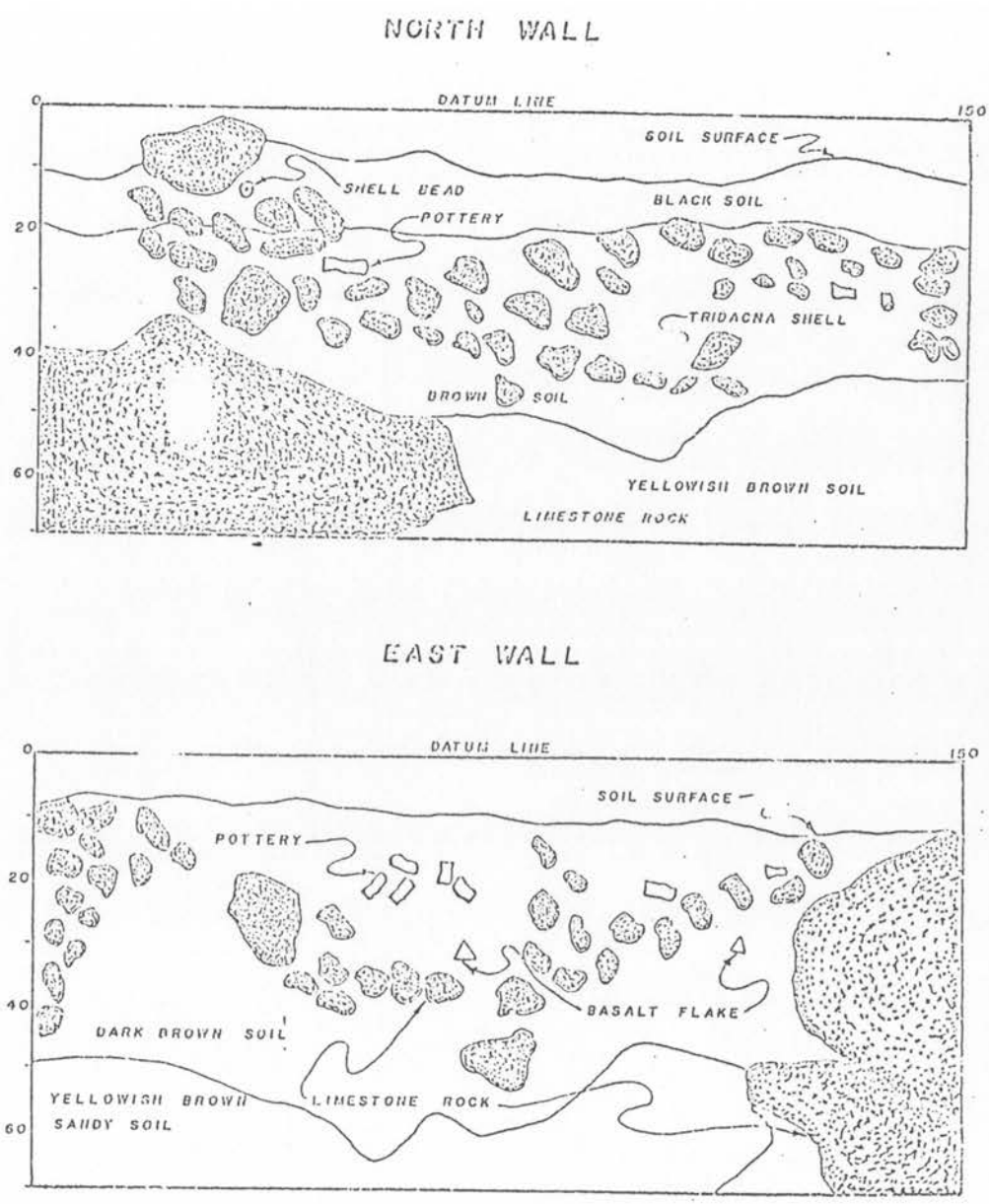


Figure 6-16 Stratigraphic Profile P82-3

Table 6-4 Cultural Material Densities - Vertical Distribution

	Pottery (g)	Artefacts (count)	Ecofacts (g) Bone	Shell
Horizon I	9192	61	200	1031
Horizon II	749	4	421	1975

Table 6-5 Pagat - Radiocarbon Dates

Unit	Depth	Material	bp	BP	AD	Range+	Lab No.
Horizon I							
C21K EDL	15-30	Turbo	290±60*	--	----	---------	Beta 10799
3-2-1	15-30	Turbo	450±60*	--	----	---------	Beta 10800
P82-3	20-30	Charcoal	565±50	560	1390	1340-1440	Beta 4740
P82-3	30-40	Charcoal	495±60	530	1420	1360-1480	Beta 4741
P82-1	40-50	Charcoal	825±115	755	1195	1080-1310	Beta 4739
Horizon II							
C11I/ C12J	135-150	Charcoal	1080±100	1060	870	770-970	UCR 1507

* dates not adjusted for C12/C13
\+ calibrated calendar year at 95% confidence interval

The depth of deposits varies slightly across the site, ranging from about 40 to 150 cm. Horizon I averages about 50 cm in depth and Horizon II about the same.

Temporal Context

The presence, and stratigraphic separation of the two major ceramic wares (CST and VST) led Reinman to argue for an early and late habitation at Pagat, a division supported in the stratigraphic profile.

A suite of nine radiocarbon dates have been run from Pagat, three dating to 'modern'. Table 6-5 provides the remaining six dates. Five of the six dates come from Layer I. Four of the dates were obtained from charcoal (coconut?) samples while two were dated from Turbo shell; the three modern dates were all from charcoal. A Student t-test was performed on the samples to determine if they statistically overlap (Thomas 1976). There is a general overlap in dates from similar depths in dispersed portions of the site.

The dates from Layer I suggest a maximum range from 900-300 years BP (AD 1080-1640); this is well within the Protohistoric period. The suite of dates from the upper 40 cm form a tight cluster while the single date of 755±115 BP is the only one that does not overlap (but does at two s.d.). This date sits on the interface with Horizon II and stands intermediate between the cluster of dates above and the single date of Horizon II. The single date from Horizon II comes from the base of the deposit (135-150 cm) and dates between 800-1000 years BP.

The general pattern, based on this small suite of dates, shows a firm cluster of dates from the Protohistoric period. If the date of mid-seventeenth century is taken as a terminus for occupation of Pagat, it would roughly coincide with the arrival of the Spanish missionaries and subsequent resettlement in the last quarter of that century.

The temporal placement and nature of initial site formation is more problematic. The gaps between dates become more pronounced (though never more than a century apart) towards the bottom of Horizon I and into Horizon II. Whether these breaks represent

discontinuities in the occupation/utilisation of Pagat or sampling problems is unclear. Perhaps more dates from this stratigraphic context can further refine the chronology. In any event, it does not seem likely that the Pagat site was visited much before 900 years ago and that a permanent village did not appear in the area until almost 600 years ago; roughly 2 centuries before contact.

Assemblage

Virtually all non-ceramic artefacts recovered from Pagat are associated with Horizon I. These materials represent a wide range of stylistic and functional types (Table 6-6) (Descriptions of Pagat artefacts are provided in Appendix B).

Since most attention has been given to the pottery component in the Marianas assemblage, there are few clear-cut typologies for other artefact classes. Usually a simple division of artefacts into source material (stone, shell, bone) is made and specific forms within each category are created. This, however, offers little more than a quick method of dividing up an assemblage and does little to inform us about how these items functioned. It also leads to unnecessary confusion in that source material often cross cuts formal and functional types.

In order to investigate the kinds and range of activities which occurred at Pagat a series of general functional categories were devised. Six functional categories are proposed which encompass not only the Pagat sample but all other reported assemblages.

1. Processing - this includes all items involved in the preparation of food material after collection and up to the point of consumption. Artefact classes include mortars, pestles, mano/mullers, stone bowls, peelers/graters, knives* (*group falling under more than one category).

Mortars are abundant at Pagat, These are not large basin troughs but small holed. Currently, there are many stands of the Federico Palm (Cycas circinalis) in and around the site. The importance of processing at Pagat is suggested in the 'expensive' nature of most implements in this category. That is, nearly all are basalt which

TABLE 6-6 Pagat - Artefact Assemblage

Artefact Class	Surface	Stratum I	Stratum II	Total
PROCESSING IMPLEMENTS				
Mortars	50	-	-	50
Pounders/Grinders	29	5	-	34
Peelers/Graters	15	12	1	28
Stone Bowls	2	-	-	2
PROCURMENT IMPLEMENTS				
Fishing Gear				
Gorges	1	30	-	31
Hooks	-	8	-	8
Barbs	-	14	-	14
Shank	1	-	-	1
Weight	11	3	-	14
FABRICATORS				
Abraders				
Scoria	186	15	-	201
Coral Files	6	22	3	31
Sea Urchin Spine	3	9	-	12
Hammerstones	13	4	-	17
Smoothing Stone	1	-	-	1
Weaving/Thatching	-	79	-	79
Chipped Stone Tools				
Circular Scrapers	21	1	-	25
Knives	7	-	-	7
Gouges	1	-	-	1
Adzes	87	45	-	134
WEAPONS				
Slingstone	9	4	-	13
Spear Pt.	-	13	-	13
ORNAMENTS				
Pendants	2	8	-	10
Beads	15	51	-	66
CONTAINER				
Pottery (g)	388,082.4	203,870.2	3993.9	595,946.5
SOURCE MATERIAL				
Stone				
Cores	20	3	-	23
Debitage (n/g)	571/4701.4	644/1650.0	14/22.1	1229/6374.

had to be brought into the site. In the case of the mortars this represented hundreds of kilograms of stone. Given the distance which this material may have had to travel and the relatively difficult access to Pagat, the presence of these stone processing materials represent a considerable expenditure of energy.

2. Procurement - All items in this category are involved in the capture and/or collection of food items (e.g. fishing gear, spear points*, slingstones*). The lack of a reef platform at Pagat was no deterrent for the inhabitants; a wide variety of fishing gear in various stages of manufacture was recovered. Though usually discussed only as weapons, slingstone and spearpoints have been included here in that they may well have served to procure fish (by spearing) and birds and/or fruit bat (slings).

3. Fabricators - tools used in the manufacture of other items: hammerstones, adzes, chipped stone tools, weaving implements, knives*. A large number of these items were recovered from Pagat.

4. Weapons - items used in warfare: spear points*, slingstones*.

5. Ornaments - these are common elements items throughout the Pacific. The descriptive term used here is purposefully general in that there is no mention in the ethnohistoric literature of any social meaning attached to these items. Similarly, nothing in the archaeological record has yet suggested pendants or beads served as specific markers of wealth and/or status. Beads and pendants of many forms were found at Pagat; blanks and unfinished forms indicate that manufacture of these occurred at the site.

6. Storage _ As at nearly all sites, pottery sherds form the bulk of the collection. No detailed analysis of the extensive Pagat sample was undertaken for this thesis; however, the material is being analysed by Dr. Michael Graves, University of Guam. Field observation of rim sherds indicated a variety of vessel shapes and sizes were present. It is not known whether any or all of the pottery was manufactured at Pagat or transported into the site.

7. Source Material - An abundance of source material, shell and stone, was recovered at Pagat. The existence and quantity of these materials suggest that manufacturing activities were an important activity at the site, even to the point of importing large quantities of raw materials (e.g. basalts, Isognonum shell).

In many respects the assemblage from Pagat is no different from those found at any habitation site in the Marianas. Perhaps the most significant aspect of the artefactual assemblage at Pagat is the amount of imported materials, particularly stone.

With its location in a general limestone environment, igneous stone is exotic to the area with the nearest source in the Mt Santa Rosa area about 8 kilometres to the north. Lithic resources at Pagat included nodules of chert forming among the limestone. Evidence of stone working was found in both Horizons at Pagat but a significant variation in stone material was clear.

Horizon II contained a small amounts of debitage, all of which was chert, presumably locally obtained. The use of chert continued throughout occupation of the site, into the Protohistoric (i.e. Horizon I). However, at the same time as the permanent settlement became established the introduction of igneous stone, primarily basalts, occurred. In addition to the obvious amount of basalt incorporated in the massive mortars, the working of stone, as represented by large amounts of basalt debitage, was revealed.

This same pattern of lithic utilisation has recently been demonstrated elsewhere in the Marianas. The sample of chipped stone from the 1983 excavations at Mochong revealed a similar absence of igneous stone in early deposits though chert was present in small quantities. When basalt appears, by about 1000 years ago, it is already in great densities, all but replacing chert. Like Pagat, Mochong is situated in a predominately limestone area indicating that all of the material had to be brought into the site from a significant distance. Though details of chipped stone is meagre at best from other reports there is some suggestion that this pattern is widespread. Additionally, lack of sourcing data preclude any identification of likely sources of these stones.

Subsistence Evidence

As Reinman (n.d.:8) proposed, the initial activities at Pagat centered around generalised collecting and/or turtle hunting. The high density of ecofactual material and an extremely low artefactual density, supports Reinman's interpretation. Furthermore, this early level is identified with fauna composed almost entirely of fish and turtle (Table 6-4). It appears that the focus of activity at this time was squarely on the local marine resources (Figure 6-17a). Most fish Families identified from Horizon II could have been taken by spearing and/or hook and line directly in front of the site (see Appendix C).

During Horizon I, the focus remained on marine resources but there is evidence of a widening range of resource exploitation (Figure 6-17b). The presence of 50 mortars at Pagat implies that food processing was a predominant activity, though mortars were used to process a variety of materials, Pagat's location in an area rich with Cycads suggests that these were an important resource. Given the energy involved in transporting the basalt mortars to Pagat, these must have been considered important to local economic activities.

Not surprisingly, the inshore fishes predominate within the sample (Figure 6-18), suggesting that much of the fishing activity at the site may have been occurring directly along the shore. As in Horizon II, all identified fish Families could have been taken by spearing, perhaps netting, angling or trolling in the two biotopes (inshore, benthic) proximal to Pagat.

An intriguing result of this analysis is the identification of pelagic fish. It should be emphasised that the MNI of 10 pelagic fish represented the absolute minimal number and given the number of very large vertebrae recovered there may have been more individuals represented. It appears that the bone barbs recovered from Pagat were being used to troll for very large pelagic fish and were successful in capturing at least Coryphena hippurus (Mahimahi) and Istiophoridae (Black marlin). A similar analysis and quantification of fish bones sample from Mochong, Rota, also yielded evidence of

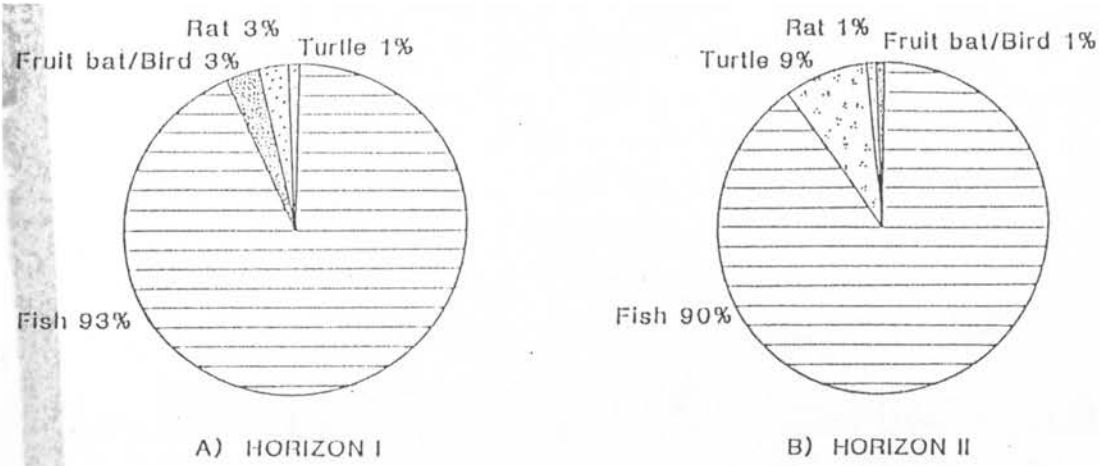


Figure 6-17 Variation in Faunal Remains

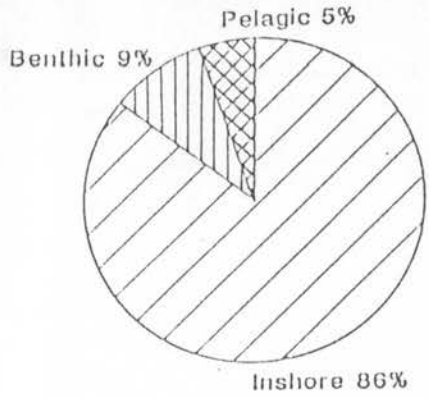


Figure 6-18 Primary Habitats of Fish Families Recovered From Pagat (Horizons I and II)

marlin and other pelagic fishes (Mike Fleming pers comm).

In general, fishing at Pagat appears to have been relatively labour intensive. That is, most fishing, even along the shore, must have been done by hook and line. The depth and surge of the sea immediately off the shore would make netting activities difficult at best. Indeed, the fishing gear recovered from the site suggest a strong reliance on angling and trolling (see Appendix B). Therefore, based on a time/catch ratio (in terms of weight) Pagat must have been more 'expensive' than, for example, Tarague where the extensive reef formation would have allowed greater catches in equal or less time by netting, observed elsewhere to be the most effective fishing technique (Kirch and Dye 1979). Given the range of fishing equipment at Pagat and the various stages of manufacture, it would be difficult to argue that fish were being traded into the site. While a portion of their fish intake may have resulted from trade, it also appears that fishermen from Pagat were contributing considerably.

Shellfish collection may have occurred along the rugged coastline. A wide range of shellfish was collected during the Protohistoric period. Though most of the identified shellfish could be found in the waters off Pagat they too would involve labor-intensive activities to procure. For example, sand dwellers would have to have been collected by divers and thus this activity would not have been done by the 'usual' shellfish collectors, women and young children.

The point of this discussion is that while a wide range of marine resources was locally available to the inhabitants of Pagat, they would be relatively 'expensive'. We may never know what percentage of food items were imported into the site though it is certain that some items are clearly exotic to the immediate environs. The imported shellfish include Strombus gibberulus and Isognonum sp (the latter probably brought primarily if not solely as source material for the manufacture of fishhooks). Both were present in considerable numbers (see Appendix C).

Whether Pagat could have existed as a completely independent settlement is uncertain. Given the limited range of resources immediately available and the expensive nature of most procurement activities, it is unlikely that the inhabitants of Pagat during the

Protohistoric period could have existed as a completely independent unit. The presence and quantity of imported goods supports the notion that avenues of exchange existed. With the predominance of processing implements, particularly mortars, Pagat may have been engaged in Cycad production . The presence of exotics in both food and source materials suggests a strong support system was in operation which may 'allowed' settlement in a 'marginal' area such as Pagat.

Concluding Remarks

The site area is defined by the extent of surface features (i.e. latte and mortars). The poor condition of the majority of latte precludes any definitive statement on the number that may have existed during occupation nor can any internal spatial organisation be discerned. However, the rather alkaline soils at Pagat have yielded a wealth of cultural materials from both surface collection and excavations.

The location of Pagat along the relatively isolated northeast coast has served to protect the site from human impact. Given the presence and variety of cultural materials, it provides an important opportunity for intra-site spatial analysis. Additionally, the the Protohistoric deposit is very shallow; the majority of cultural materials were recovered from the top 30 cm. Thus, I argue that Pagat is virtually a surface site and that much information about Protohistoric settlement configuration can be derived from analysis of the surface collection.

Given the variation of site extent between Horizon I and II, Reinman suggested that the earliest occupation of the limestone bench at Pagat was as a temporary camp. A more detailed analysis of areal extent, artefact variations and densities presented here supports his proposition. Given the apparent sharp break in pottery types and geologic strata, Reinman argued that the area was abandoned for some time prior to the establishment of the latte village observed on the surface. The current archaeological data are ambiguous on this point; the dating of Pagat suggests some continuity of usage. Rather than abandonment the site may have

experienced a change in usage from a temporary collecting camp to a permanent settlement.

Deposits associated with latte at Pagat are dated to the Protohistoric period with occupation beginning perhaps about 900 years ago. The Protohistoric period occupation is characterised as a permanent village which grew to its ultimate size over roughly two centuries and was abandoned after contact.

CHAPTER SEVEN: PAGAT - THE SPATIAL CONFIGURATION

Settlement pattern analysis has long held the attention of Pacific archaeologists. Yet, as Green (1984:64) recently noted, most studies have been either regional in scope or concentrated on identifying the presence and range of features within sites. Studies involving the analysis of relationships of portable artefacts to each other, and to features within a site, are rare in Pacific archaeology (but see Best 1984). This kind of analysis is fundamental to this thesis in an attempt to investigate the proposition regarding the existence of non-latte dwellings as well as examine ideas about the structure of latte villages.

The purpose of this chapter is to explore the spatial arrangement of surface features and cultural materials at Pagat in order to determine if non-latte residences may be identified. Having looked for these dwellings over the regional landscape and found no clear evidence of non-latte habitation sites, we must now focus upon a latte village to determine whether they may exist within this type of site.

The investigation of intra-site patterning is only now beginning in the Marianas and, indeed, the rest of Micronesia on both archaeological (e.g. Athens 1984, Snyder, Masse, and Gummerman 1983) and ethnoarchaeological studies (e.g. Hunter-Anderson 1983, Craib 1983b). In order to derive a model of a late prehistoric Chamorro village it is necessary to draw on many sources both dealing specifically with ethnohistoric and archaeological observations of Chamorro and deriving general expectations from recurrent patterns from studies elsewhere.

A recent attempt at identifying and analysing intra-site variation at the Ypao site on Guam was made (Leideman 1980). Given the nature of the sample size and coverage any useful spatial patterning would have been difficult to discern. This stemmed from from the fact that the site was not sampled in any systematic fashion which would be amenable to spatial analysis. Other than providing a catalog of provenience data, no useful spatial information was presented.

The focus of the spatial analysis at Pagat will be on a general,

operational level (Carr 1984) concerned with defining site boundaries, identifying internal clustering and the distribution of these especially in relation to latte. It is expected that much overlap of materials would characterise long-term sedentary settlements. In this way, the search will be for general 'use-areas' rather than attempting to identify specific activity areas and/or tool kits.

Though little detailed analysis of spatial distribution has yet been offered from Micronesia two recent projects have offered important observations; one of them involving excavation data and the other from surface survey and mapping. Excavation around features in a Palauan village revealed that house platforms contained high quantities of refuse when compared to other structures (e.g. clubhouses) (Masse, Snyder and Gummerman 1984:113). They state that households serve as centers of domestic production and are located around small platforms (blai). Features and other remains, including garbage pits, refuse middens, and clusters of stones were noted around the platform. Masse et al (1984) observed that nearly all refuse middens, garbage pits, and hearths are usually found on the same side of the platform.

On Yap, Hunter-Anderson (1983) has presented some valuable ethnoarchaeological observations regarding what she refers to as 'debris management' among households on the village of Toruw. Unlike the Palauan example, Hunter-Anderson suggests that a spatial separation of debris is attempted within the living compound. Dumps are found 'not far from' cookhouses which are where most debris accumulates (Hunter-Anderson 1983:34). Each residential compound has its own refuse disposal area (1983:20). She further suggests that this pattern can be influenced by the density of population within the village at a particular time. That is, the denser the population the tighter and more specific the dumping practices become. As population wanes, the dumping takes on a more general pattern occurring around the house and perhaps spilling over into other compounds.

Some general implications for spatial analysis can be drawn from these brief examples. First, that densities of a wide range of materials may be expected in the immediate vicinity of residences

even though dumping practices may have removed larger items. Secondly, that there is at least a loose correlation between surface densities and subsurface densities and features.

Protohistoric Village Configuration: Archaeological Implications

An important implication for intra-site patterning arises from the traditional view of the Protohistoric period. First and foremost is the proposition that the majority of the population lived in residences not built upon latte; these dwellings were located either as spatially distinct clusters or among latte within a single village and should be found to be quite numerous. The presence of other structures within a village is also predicted by the model. As discussed in Chapter Three, ethnohistoric data from the Marianas is scant in the extreme. Structures which may have existed in most villages are residences, cookhouses, men's house, meeting houses (perhaps the same as men's house) and, in coastal areas canoe houses.

As discussed in Chapter Five, archaeological attention to village layout in the Marianas has been restricted to an occasional plan map of latte distribution (e.g. Thompson 1932; Spoehr 1957; Reinman 1977). However, in an archaeological examination of an individual site, the general method was to select a latte (usually the biggest) and excavate between the uprights. While this usually uncovers a greater density of materials and features (i.e.burials) it reveals nothing about site organisation or what types of patterning, if any, are likely to occur.

Hornbostel (n.d.) offered some general observations regarding the surface distribution of cultural materials stating that most of the artefacts ('implements and weapons') collected from the surface come from the 'cultural area' surrounding latte. He comments that pottery fragments are found only at latte sites but later adds that 'pottery fragments in large quantities are only found at latte' (emphasis mine).

A model of the spatial distribution of cultural materials around latte has, in fact, been in existence for about 60 years though never explicitly tested. Hornbostel (n.d.) presented a highly

idealized, and unquantified, model based on his excavations of more than twenty-five latte. His model is based upon both surface and subsurface distributions with the presence and distribution of burial types (defined by their orientation) as the primary variable.

Hornbostel defined three zones in a latte area; zone A is contained within the latte uprights and consists of burials situated parallel to the long axis; zone B forms a triangular area encompassing roughly 100 square metres immediately outside (i.e. seaward) of the pillars; zone C is the 'cultural' area containing the majority of artefactual materials. It appears that Hornbostel exaggerated the areal extent of these zones around a latte. His figures translate into nearly 11,000 square metres or an area of about 120m x 90m. This appears to reflect his suggestion that latte are individual features and are not part of village clusters.

Mounds

Various authors (e.g. Thompson 1932, Spoehr 1957, Reinman n.d., 1977) have commented on the presence of low mounds within some archaeological sites. Though descriptions of surface manifestations are consistent, if often vague (Table 7-1) no quantitative data from these features has yet been presented. Questions relating to the relative density of these features still need to be explored. One possibility that has not been discussed is that the mounding may be the result of natural processes (e.g. tree throw) rather than cultural (i.e. trash dumps, house mounds). If these were natural features then it may be expected that evidence of disturbance and minimal consistency of contents would be found.

The contents of these mounds appear to constitute the 'midden debris' of Reinman (n.d.). Hornbostel (Thompson 1932:17) described the mounds as 'heaps of shell and animal bones.' Spoehr (1957) tested two mounds at the Blue (Tachogna) site on Tinian and simply states that both 'proved to be refuse dumps'; no details or descriptions of contents were presented. Reinman (1977) also refers to these mounds as containing 'debris' though he apparently did not test excavate any of these features during his 1965-66 fieldwork.

Table 7-1 Mound Descriptions

Source	Size Diam./Ht.	Contents	Location	Function
Hornbostel (Thompson 1932)	4.6/0.6	Shell/Animal Bone	'outer area' of Latte	midden
Spoehr (1957)	'small'/'low'	N/A	'seaward side of Latte'	Refuse Dump
Reinman (1977)	20-30m/'low'	midden debris	latte/non-latte areas	Fire areas

Referring specifically to the internal configuration of Pagat as well as providing a site map with the locations of various 'mounds', Reinman identified 50 distinct mounds which he states contain midden debris from cooking and/or other fire-related activity (n.d.:2). Many of these 'mounds' were, in fact, areas of apparent artefact concentrations rather than distinct topographic features (Reinman personal communication). Results of test excavations in 1974 indicated that these features contained ash lenses and evidence of fire pits, leading Reinman to interpret these as remnants of cookhouses where the Chamorro ' did their cooking and other fire-related activities' (n.d.:2). He further suggests that these mounds formed over a long period as 'food remains, broken pottery, tools and other lost and discarded articles accumulated...' (n.d.:10). Significantly, he reports no evidence of structures.

Another important variable regarding interpretation of these mounds, at least relative to the question of the existence of non-latte residences, is their spatial placement. Hornbostel (Thompson 1932:17) places mounds in the 'outer area' (his Latte Area C?) of latte 'sites'. Spoehr also associates mounds with latte and states that they are found (at least at the Blue site) on the seaward side. Reinman argues that mounds are found both in direct association with latte and in areas 'without any indication that latte structures formerly occurred on them. He does not specifically argue that these were non-latte residences even though in his discussion of the Pagat site, he states (n.d.:10) that 'both stone latte houses and presumably other houses on wooden pilings occurred' and that the mounds were adjacent to a 'house or small group of houses' (n.d.:10).

Whether these mounds may reflect non-latte dwelling areas is still unclear. Only Reinman comments on the presence of ash and other evidence of fires which may be more suggestive of cookhouse locations. It may be significant that Spoehr does not interpret these mounds as cookhouses; he has excavated two 'earth ovens' associated with Laulau house A on Saipan but he did not mention any mounding over this area. Rather he commented on the lack of evidence for a structure and recorded the 'ovens' as two circular, shallow depressions (<1m diam) filled with small, heavily burned rocks

(1957:46).

Surface as Indicator of Site Configuration

Though often neglected in archaeological research, surface materials can provide important data on a number of research topics (Lewarch & O'Brien 1981). Where surface distributions have been studied in detail, these materials have proven to be a good indicator of site configuration, especially if the deposit is generally shallow (i.e. <50 cm). Examples are Hatchery West (Binford et al. 1970) and Coapexco (Tolstoy & Fish 1973). In both these studies it was found that non-random concentrations of cultural materials occurred throughout the respective sites and that these 'hot spots' were indicative of subsurface concentrations. While it was emphasised that there was no one-to-one correlation between surface concentrations and habitation it did indicate the presence of subsurface features and defined site boundaries with some accuracy. While spatial analysis, generally, and surface distributions have not been given much attention in the Pacific there are some indications that the surface is an useful indicator (Green 1979, Irwin 1977).

Attention to the vertical distributions of cultural materials at Pagat (see Chapter Six) supports the idea that the surface is useful in determining site configuration. That the majority of all classes of items occur on or within the top thirty centimetres of the deposit makes Pagat a virtual surface site for the purposes of spatial analysis.

As indicted in Table 6-4, most materials in the assemblage were found in both surface and subsurface contexts. However, the tendency was for larger materials (e.g. mortars, large circular scrapers) to be found on the surface while smaller, more fragile items (e.g. hooks, barbs, spear points, needles) were found only in subsurface contexts. As Stockton (1973) has pointed out, during periods of treadage and scuffage, larger items tend to be moved laterally while smaller ones are pushed downwards. This may partially explain the differences in recovery contexts at Pagat. Also important is that when these smaller pieces are uncovered and sit at the surface, they

are exposed to breakage due to movement (human or animal) through the area and, also equally important, become more susceptible to natural processes of decay. This latter consideration may be most important since the smaller items are bone and shell.

While a variety of cultural and natural variables can intervene and complicate pattern recognition, it was argued in Chapter Six that post-depositional processes have had a relatively minimal effect upon the deposits at Pagat. This does not presuppose the 'Pompeii Premise' (see Binford 1980). The scatters of cultural materials at Pagat do not represent a 'frozen moment' from the Protohistoric period. Rather the working assumption is that cultural processes at work during the last phase of occupation are primarily responsible for the general patterns of distribution now observed at Pagat.

The main goal of any sampling scheme is to be able to extrapolate with some degree of certainty from the known to the unknown. In the case of the surface collection at Pagat, sampling was devised in order to extrapolate the distribution (spatial structure) of cultural materials so that a general pattern of distribution could be discussed. The details of the sampling design used in this instance are described in Chapter Six. It was designed specifically to address questions of spatial structure and thus differs somewhat in form from probabilistic sampling.

Probability sampling alone does not adequately investigate configurations and associational patterns (Redman 1975:151). For example, simple random samples, while providing an adequate statistical sample of the types and ranges of artefacts within a site would not be sufficient to investigate their distribution across that site. To investigate this latter point, a more systematic layout of sampling units is required, the size of sampling grids and the spacing intervals being dependent upon the resolution required given the scale of the research problem. For this thesis, the questions relating to the spatial patterning at Pagat are quite general; how are cultural materials distributed across the site (random/non-random); are there any consistencies in the distributive patterns? The focus is on the general clustering of materials in an attempt to identify non-latte features within a

latte site. At this level it is not necessary to examine the co-variation of artefact types nor detail specific point locations of occurrence.

Redman (1975:150) cautions that a danger in the use of systematic sampling schemes is that the interval of unit placement may coincide with the 'periodicity' of materials within a site. Given the relatively tight 'checkerboard' layout of sampling units at Pagat, it seems unlikely that major features such as residences would be lost between the units; the assumption being that major features (i.e. residences or other structures) within the site would be in excess of 25 square metres.

The adequacy of sample size is an old and ongoing debate. As Read (1975:51) points out, there is no magic number. Jermann and Dunnell (1979:58)have argued that, '[H]olding sample design constant, a larger sample is required to provide an adequate basis for mapping spatial structure than is required to approximate population statistics.' However, it has been my experience that when investigating horizontal patterning, size of sample is not as critical a factor as the actual design (layout) of the sampling. For example, at a shell midden in southern California a 1% excavation sample taken from systematic intervals across the site yielded a generalized distribution map which mapped exactly the pattern displayed by an intensive surface collection (Craib 1982).

As discussed in the last chapter, 4225 square metres were collected representing approximately 20% of the site. These collection areas did not form a continuous grid across the site but rather consisted of two main sample areas (see Figure 6-8). The eastern sample area totalled about half (13,500 sq.m) of the entire site area of which 3050 square metres were collected, representing a 23% sample from this particular area. Along the western portion of the site, the sample area covered 5500 square metres and 1150 square metres or 21% of this area was sampled. Within each sampling block a 50 % sample was obtained. Thus, the specificity of statements regarding surface distributions will reflect these various levels of sampling; specific areas can be looked at in detail while the larger, site-wide context can be discussed on a more general level.

Due to the highly disturbed condition of most latte sets within

Pagat, it became necessary to define general areas where latte had once stood. Three major 'areas' have been defined within the site - Latte Areas, Latte Zones and Open areas. Latte Areas are defined by the scatters of stone pillars and capstones. These areas are not considered to delimit the original areas of Latte but rather provide a core area for purposes of measuring relative densities. Neither do they represent the actual numbers of pillars (in all cases there are fewer pillars and capstones than necessary for a complete latte of any size) though the results are principally the same; clustering occurs more densely in and about scatters of latte components (i.e. within Latte Areas). The focus is directed in this chapter towards the variations between Latte and Open Areas, not between Latte Areas themselves.

Hornbostel's model posits that areas immediately outside the latte should also exhibit a significant (of unknown strength) density of cultural materials. The Latte Zones incorporate the area immediately outside the Latte Area. This is done by extending the field by five metres (the size of the collection units). With the exception of Area II C and D most latte areas are situated so to avoid overlap in their zones. This zone may, in fact, be a rather conservative measure, at least compared with Hornbostel's model.

Lastly, Open Areas are defined as any area lying outside a Latte Zone. These are important to define because it is expected that if non-latte residences exist they would most likely be found here. To reiterate, the three alternative hypotheses under consideration are:

Ho: Cultural materials are distributed randomly throughout the site and do not form clusters.

H1: Cultural materials tend to cluster and are found only in and around Latte (Areas plus Zones);

H2: Cultural materials tend to cluster both in and around Latte and in Open Areas.

In examining the internal configurations of Pagat, two simplifying assumption are made. First, assemblages found at latte

and non-latte residences should not be significantly different in amounts (densities) although the relative frequencies of artefact classes may differ and the presence/absence of some classes or types of materials may occur. This allows the potential recognition of non-latte residences on the basis of discrete clusters of cultural materials in areas where latte are not present. Table 7-2 presents the general classes of cultural materials, and their respective counts, to be analysed in this chapter.

The second assumption is that latte and non-latte areas were spatially distinct; these dwellings were spatially segregated so that non-latte residences would not be found immediately adjacent to latte. Certainly there is nothing in the ethnohistoric literature that even vaguely suggests a spatial association. Therefore, non-latte residences may be expected on the periphery of settlements and/or in the open space between latte within a settlement.

Although numerous methods of graphic display are now available (Upham 1979), two basic methods will be employed here. The first is the use of simple histograms and the second involves computer isopleth mapping. Used together these two provide an adequate graphic display of surface distributions. The following series of maps were generated through the ISOMAP mapping program.

This program is essentially a miniature version of the well-known SYMAP program. ISOMAP is capable of producing isopleth and proximal maps on microcomputers. The program used here was rewritten from the Fortran listing in Bauman (1978) into Basic by Ed Roper, Technical Officer, Department of Anthropology, University of Sydney. To create an isoplethic map the program uses Z-values and straight-line distances of the six nearest data points in a gravity-type model. This interpolation algorithm is similar to that used in SYMAP (Baumann 1978:25) and a predictive interpolation of values (e.g. pottery weights, artefact counts) around specific data points (i.e. surface collection squares).

Establishing Site Boundaries

Establishing the peripheries of a site is an important initial task in any archaeological project but especially critical at Pagat

Table 7-2 CULTURAL INVENTORY - SURFACE COLLECTION

Cultural Items	Number of Units Recovered From	Percentage of Occurrence
Pottery	168	99%
Shell	111	66
Chipped Stone (non-diagnostic)	106	64
Scoria (Tuffaceous Stone)	84	49
Fire-Affected Stone	77	45
Adze	53	31
Bone (non-human)	26	15
Chipped stone Tool	16	9
Ornaments	11	6
Weapons	7	4
Fishing Gear	3	2
Processing Tool	2	1

Table 7-3 Results of Nearest Neighbour Analysis - Mortars

Sample	48^
Area	25,681 square metres
Density	1.86909E-03 (i.e. 0.000186909 mortar/sq.m.)
Expected-Mean	11.5653
Observed-Mean	7.79167
Ratio O:E	0.673713 Tends to Aggregate

^ Two mortars were closer to the edge of the site than to their nearest neighbour and were deleted.

because the periphery of the site may be a possible location for non-latte structures; Sanvitores suggested a distinct spatial segregation of high and low status housing at Agana. The borders of the site along the northern and southern portions are defined largely by physiographic features. It is at the eastern and western edges that we need to turn out attention. Reinman observed surface materials beyond the extent of features at Pagat.

Sampling units were placed beyond the extent of features in order to identify, quantitatively, the edges of the site. Pottery, as the most abundant class of material recovered was selected as the best indicator (Read 1975). A single east-west transect was established using collection units immediately north and south of each baseline. Additionally, a series of north-south transects were established in order to document the distribution at selected intervals across the site.

Figure 7-1 illustrates the distribution of pottery by weight on an east-west transect.The edges of the site are clearly defined by the ever decreasing amounts of pottery along both the eastern and western ends of this transect collection units exhibit less than 1000 grams, nearly one-third of the amount in many areas in the center of the site.

The five histograms in Figure 7-2 illustrate two important interrelated trends in the distribution of pottery. First, the transects at the east and west ends of the site (7-2 a and e) both contain significantly less amounts of pottery than the other three. Secondly, there is a general yet consistent decrease in pottery towards the southern (seaward) edge of the site.

A series of collection transects was also undertaken beyond the 'edges' of the site. These extended nearly 200 metres beyond the eastern and western boundaries with surface collections made about every 20 metres. Three transects were walked from the southern edge of the site (corresponding to the change from canopy to low bush) to the coastline. The results of each transect indicated a very low density or complete absence of cultural materials. Pottery was the only class of materials observed along these transects.

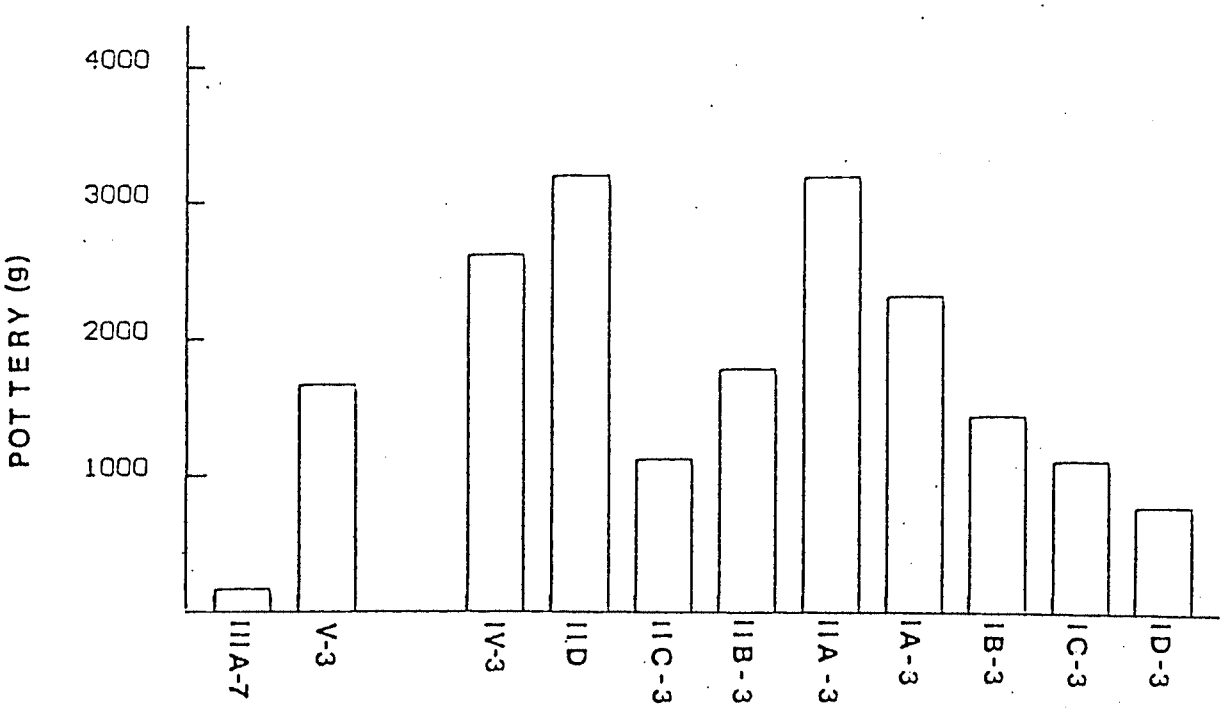


Figure 7-1 Variation in Sherd Weight Along West-East Transect

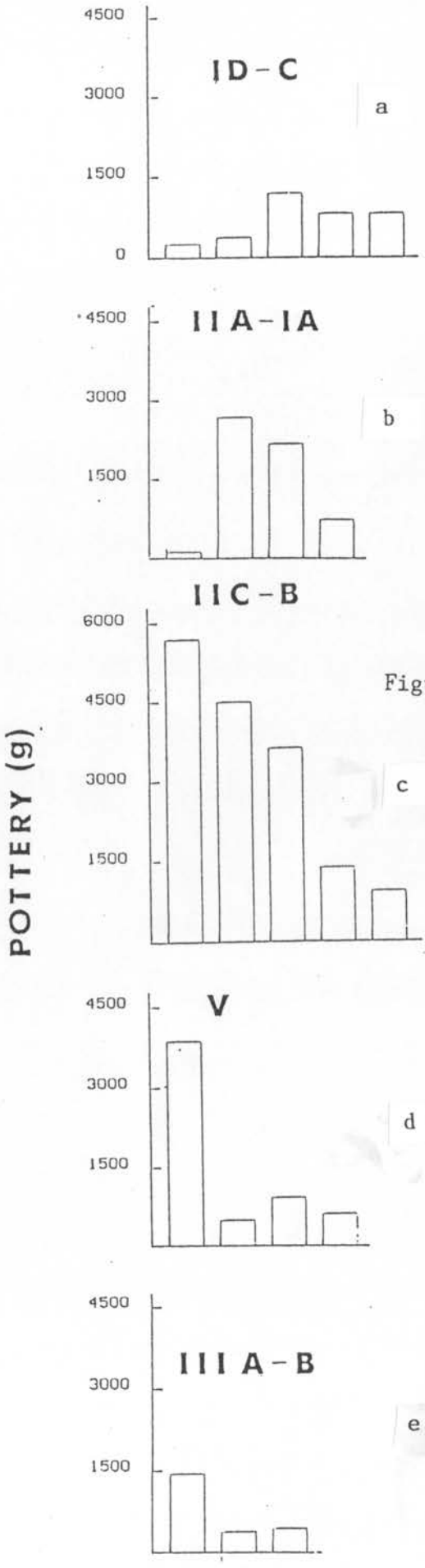


Figure 7-2 Variations in Sherd Weight Along North-South Transects

Mortars

Pagat is notable for the large numbers of mortars; approximately 50 were mapped. A quick visual inspection of the distribution of these features also suggest an association with Latte Areas. This has also been noted at many other sites (Thompson 1932, Spoehr 1957, Reinman 1977). A Nearest Neighbor analysis was performed to test the Null Hypothesis that mortars occur randomly throughout the site. Table 7-3 presents the resultant statistics. The Null Hypothesis is rejected and it is argued that mortars tend to cluster within the site.

In summary, the surface limits of Pagat do not extend much beyond the distribution of surface features. Important in this discussion is that there is no evidence for the presence of habitation beyond the distribution of latte. If the non-latte dwellings are to be found they must exist in the open spaces among the latte features of the site. We now turn to detailed examination of the distribution of cultural materials within the site.

Surface Distributions

The distribution of five classes of cultural materials - pottery, fire-affected igneous rocks, chipped stone debitage, scoria, and faunal (bone and shell) remains are examined. This was done rather than simply plotting the distribution of a general category of artefacts in order to investigate possible recurrence of clusters. Also such a general category as artefact may have served little useful purpose in delineating clusters.

The following distribution maps are in the same configuration as the sampling areas. This was done in order to depict more precisely the location and configuration of clusters, an important consideration in terms of arguing spatial association. If the mapping surface was extended to include all areas within the site boundaries the resulting maps would perforce become more generalised, in effect, expanding the areas of concentration, potentially distorting the distributional boundaries.

Pottery

Nearly 500 kilograms of pottery was recovered from the surface collection at Pagat. This material was by far the most abundant not only in terms of bulk but in the overall spatial distribution. Only one of the 169 collection units failed to yield any sherds. The range of values (i.e. sherd weight per unit) varied from 0.0 to 11,550 grams; both represent extreme figures. The upper value is the only one over 9000 grams with most clusters represented by values of 6000-8000 grams. Variation within the sample is indicated by the high standard deviation around the relatively low mean - 2400 $\pm$ 2110 g.

Most of the site is characterised by a light (<2000 g) scatter. The densest concentrations (i.e. 4600-9000 g) are directly associated with Latte Areas and Zones (Figure 7-3 a-c). Area I exhibits a generally light scatter with significant clusters occurring in only two areas. A small, moderately light concentration is observed at Latte Area 1. The highest concentration sits at the northern edge of IB well away from the nearest Latte Area (Latte Area 2). This locus is situated on a angled (c. 30 degrees) slope rising northwards towards the cliff. Given its location, this may represent a dump area rather than a non-latte dwelling. Examination of the distribution of other classes of materials in this area may clarify this.

The Open areas of IIA and IIB exhibit very light dispersed sherd scatters. On the other hand, IIC and IID contain the densest general scatter within any of the sampling areas. There are three clusters in this distribution each proximal to a Latte Area. While some Latte Areas in this section do not exhibit a peak they do exist in areas of moderately heavy concentrations. In fact, there is a noticeable band of sherd concentration along the northern border. This corresponds to the cliffline which in this portion of the site ranges from 60-90 degrees. This clustering towards the cliffline is also present in IIA and IB.

The heaviest concentration within the sampling areas is found on the 'mound' of Area IV. The high concentration of sherds was restricted to a single collection square (IV-2) though surrounding

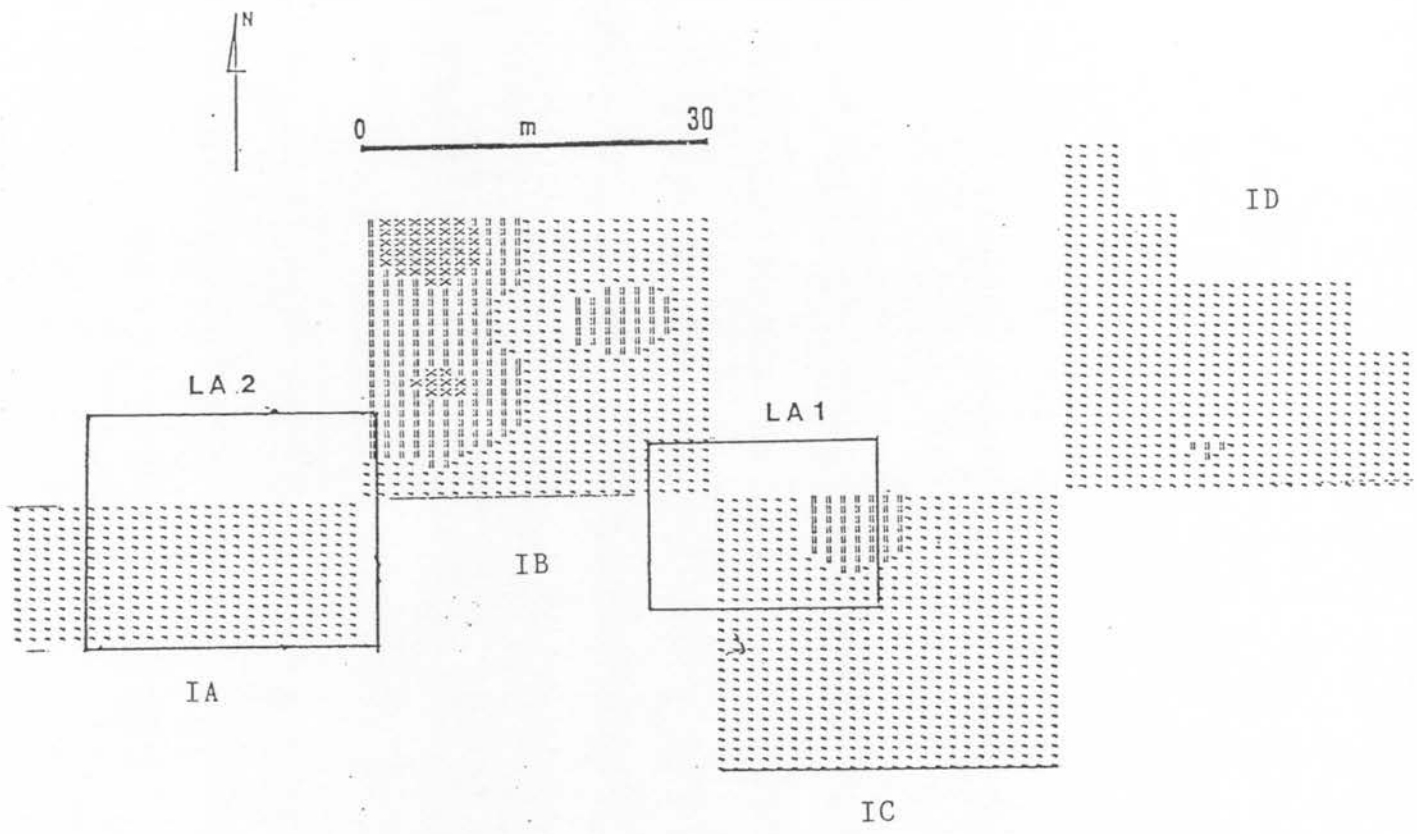
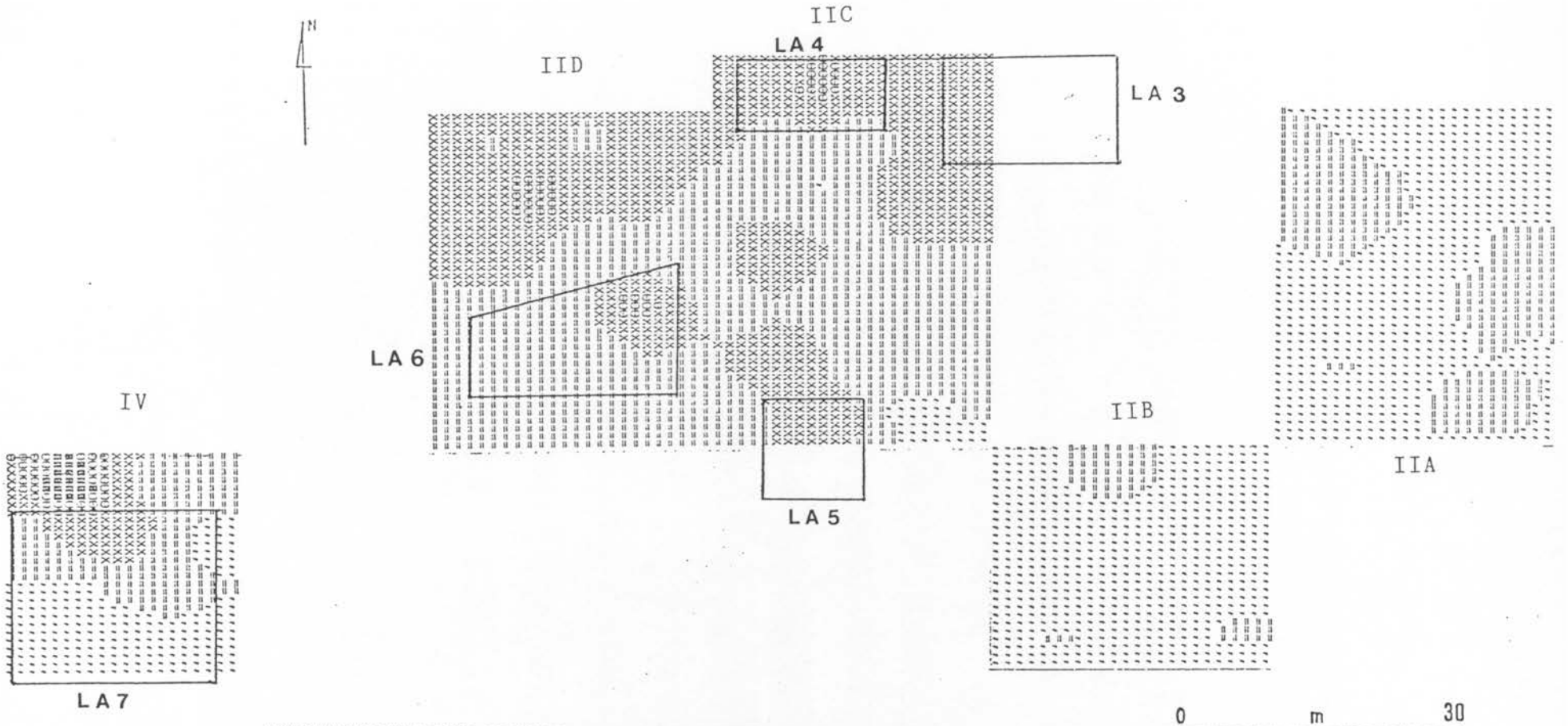


Figure 7-3a Pottery Distribution - Area I

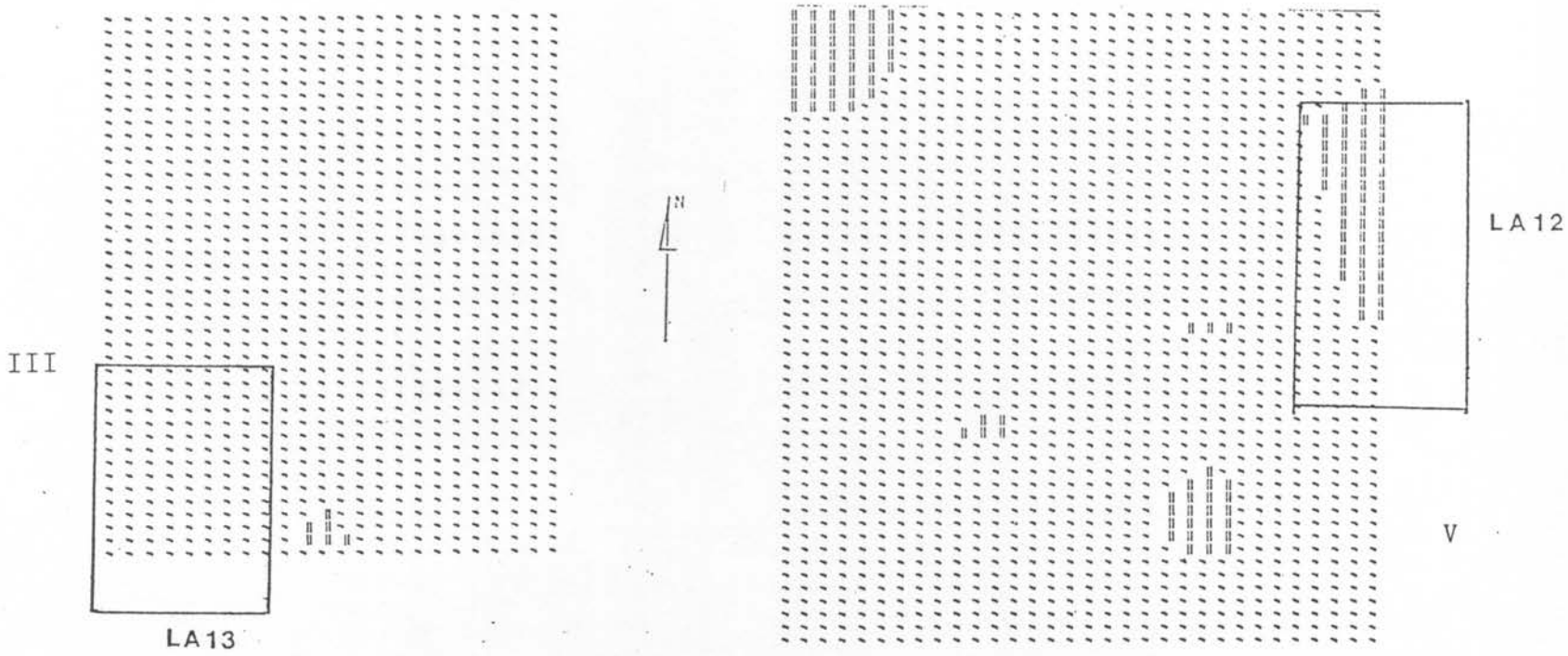


ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL USING : EQUAL INTERVALS.

MINIMUM	0.00	2300.00	4600.00	6900.00	9200.00
MAXIMUM	2300.00	4600.00	6900.00	9200.00	11500.00

LEVEL	1	2	3	4	5
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	,,,,,,,,,	=========	XXXXXXXXX	000000000	HHHHHHHHH
	,,,,,,,,,	=========	XXXXXXXXX	000000000	HHHHHHHHH
	,,,,,,,,,	=========	XXXXXXXXX	000000000	HHHHHHHHH
	,,,,,,,,,	=========	XXXXXXXXX	000000000	HHHHHHHHH

Figure 7-3b Pottery Distribution - Areas II and IV



ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL USING : EQUAL INTERVALS.

MINIMUM	0.00	2300.00	4600.00	6900.00	9200.00
MAXIMUM	2300.00	4600.00	6900.00	9200.00	11500.00

LEVEL	1	2	3	4	5
	,,,,,,,,,	=========	XXXXXXXXX	eeeeeeeee	#########
	,,,,,,,,,	=========	XXXXXXXXX	eeeeeeeee	#########
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	,,,,,,,,,	=========	XXXXXXXXX	eeeeeeeee	#########
	,,,,,,,,,	=========	XXXXXXXXX	eeeeeeeee	#########

Figure 7-3c Pottery Distribution - Areas III and V

squares also yielded heavy (interval 4) amounts.

The situation in the western portion of the site resembles that found in Area I. A very light scatter with only a few scattered pockets of sherds concentrations but even these are only at the second interval (i.e 2300-4600 g). Nevertheless Latte Areas 12 and 13 are proximal to these light concentrations. The locus situated at the northwest corner of Area V is not associated with any latte but rather represents the area immediately outside a rockshelter.

Fire-Affected Rock

No hearth features were noted at Pagat, though many unworked igneous stone were noted which appeared to be fire-affected. This was determined by the crystalised, often friable nature of the rocks and/or an oxidised appearance of hematite inclusions which usually suggest exposure to fire. These fist-sized stones, obvious imports to Pagat, must have been used as hearth and/or oven stones. The basaltic material comprising these stone is coarser-grained than that found in mortars, chipped stone tools and debitage. It is more similar to the material from which pestles and other processing tools were made. In fact, some of the fire-affected stone were broken tools used subsequently as hearth stones.

This class is quite clustered (Figure 7-4 a-c), the sample of 253 rocks occurring in less than half the collection units. The counts of fire-affected rocks range from 0.0 to 16.0 per unit; of the 45 units where these stones were found most were proximal to each other. While limited in extent, none of the rocks were found in any configurations recognizable as a specific feature though another close correspondence between clusters and Latte Areas occurred. It is interesting to note that each loci of fire-affected rocks are adjacent to but not within Latte Areas.

Two areas of concentration which are found in the Open Areas - IB, IIB. The cluster of stones in IB is adjacent to the pottery loci illustrated in Figure 7-3a. Again, no latte was identified from this area. Whether the presence of these stones is suggestive of an activity area is still unclear but its consistent clustering may suggest it was not simply a scattered dump area.

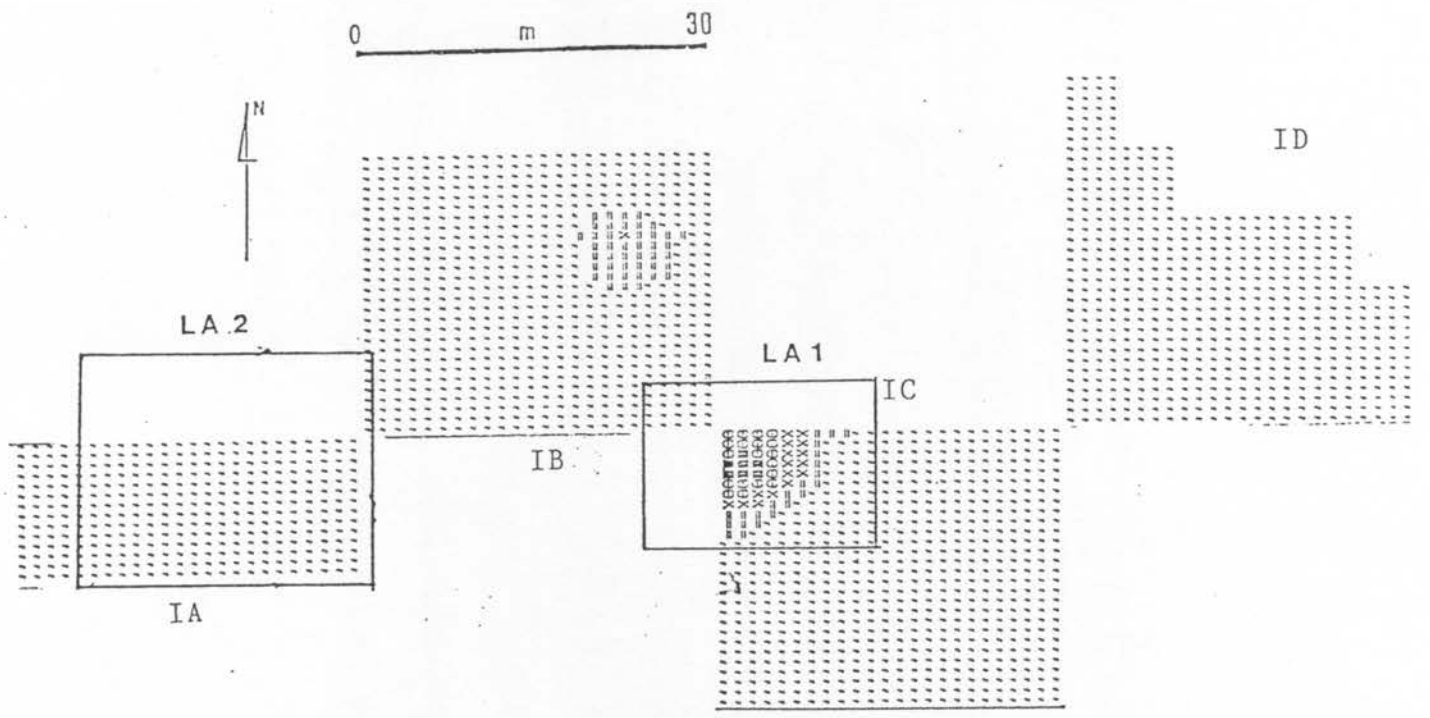


Figure 7-4a Fire-Affected Stone Distribution - Area I

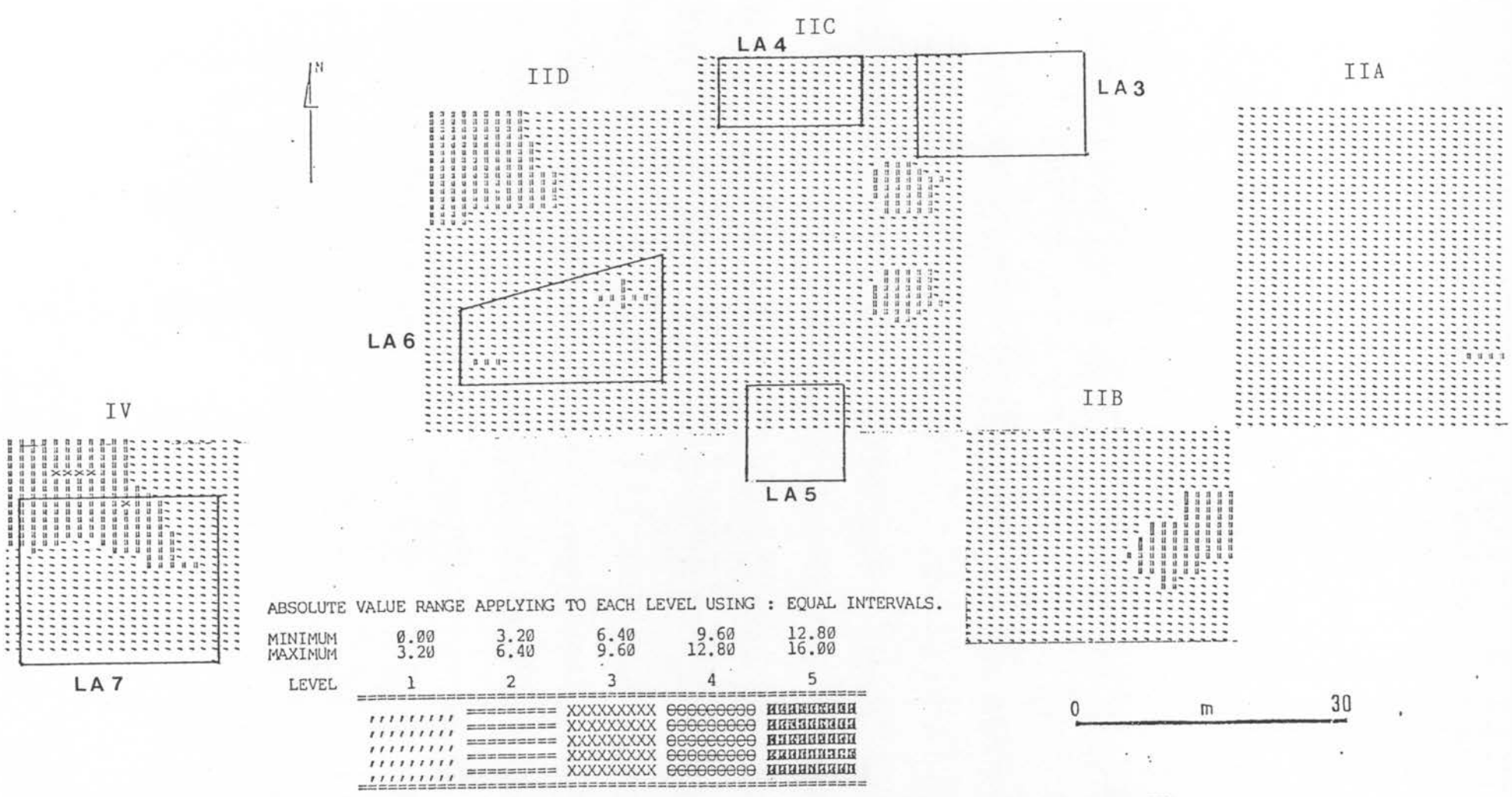


Figure 7-4b Fire-Affected Stone Distribution - Areas II and IV

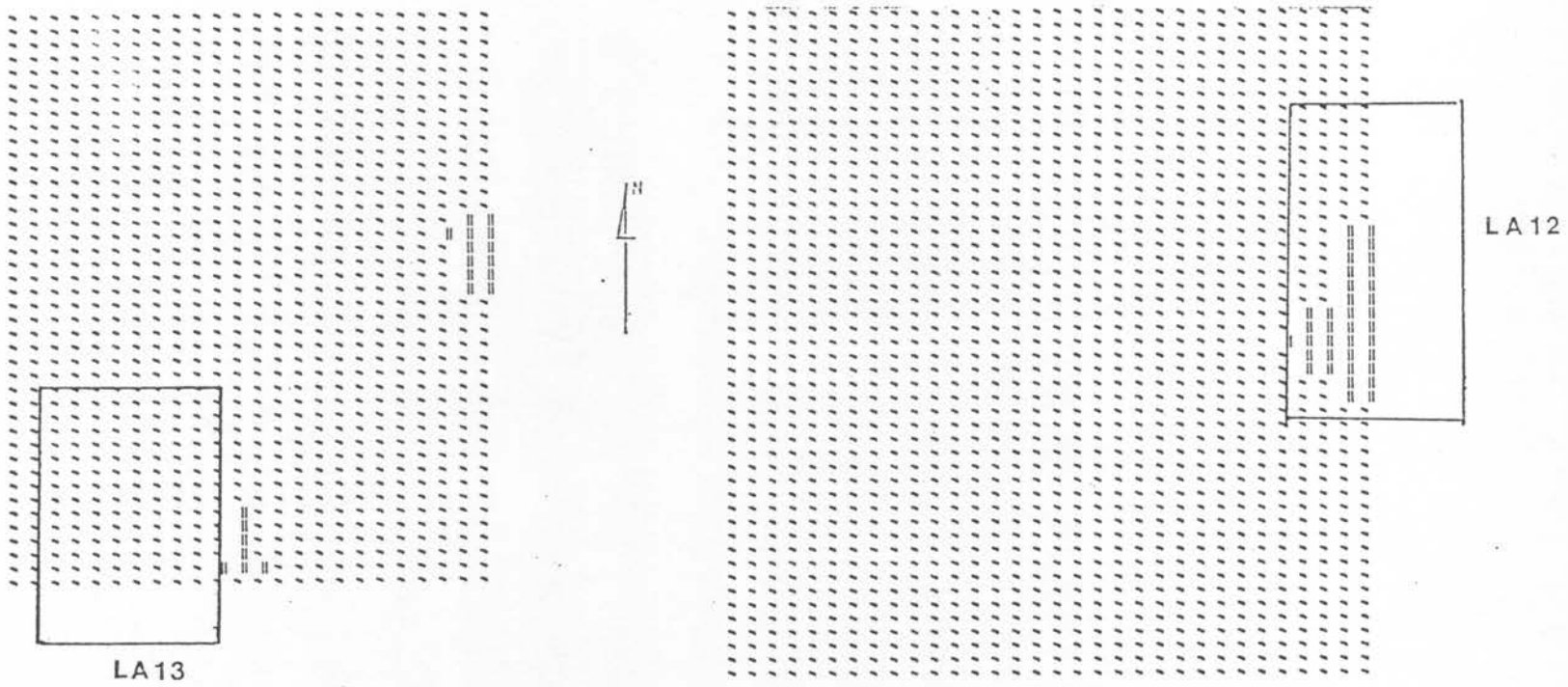


Figure 7-4c Fire-Affected Stone Distribution - Areas III and V

The presence of these stones in Area II and IV are proximal to Latte Areas with the exception of IIB.

Chipped Stone

This class of material was commonly encountered during surface collection, occurring in nearly two-thirds of all collection units. As indicated in Figure 7-5a-c, though common, chipped stone was also distributed in a non-random fashion.

In the Eastern collection Area three distinct loci are observed, each in or around latte. Again, the heaviest general distribution is in IIC and IID especially around Latte Areas 5 and 6. Area I contains very low amounts of chipped stone with small clusters occurring at Latte 1 and in the southwestern corner of IB adjacent to Latte Area 2. This is the third class of materials to cluster in IB.

Unlike the previous two classes of materials, chipped stone occurs in great number in Area V. The area of heaviest concentration is found in Latte Area 12 and in the immediate surrounding area. All four of the densest clusters occur directly adjacent to this latte. Another cluster appears in the northwest corner near the rockshelter. No clustering of chipped stone is found in Area III.

It should be noted that the distribution of chipped stone tools are also highly restricted (i.e. found in only 9% of the collection units) and follow a pattern similar to the debitage illustrated here. Ninety-eight percent of all chipped stone tools (adzes not included) were recovered from Latte Areas.

Scoria (Tuffaceous Stone)

This is one of the more common surface items though its occurrence is characterised by small clusters. Within the sample of over 200, most pieces were small (c.3 x 5 cm) fragments and were found in nearly half the collection units, though the general scatter usually consists of less than three pieces per unit. The range is from 0.0 to 13.0 pieces and they are found in a rather

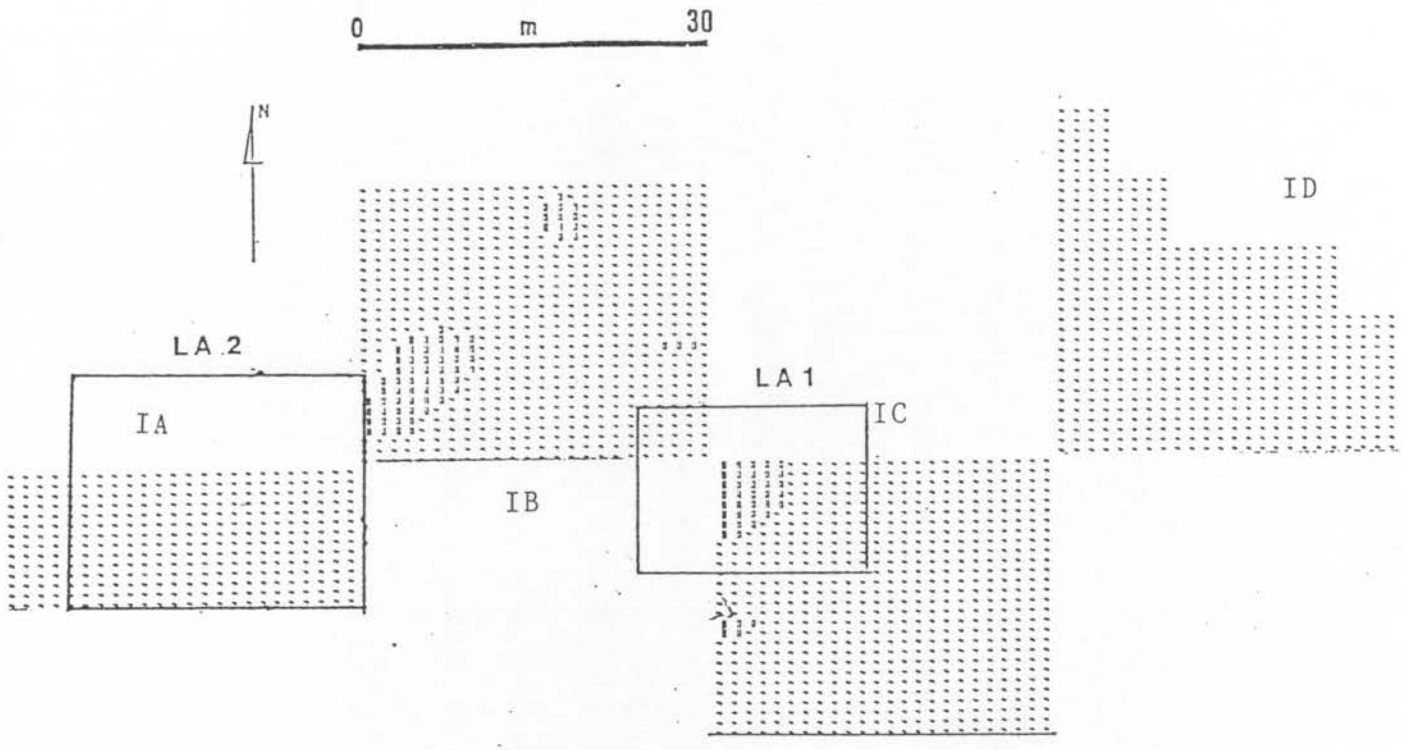


Figure 7-5a Chipped Stone Distribution - Area I

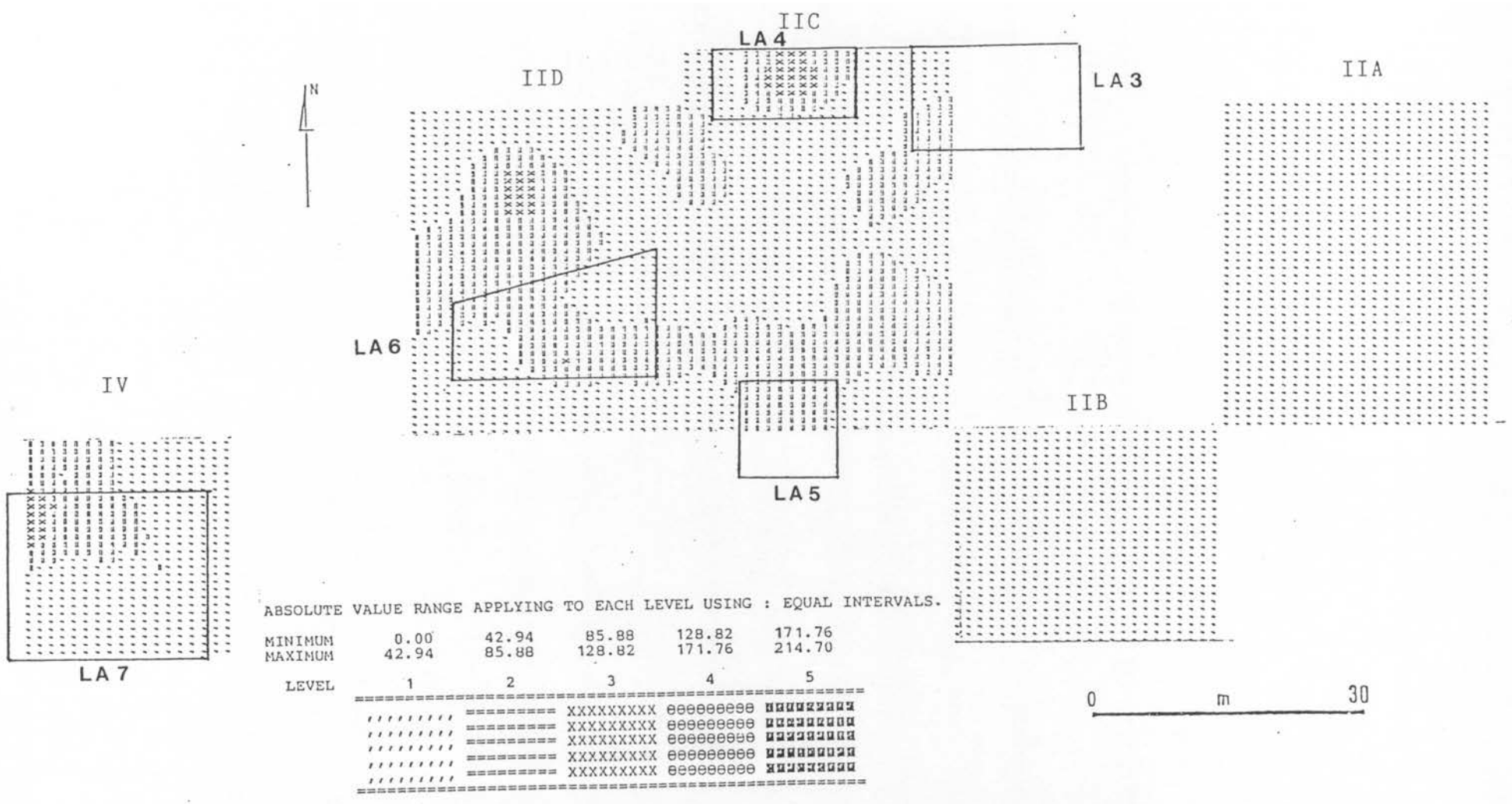
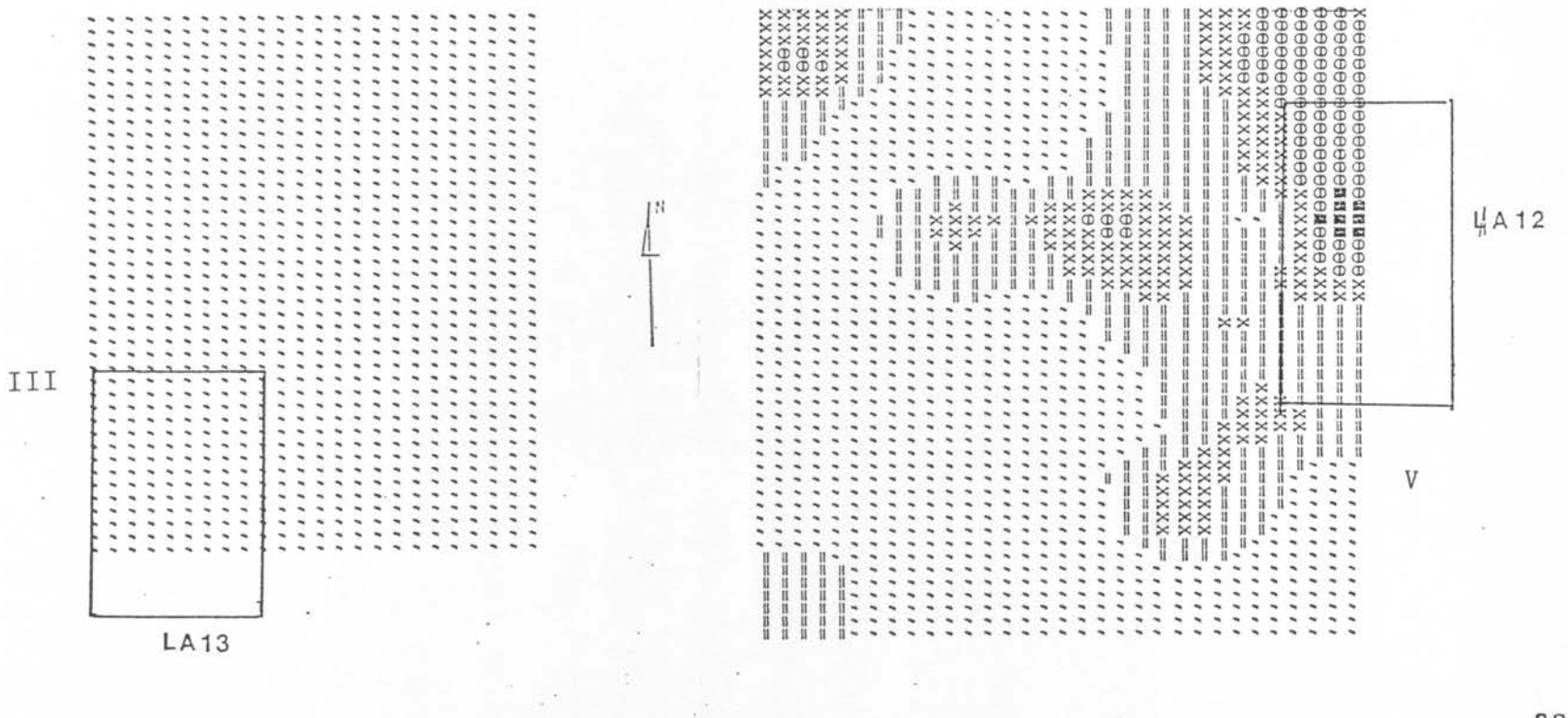


Figure 7-5b Chipped Stone Distribution - Areas II and IV



ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL USING : EQUAL INTERVALS.

MINIMUM	0.00	42.94	85.88	128.82	171.76
MAXIMUM	42.94	85.88	128.82	171.76	214.70

LEVEL	1	2	3	4	5
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	,,,,,,,,,	=========	XXXXXXXXX	eeeeeeeee	■■■■■■■■■

Figure 7-5c Chipped Stone Distribution - Areas III and V

restricted distribution (Figure 7-6a-c); all but one of the clusters is associated with latte. The exception is again immediately outside Latte Zone 1 in IB . Areas II C and IID again contain the largest and densest clusters with the peaks occurring within Latte Areas 3, 4 and 6. The only other peaks occur at Latte Area 1 and 7.

Faunal Remains

The bone and shellfish remains which comprise this category do not include any artefact source materials. That is, Tridacna and Isognonum shells in addition to human bone are excluded from this sample (see Appendices B and C for supporting arguments). It is assumed that the remaining class of materials would have constituted trash and should be expected to indicate dump areas. As such, they might be expected to occur further away from residences than the previous classes of materials. The sample mapped in Figure 7-7a-c ranges from 0.00 - 195.8 grams, a very light scatter. Most of the material was fragmented.

Area I is nearly devoid of faunal material except for an area in and around Latte Area 1. The locus is very restricted with the highest concentration along the seaward and inland edges.

There is no clustering of material around Latte 2 which is somewhat puzzling. However, previous excavation in this area (EDL) may have removed many of the faunal remains. Certainly, this is the only Latte Area which does not exhibit associated clustering of faunal remains.

The distribution in Area II is more complex but it too correlates with Latte Areas. The Open Area of IIA exhibits a minimal amount and is characterised by a generalised dispersal. A high concentration is noted in the eastern edge of IIB. IIC and D exhibit the expected pattern of faunal remains distribution in that the clusters occur proximal to latte. Like the chipped stone material, the pattern of distribution reflects a general clustering along the northern cliffline Three dense areas are found in and around Latte Areas 5 and 6. Likewise, Latte Area 7 in Area IV also has an associated clustering.

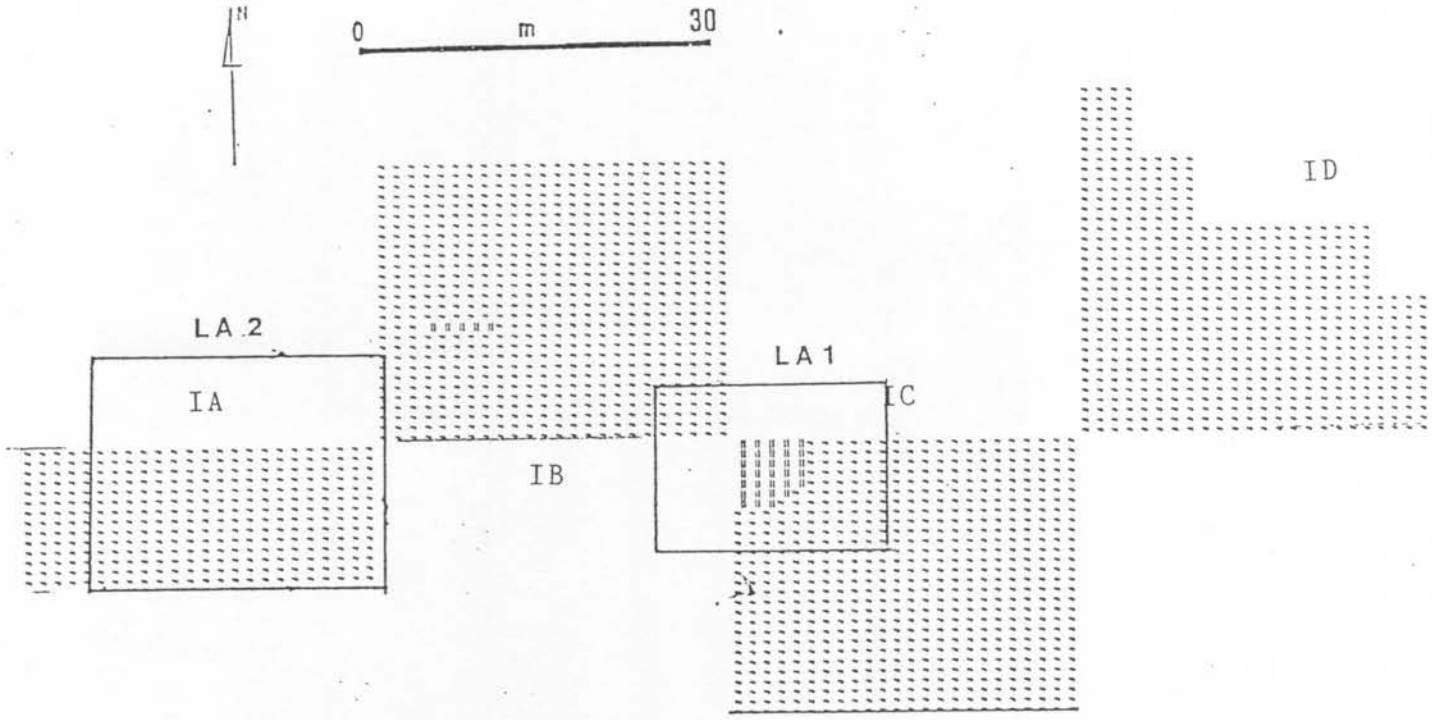


Figure 7-6a Scoria Distribution - Area I

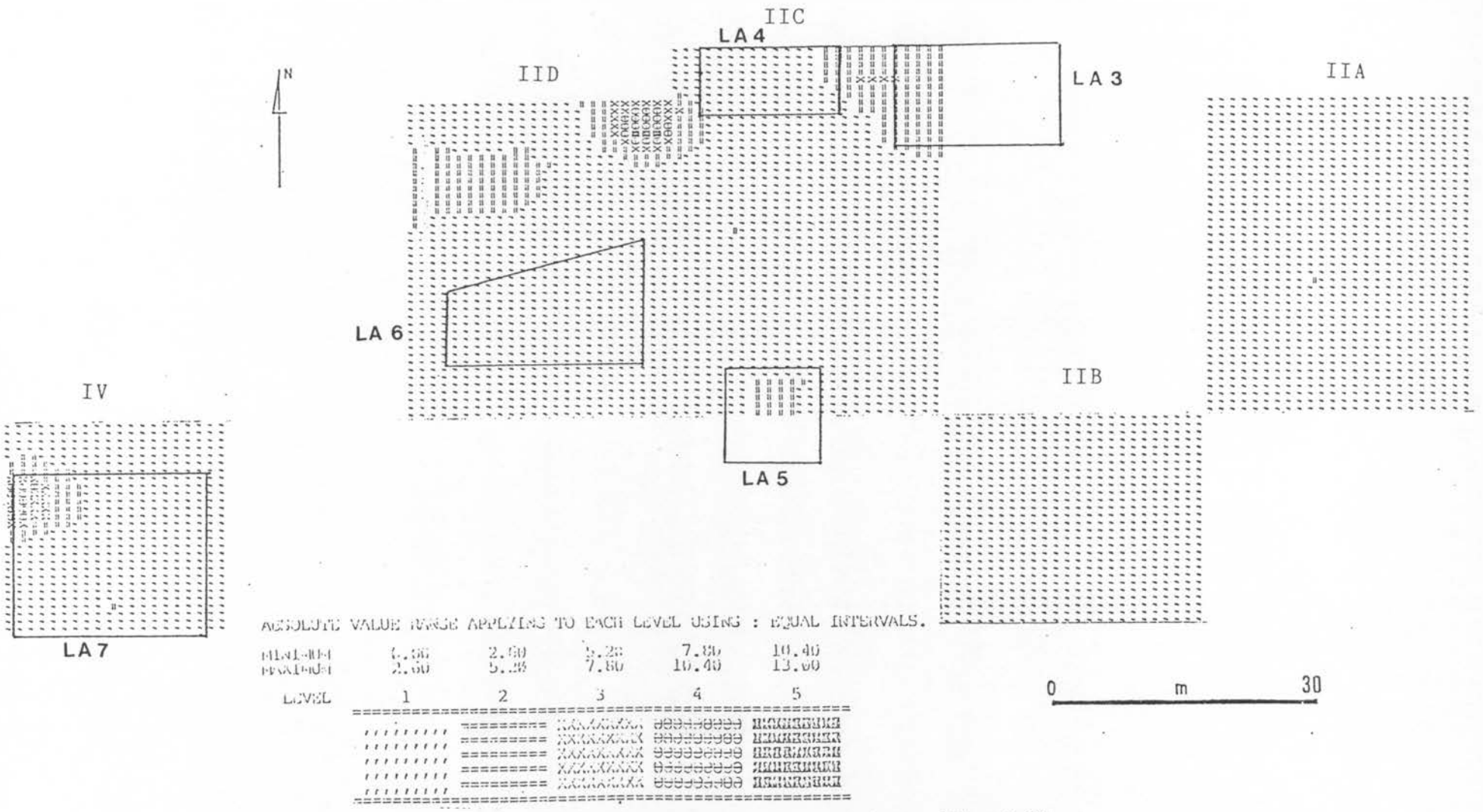
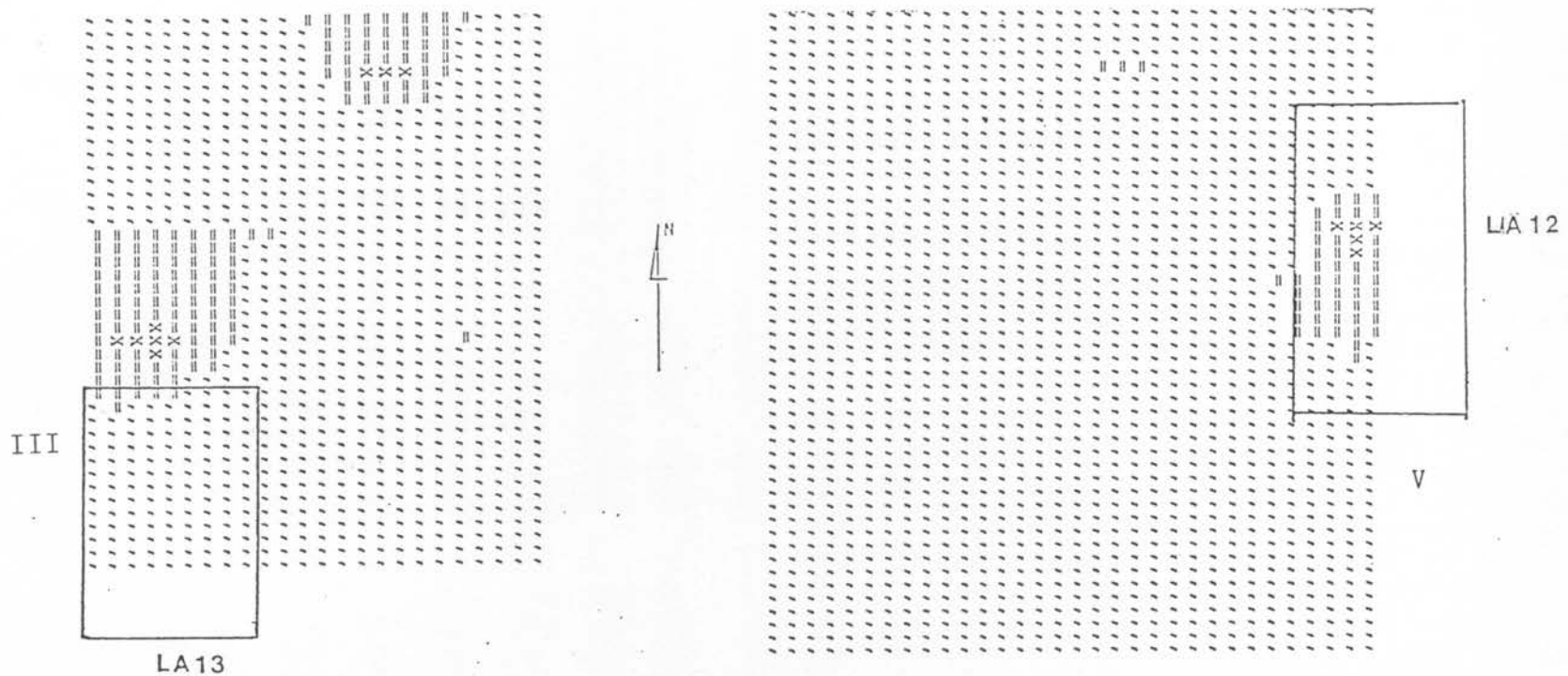


Figure 7-6b Scoria Distribution - Areas II and IV



"TUFFACEOUS STONE DISTRIBUTION IN WESTERN AREA - PAGAT"

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL USING : EQUAL INTERVALS.

MINIMUM	0.00	2.60	5.20	7.80	10.40
MAXIMUM	2.60	5.20	7.80	10.40	13.00

LEVEL	1	2	3	4	5
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Figure 7-6c Scoria Distribution - Areas III and V

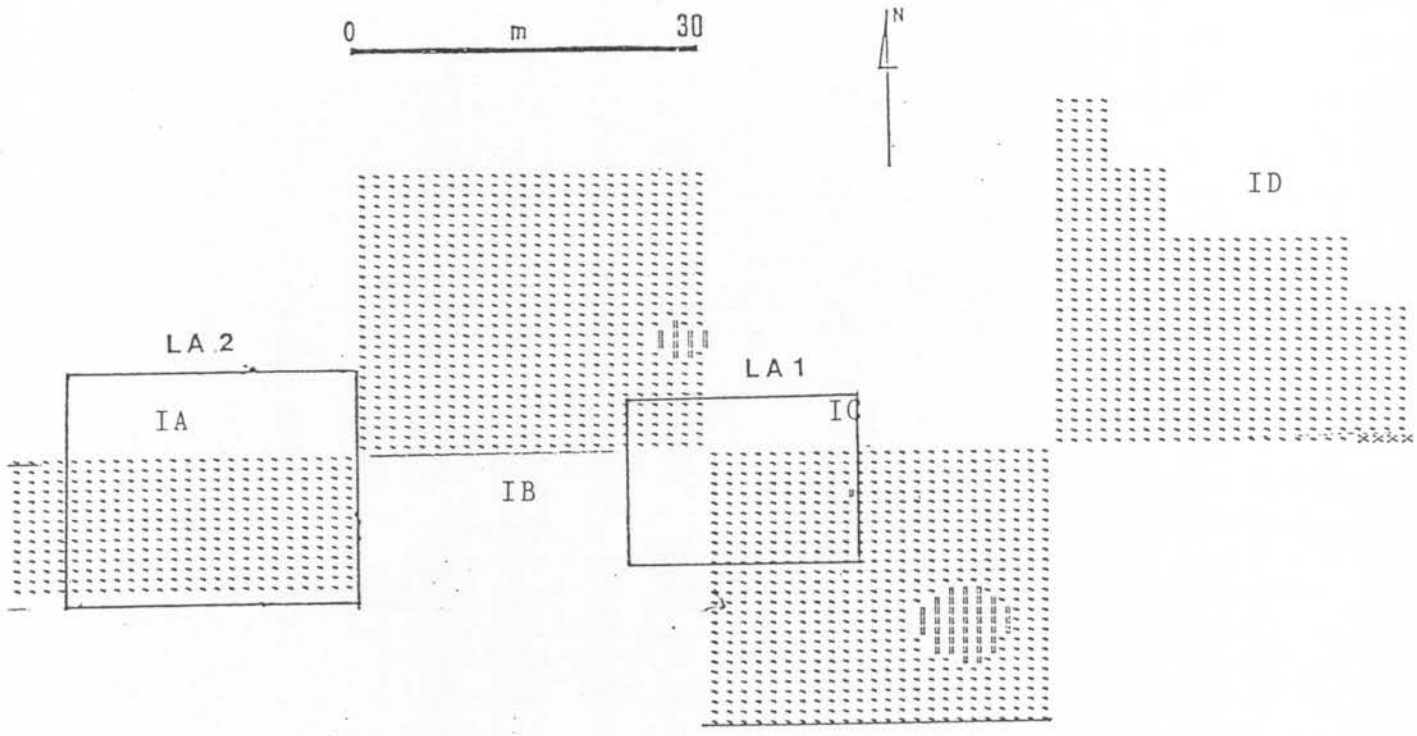


Figure 7-7a Faunal Material Distribution - Area I

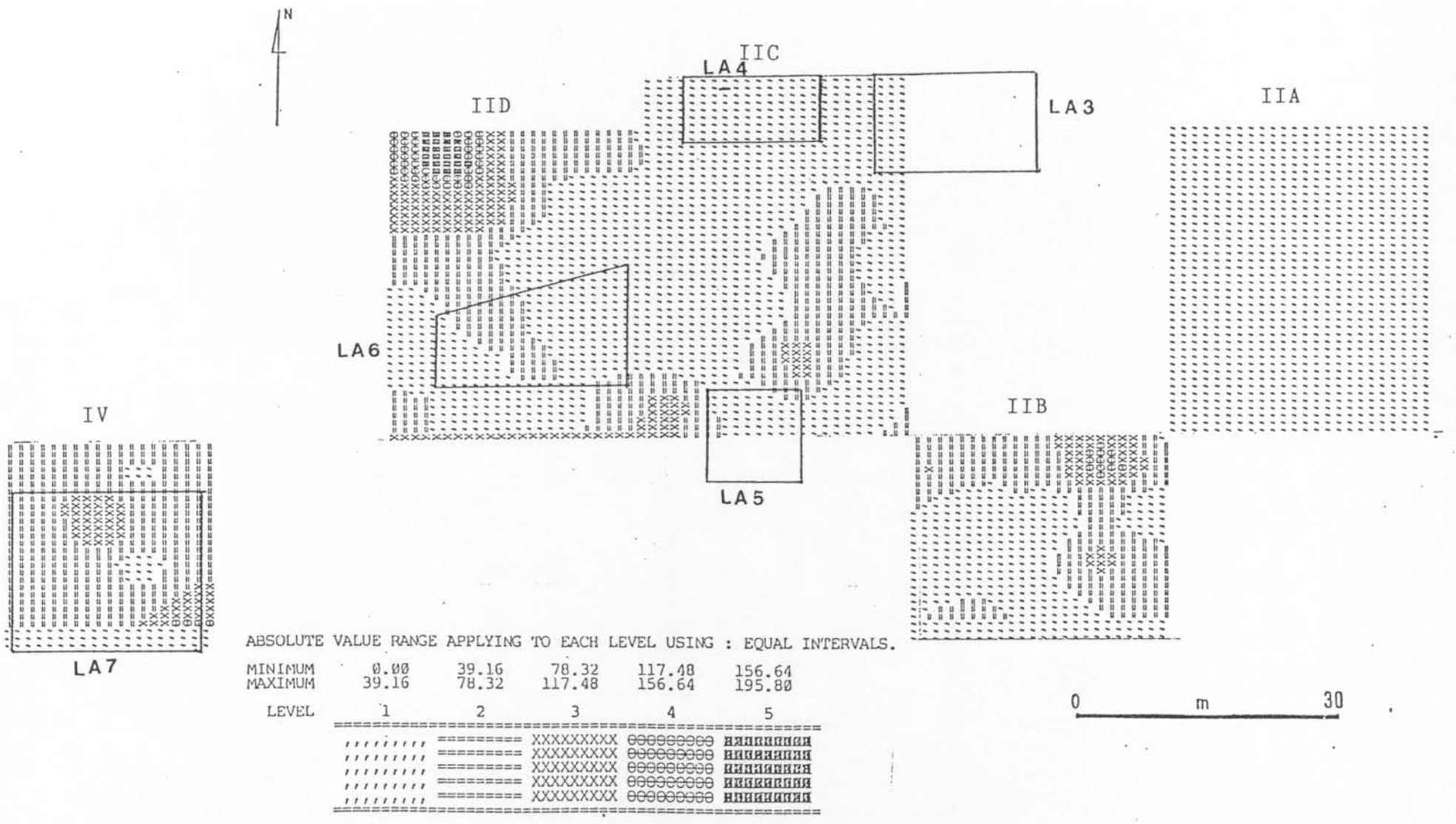
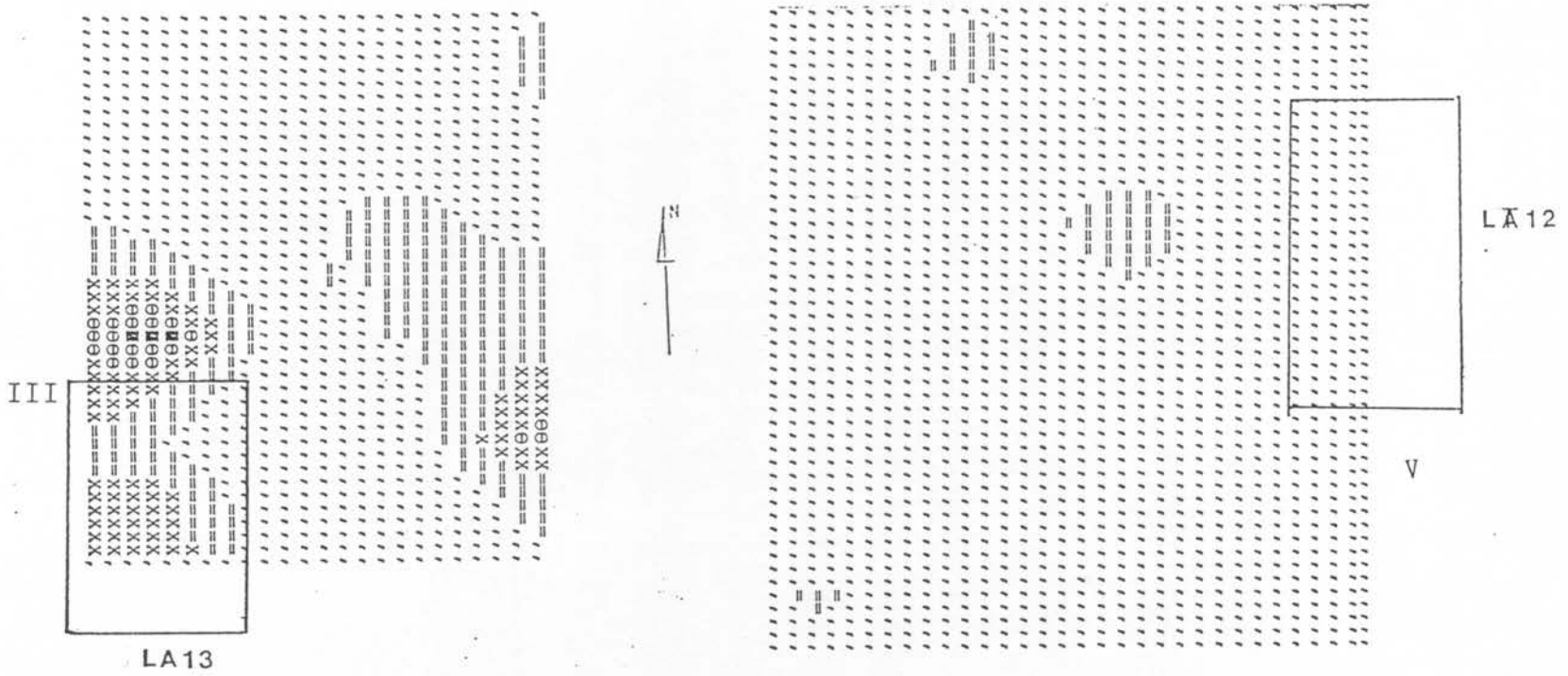


Figure 7-7b Faunal Material Distribution - Areas II and IV



ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL USING : EQUAL INTERVALS.

MINIMUM	0.00	39.16	78.32	117.48	156.64
MAXIMUM	39.16	78.32	117.48	156.64	195.80

LEVEL	1	2	3	4	5
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	,,,,,,,,,	=========	XXXXXXXXX	eeeeeeeee	■■■■■■■■■
	,,,,,,,,,	=========	XXXXXXXXX	eeeeeeeee	■■■■■■■■■
	,,,,,,,,,	=========	XXXXXXXXX	eeeeeeeee	■■■■■■■■■

Figure 7-7c Faunal Material Distribution - Areas III and V

The pattern once again illustrates the presence of highest densities in or adjacent to Latte Areas. If these areas represent disposal areas composed of the residue of meals then dumping practices appear to have occurred proximal to residences and are not centralised in community level areas nor removed to scattered areas away from residences.

These maps have each presented the distribution of a single class of cultural materials. It is also important to consider the spatial association between classes. This is particularly important in analysing the dense clusters of materials appearing in non-latte areas such as IB and IIB.

To produce maps illustrating overlapping spatial distribution can result in a confusing, ultimately unreadable map, depending on the amount of actual overlap in the distributions. Certainly, there is tremendous amounts of overlap between nearly every class of materials presented here. A series of overlay maps were constructed for analytical purposes. As each additional class of material was added spatial associations were noted. By the nature of the overlapping distributions at Pagat these maps are not easily reproduced in readable form. Nevertheless, the important observations and implications from these are discussed here.

Fire-affected rock has been noted to exist as small, discrete clusters. Two classes of materials are regularly found directly overlapping these rock clusters, pottery and faunal remains. In the eight loci illustrated in Figures 7-4 a-c, either pottery or faunal remains are found in association with the stones, but not pottery and faunal remains together with the stones. Certainly, if igneous rocks were used in cooking activities both pottery and faunal remains would be expected to occur; this apparent separation is unclear. The separate associations may represent cooking areas (stones with faunal remains) as opposed to pottery manufacturing areas.

All classes of materials occur around latte, with the greatest amount of overlap occurring within and/or on the periphery of the Latte Area. The single exception is faunal remains which tend to be slightly away from these structures. If we accept this pattern as representative of a residential area, then attention can be turned to the areas of non-latte clustering in an attempt to interpret

the activities involved in their creation.

Collection area IB is situated on a slope immediately south of the northern cliffline and incorporates a portion of Latte Area 1 in the southeastern corner. Latte Area 2 is immediately adjacent to the southwest. As illustrated in Figure 7-8 all five classes of cultural materials are present in IB. The contours represent the highest interval present for each class.

The range of material is identical with that found in Latte Areas though there is much less overlap. As indicated above, loci of fire-affected stones usually occur proximal to latte and this is found in IB. The high densities of materials. particularly pottery along the northern cliffline has been observed in other portions of the site. Therefore, the occurrence of a similar pattern in IB may not be used to argue for habitation in this specific area. Additionally, the angle of slope is such that it would be unlikely that the areas was used as a residence. Lastly, being adjacent to two Latte Areas, a more reasonable interpretation would be that IB served as a cooking area and/or dump for one or possibly both latte.

Area IIB exhibits a different configuration than that in IB (Figure 7-9). Firstly, the contents are much more limited with only fire- affected stones, faunal remains and pottery occurring; four adzes were also collected from IIB. Secondly, there is very little overlap among the different classes. The only exception is with the fire- affected stones and a small pocket of faunal material. Like IB, this area is adjacent (15-20 m) to a Latte Area (5) and may also have served as a cookhouse. The limited range of materials would not suggest a residential area.

Finally, the materials clustering in the northwest corner of Area V represent an even more limited range than found in IIB. Chipped stone predominates, found in high levels for the site as a whole, but other materials such as fire-affected rock and scoria are completely absent. A very low level (interval 2) loci of pottery is found in this corner and virtually no faunal material. Perhaps the rockshelter was used as a workshop, primarily as a chipping station. The northwest corner of Area V represents the most specialised loci within the site does not appear to have served as a residence.

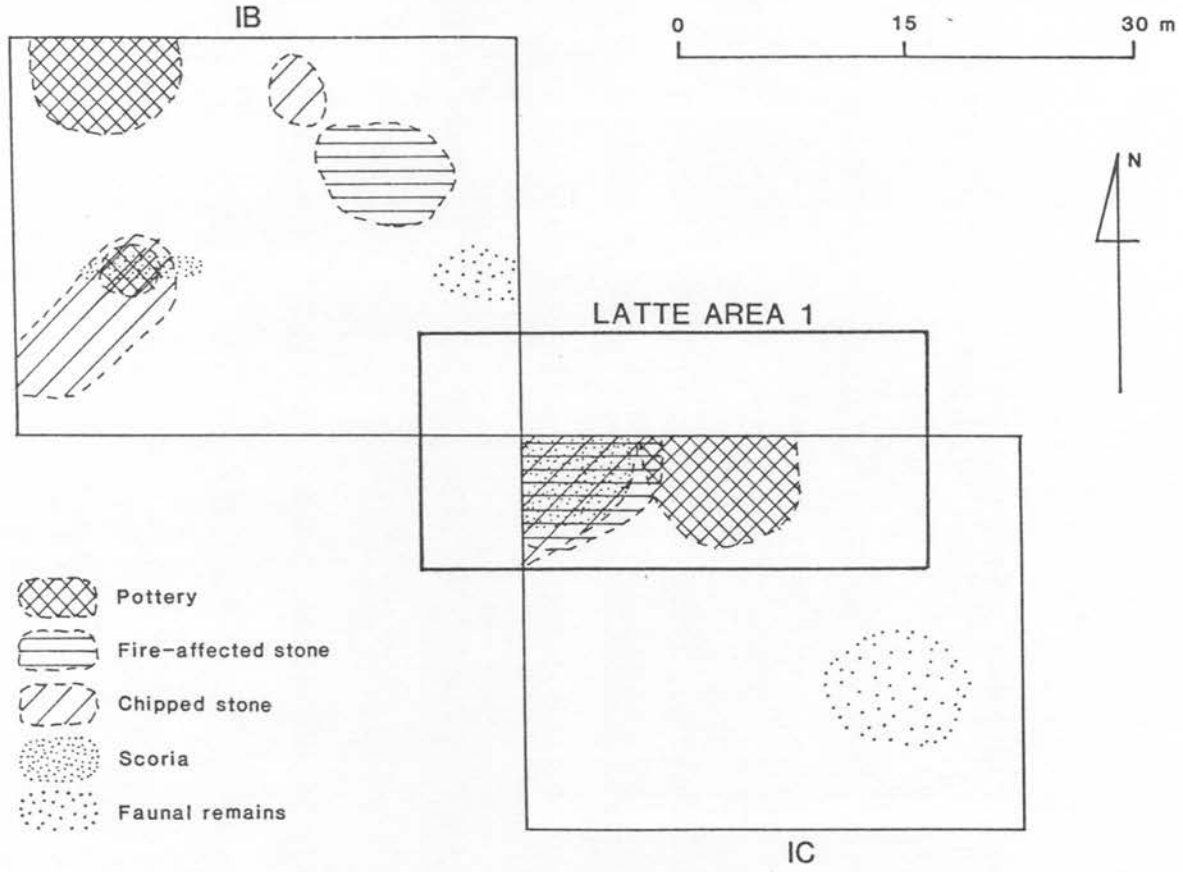


Figure 7-8 Detail of Spatial Overlap in Areas IB and IC

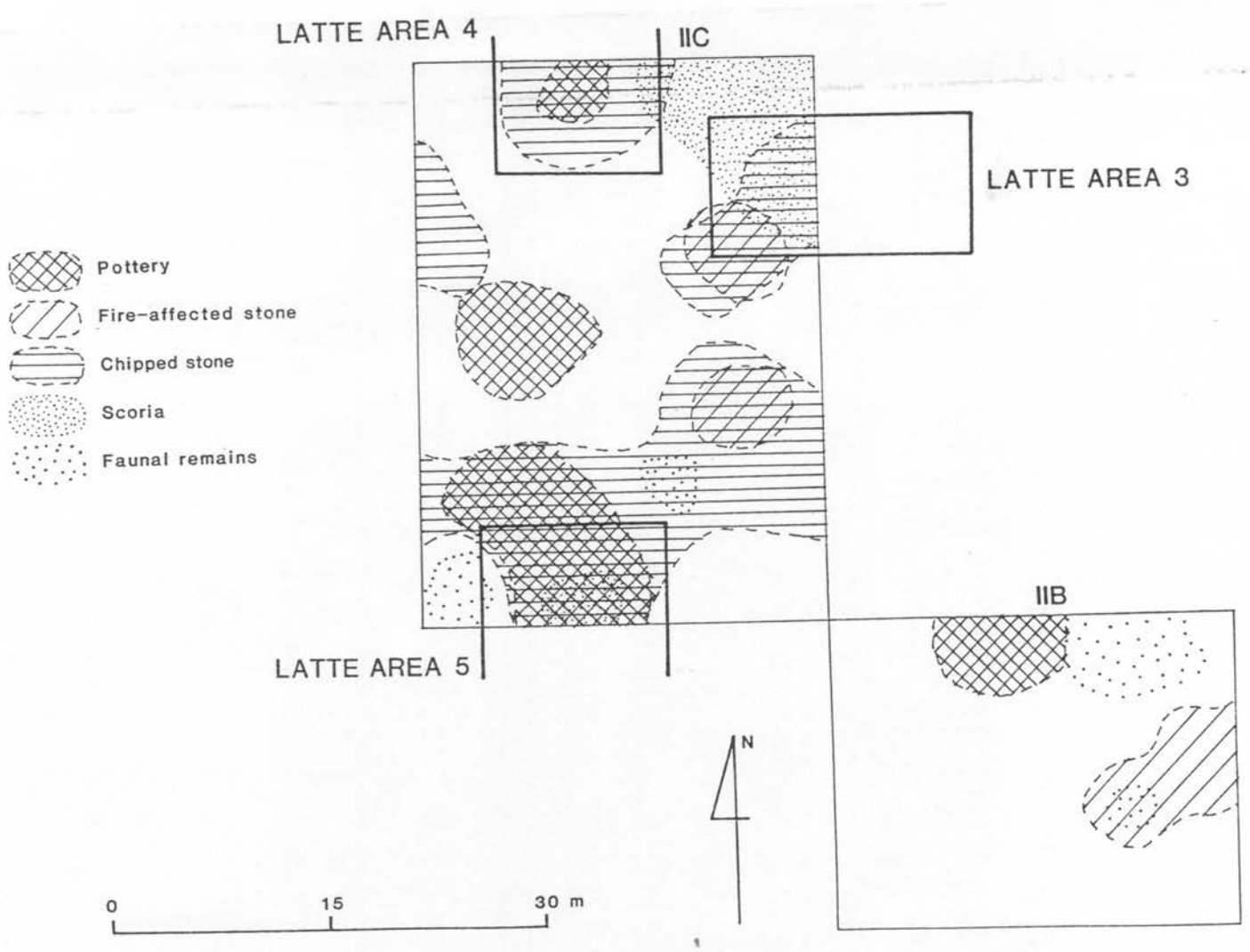


Figure 7-9 Detail of Spatial Overlap in Areas IIB and IIC

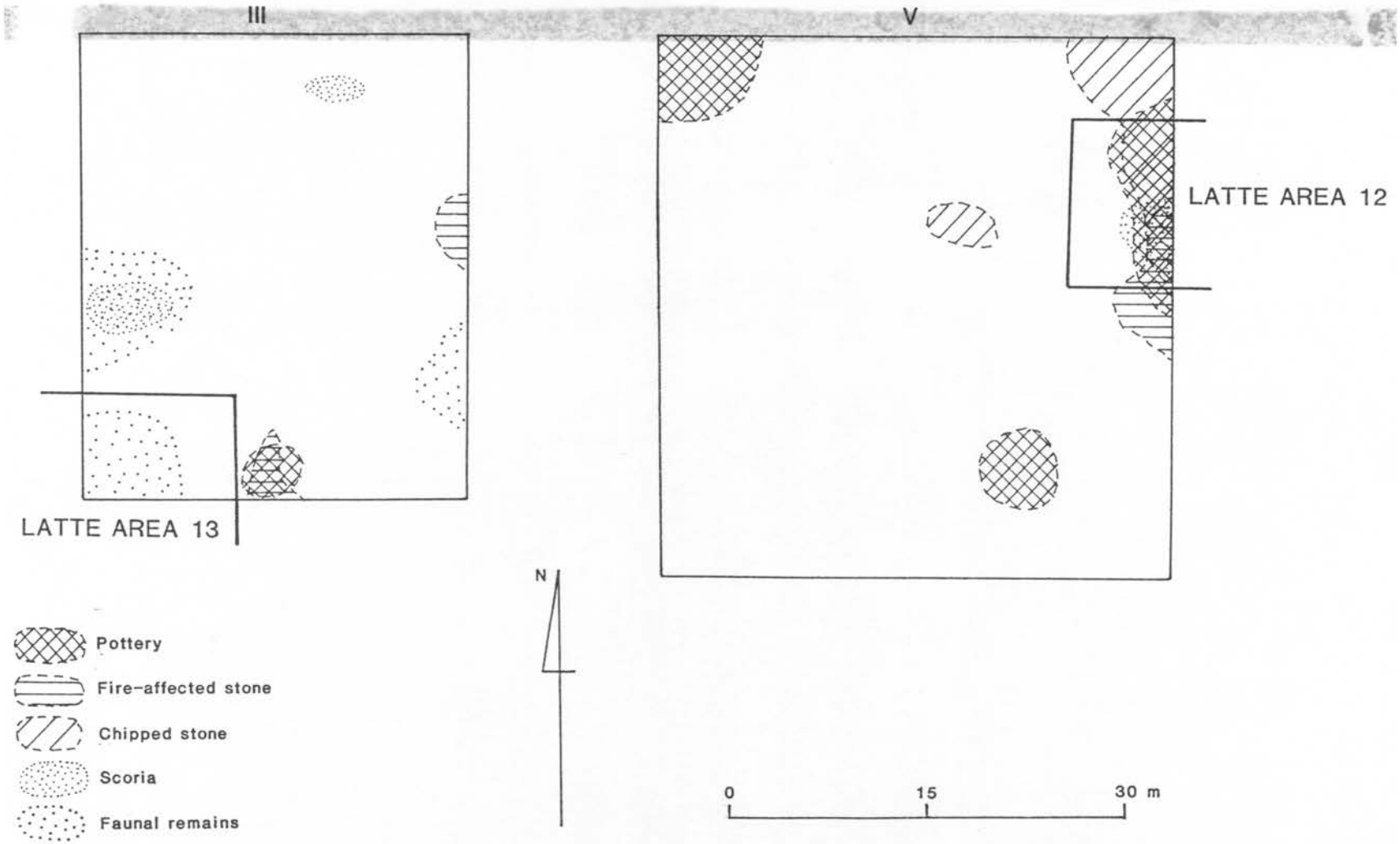


Figure 7-10 Detail of Spatial Overlap in Areas III and V

Subsurface Distribution

Though excavation at Pagat was performed at various times over the last decade without any overall sampling design, the major components of the site have been tested. If the surface remains at Pagat are an adequate reflection of subsurface configuration then it would be expected that a similar pattern should be reflected in the subsurface densities. Table 7-4 lists the subsurface densities for five major sets of cultural materials.

The same trends are observed in the subsurface materials as found among the surface distributions. Latte Areas exhibit the highest densities of nearly all of the cultural materials listed here. As in the surface patterns, pottery is the clearest indicator. In this excavation sample there is three to four times as much pottery in the Latte Areas as elsewhere in the site. The same trend is also evident among most of the other classes though the variations are not as pronounced.

Table 7-4 Variation in Subsurface Densities (cu.m.)

	Pottery (Kg)	Artefacts (n)	Chipped Stone (g)	Shell (g)	Bone (g)
Latte Area					
5	16.8	8	120.6	1128	125
9	12.3	18	78.1	1664	153
Mound/Latte Zone	5.2	10	152.1	906	135
Open	4.0	6	84.5	778	348

The Mound/Latte Zone (Area C) exhibits only intermediate figures suggesting that these features are not necessarily dense features of cultural materials. In fact, it may be argued that the relatively high artefact count may be more a reflection of its location within a Latte Zone than depicting the refuse contents of a mound itself. While Reinman noted that this area contained ash layers and fire pits, the low amounts of pottery may suggest that these are not cookhouse areas.

As expected, the Open areas contain the lowest densities of all materials except bone (non-artefactual). Indeed, these areas exhibit the highest densities of this material. As discussed earlier this is

not inconsistent with the pattern of disposal of organic materials away from living areas. The small amount of bone recovered from the surface (as opposed to shell) served to skew the distributional pattern.

The argument that most classes of cultural materials tend to cluster around latte has been examined in finer detail at Mochong (see Appendix A). A sampling transect cross cutting latte (ML-13) and extending seawards indicates that significantly higher densities occur in the immediate area of the latte and that by 20 metres away the densities have reduced substantially and by 40 metres the density of all cultural materials in associated deposits are negligible.

Having examined the distribution of materials within a settlement the general pattern becomes clear. There is a tendency for most classes of materials to cluster around latte. With only a slight modification this pattern corresponds to Hornbostel's model presented earlier in this chapter. Instead of identifying areas on the basis of burial it is densities which identify various areas. The Latte Area is expected to contain the highest densities and this centers upon the latte itself. The surrounding Latte Zone exhibits moderate density of material. The width of this zone may vary.

Concluding Remarks

Obviously, this does not represent an exhaustive analysis of the spatial component at Pagat. However, for the questions outlined in Chapter Two and at the beginning of this chapter, this general level of analysis is sufficient. A further, detailed discussion of intra-site patterning at Pagat is currently being prepared for publication.

Pagat is a well-defined area in terms of site boundaries. Both the distribution of surface features (i.e latte and mortars) and surface materials reveal the limits of the habitation area. There is little chance that residences occurred outside of, or on the periphery of the settlement at Pagat.

There is a remarkable consistency of surface densities with

virtually all occurring around latte. Latte appear as the focus of activity within the site.

The pattern of cultural materials concentrating around latte resembles the Yapese situation described by Hunter-Anderson. Yap. It may be proposed that this tight, proximal disposal of materials at Pagat suggests that most of the latte were occupied contemporaneously.

A consistency of clustering within all classes of materials has been demonstrated and these are always found in direct association with latte. An important implication of this is that the distribution of cultural materials is so closely correlated with the Latte Areas that using only the distributional maps presented here, one could accurately predict the locations of nearly all latte within the collection areas. While it would be unwise to extrapolate the findings at Pagat to all sites in the Marianas, it can be said with some certainty that no non-latte residences were observed in a Protohistoric site situated in a marginal environment. If they were to exist, Pagat would be a likely location. Evidence for non-latte residences still eludes us; I argue that it now seems less likely that they existed at all.

CHAPTER EIGHT - SUMMARY AND CONCLUSIONS

All major assumptions and interpretations of past and present interpretations regarding latte and their place in Protohistoric Chamorro society have now been examined using a wide variety of data sets. Some of these (e.g. regional survey data, excavated latte assemblages) existed as part of the enormous data base existing from the Marianas while others (e.g. latte size class occurrence, intra-settlement partitioning using Central Place Theory, intra-site spatial patterns of artefactual materials) generated from my research. As a result, many of the long standing ideas about latte and the nature of Protohistoric Chamorro society have been called into question. Though some of these findings have been forshadowed by recent studies (e.g. Cordy 1983a, Graves 1983, 1985) this thesis has served to expand upon and/or clarify these points as well as adding new perspectives to the subject. This chapter summarises and discusses these findings and integrates them into a model of the Protohistoric period in the Marianas. As in any study, new questions arise as old ones are answered; directions for future research will also be discussed. Finally, general implications for the study of social complexity are presented and discussed. As outlined in Chapter Two, these arguments can be reduced to five major areas temporal, function, dimensional, social, settlement Each of these are now considered.

As this thesis demonstrates, the study of Protohistoric Chamorro society is almost entirely an archaeological pursuit. The ethnohistoric record is brief, often contradictory and was recorded during a period when local lifeways were already reacting to the intrusions of European contact. In the past, interpretation of the archaeological record in the Marianas has been based on what was assumed to be known from the ethnohistoric record. However, as shown in Chapter Three, the 'facts' of ethnohistory are, in themselves, interpretations of Spanish accounts. Instead the archaeological record is now being used to test some of the propositions ('facts') of the ethnohistoric record (cf. Groube 1977).

Until recently, Marianas prehistory was conceived in terms of a two-phase sequence, beginning at least 3000 years ago and ending

shortly after Spanish contact in the sixteenth century. Though little is known of the pre-Protohistoric period, Chamorro society at contact was described as highly stratified in organisation and characterised by distinct social classes. This interpretation was derived from ethnohistoric accounts with archaeological data used for corroboration and to add temporal dimensions. These long held views are now being challenged by some. For example Graves (1983, 1985) has questioned the temporal placement of latte and the nature of Chamorro social organisation (see also Cordy 1983a). I have taken issue with many aspects of the more traditional view as well as these newer studies.

The temporal dimension of the Protohistoric Period has become clearer. Its limited span of about 500 years appears more certain as new sites are dated. For example, new evidence from Pagat and Mochong support Graves' contention that latte do not appear prior to 800 BP. At this point the best temporal marker of the Protohistoric are the latte themselves. Despite this, I have purposely avoided using the term 'Latte Period' in order to avoid confusion with Spoehr's Latte phase.

There is also some suggestion that latte may be the latest addition to the constellation of materials which comprise Spoehr's 'Latte Phase' assemblage. These artefacts have been recovered from below deposits specifically associated with latte (Appendix A). That is, only pottery seems to vary over time while the primary variation in the remainder of the assemblage seems to be one of presence/absence of artefact types. Thus latte may be seen as a late addition to a general Marianas assemblage already in existence.

Analysis of artefact classes associated with latte revealed no evidence of specialised assemblages. The latte assemblages analysed in this thesis were found to be similar regardless of size class or location of site. However, it is recognised that this type of analysis is still on a most general level, simply analysing the presence/absence of artefact classes. The wide range of materials is not inconsistent with expected kinds of household residue. This does not preclude the possibility that some latte may have served as non-residential structures (i.e. meeting houses, lineage houses) though it is argued here that based on all available data, it is more

likely that all latte served as supports for residential strucures. It is assumed that the 6 pillar latte also served as residences though no excavations have been performed on this type of latte so no assemblage data exist.

Latte assemblages provided no materials which may be interpreted as symbols of wealth or status. Since the occurrence of artefact classes was regular between latte of all size classes the existence of status items cannot even be implied by demonstrating an uneven distribution of a particular items or class of items (cf. Lightfoot and Feinman 1982).

The ethnohistoric record regarding latte has caused a crucial and longstanding misinterpretation of their function. It has been shown here that when stone pillars were mentioned by the Spanish (and this was very seldom) they were always in the context of residences. Additionally, the association of latte with high ranked people is not mentioned nor implied in the Spanish accounts but is, in fact, a much later interpretation.

The idea that latte served as canoe houses was first developed by Thompson and has been propagated by others. This developed from her uncritical use of what is now shown to be an erroneous translation and her misinterpretation of the archaeological record. There is in fact no evidence to support the proposition that latte served as canoe houses.

Although there is nothing in the ethnohistoric record to suggest variation in dimensional aspects of latte, there can be no doubt now that latte exist in five separate size classes based upon the number of pillars per set. However, the internal measurements of latte are not as standarised as stated by Thompson and implied by Graves. While it is not unexpected to find variation among individual features, in fact there is often significant variation even within a single size class. This variation is exhibited in area, pillar height and the volume of stone per latte.

Although many areas within the southern islands have been surveyed there are not yet sufficient detailed data with which to confidently assess the question of non-latte habitation sites. Of the two general alternative hypotheses proposed in Chapter Two (p.40) regarding the contents of habitation sites, neither can be refuted

at this time though the general archaeological pattern suggests that latte were present on all or nearly all habitation sites. Sites where these features do not exist are usually in disturbed areas or exist as small, relatively isolated loci exhibiting shallow deposits with a limited range and density of cultural materials. These problematic sites are few in number and even if eventually shown to be non-latte habitation sites, would have housed only a very small proportion of the population.

Latte are not restricted in their distribution and have been found in all major physiographic regions from coastal flats to interior uplands. While the problem of defining the optimal-marginal spectrum of the environment remains a priority in the Marianas, application of the general zonation proposed in Chapter One demonstrates the existence of habitation sites with latte even in marginal areas. No correlation exists between resource areas and the presence of latte.

Few sites in marginal areas have been excavated but the results suggest that they were settled quite late in prehistory with no evidence of habitation (as distinct from short-term special-use) occurring prior to the initial appearance of latte (i.e. the beginning of the Protohistoric period).

No explicit attempt to account for the frequency of size classes of latte has been made until now. Previously, only very general, oblique statements had been made. Latte were discussed as a single class of objects with no attention paid to the pattern of their occurrence and/or relative frequency among sites. In fact, the examination of the occurrence and relative frequency of sizes classes has proved to be one of the more intriguing aspects of this thesis.

The null hypothesis regarding the random occurrence of size classes per site is quite convincingly refuted; a most consistent, non-random pattern of size classes has been demonstrated. Although the sample is small, the pattern holds among settlements within and between islands.

It has been previously reported that the majority of latte are the 8 pillar variety with most of the remaining sets consisting of 10 pillars. What has not previously been proposed or even implied

was that their relative frequency varied systematically. The smaller size classes predominate at all sites with the 8 pillar latte the most common, comprising about 60% of all latte at any site. The next most common, the 10 pillar, usually occurs in a ratio of roughly 1:3 with the eight pillar. These two size classes comprise the minimal settlement content.

The occurrence of the largest latte (primarily 12 pillar, only two 14 pillars sets are known) do not form any sort of regional site hierarchy. In nearly 50% of the sites containing 12 pillar latte there are two of these features. However, regional sampling is currently incomplete.

Sites with latte of 12 pillars are found in a variety of environmental situations, even the two 14 pillar latte have been recorded from a coastal site on Rota and an interior site on Guam. Similarly, Pagat, situated along the northeast coast contains a 12 pillar latte.

Following from this discussion is the question of how latte may relate to each other spatially on an intra-settlement basis (i.e. feature-feature analysis). Knowing that nearly all latte are found in nucleated settlement the question to be considered was quite simple, how were latte spaced within a site: randomly, uniformly or in clusters? Previous authors claimed that linear alignments of latte were characteristic of most settlements. In terms of identification of residential groups, it was proposed that strongly corporate groups would be reflected in intra-site spatial coherency (cf. Keesing 1975).

Intra-site spatial organisation of latte was investigated and again the findings conflicted with traditional views. In only one site did the largest latte (defined here as having 10 or more pillars) occupy a central position. Nevertheless, it was demonstrated that large latte are responsible for settlement configurations.

An analysis of a series of site maps indicated two basic site plans. The 'classic' linear site has latte aligned along one or two rows within a settlement. The second site form is distinctive for its lack of linear alignment. Rather these consist of clusters of latte across the site. Examination of spatial patterning was

initially made by proposing that larger latte (those having 10 pillars or more) within any site may have served as central places. Even though plagued with problems such as latte preservation and uneven survey data this approach has provided some interesting results.

If large latte served as central administrative loci for nearby smaller latte then it may be expected that a consistent ratio of large latte to total settlement size. Given the studies discussed in Chapter Two regarding the structure of administrative hierarchies (Johnson 1982), this ratio would be on the order of 1:6. While Johnson correctly points out that this ratio may not have universal application, the consistency of the ratios from sections within a settlement (1:4.6) and between settlements (1:4.8) closely approximates Johnson's figure suggesting its applicability in the Marianas. This further supports the idea that intra-site divisions, defined by Thiessen polygons around large latte, approximate social areas. This, in turn, supports my contention that Protohistoric corporate residential groups within the Marianas are composed entirely of residences built upon latte.

Perhaps the most radical proposition presented in this thesis is that non-latte residences did not exist during the Protohistoric period. One of the more intriguing results of my analysis has been the lack of any archaeological pattern which may, even remotely, be interpreted as a non-latte residence. Examination of evidence on both a regional (Chapter Five) and intra-site (Chapter Six) level, demonstrated no convincing evidence to refute the hypothesis that all residences were built on latte. Yet the existence of non-latte residences is a fundamental assumption of all previous interpretations of Marianas prehistory.

Investigation of the Protohistoric site of Pagat revealed that all classes of cultural materials clustered in the immediate area of latte and no spatially distinct concentrations away from latte were observed. The analysis also demonstrated that latte were the foci of activity within a site given the range and density of materials found in association.

It is my contention that we must proceed on the assumption that all latte served as supports for <u>all residences</u> and that it is

variations in size class which reflect relative ranking within each village and not simply among a separate, exclusive high status group.

This series of conclusions has important implications regarding the identification and analysis of residential group composition. Residential groups are not related to a specific latte (cf. Graves 1985) but rather groups of latte comprised these corporate groups. The regular spacing of larger latte suggests a method of identifying such groups.

This discussion holds important implications for the question regarding population size in the Marianas during the Protohistoric. If latte were residences for most, if not all, people then it must follow that there was a greater number of latte and/or a much smaller population.

There are significant problems with both sides of this equation resulting in authors assuming what is necessary in order to sustain their argument. As reported earlier, contact period population estimates throughout the Pacific are questionable at best. Likewise, cultural and natural factors have severely impacted upon the archaeological remains in the Marianas, of which latte are a particularly vulnerable component; these standing pillars of limestone are prone to regular batterings by tropical cyclones and have also been subjected to the substantial impact of World War II. Indeed, it is remarkable that so many latte still exist. The point here is that to assume, as Thompson did, that the number of latte as revealed by survey closely approximates the original population of latte fails to consider the question of preservation and visibility of these features.

Graves' doubling of Hornbostel's estimate of latte on Guam to 600 is a step in the right direction though he does not substantiate this figure. I would argue that assuming only a 50% reduction of latte on any of the southern islands, with the possible exception of Rota, is over optimistic. Destruction of latte has been occurring for nearly 500 years and has not necessarily proceeded in a random fashion. Some sites (e.g. Agana) exhibit no latte even though it is known that they existed at contact. Coastal sites are generally larger than inland settlements and it is these sites which have

felt the destructive impact of initial Spanish occupation and subsequent modern development. No matter how it is argued, the latte number/population figure ratio is perhaps the most vulnerable argument and does not provide a solid cornerstone however one may wish to interpret the Protohistoric period.

In the final analysis though the question which must be addressed is what do these conclusions tell us, if anything, about the nature of Protohistoric Chamorro society? Are latte the 'enduring symbols' of differentially ranked groups as suggested by Graves? Do the five size classes indicate the existence of five decision-making levels (or echelons, social strata) which would define Chamorro society as a state formation as Cordy (1981b) has done for Kosrae and Bath (1984) implies for Ponape? Or did latte demarcate another form of social divisions within a less stratified society?

Despite Thompson's claims, there is no evidence in the ethnohistoric record to indicate a highly stratified society. In fact, one is struck by the great similarity in early accounts written over a span of nearly 150 years which repeat the statement that no regional leaders were observable by the Spanish. Zamora's account, which has only recently become available, also acknowledges the lack of a centralised power structure and suggests that even on an intra-village level there could be multiple 'leaders', the so-called Principales.

I also take issue with Cordy's characterisation of Chamorro society as representing a simple chiefdom represented by two 'social classes' (his term) or decision-makers - chiefs and commoners. A characterisation such as this is, in fact, not very informative, due in part to the lack of attention given to the possibility of horizontal differentiation. Of course, Cordy, like Tainter, sees a positive correlation between vertical and horizontal differentiations (see Cordy 1981c:38). Thus Cordy's two strata model for the Marianas must imply minimal horizontal variation. As a result it seems as if he is not rejecting Thompson's idea of a stratified society but merely haggling over the number of social classes. This I argue is inappropriate. Not only does Cordy's use of the decision-making model mask important horizontal variation in Chamorro society but more importantly is ultimately misleading.

Also, an obvious question is how would five size classes of housing fit into a two strata society? Cordy is silent on this point.

I maintain that if latte demarcate different social ranks, they include all members of Chamorro society and that this differentiation represents horizontal partitioning. This of course raises the question of why differentiation should be conceived along this axis and not vertically. First, nearly all of the earliest visitors (up to the time of Sanvitores) specifically state that no general leader or regional system of allegiance was in evidence. Additionally, villages were were seen to be autonomous, some having multiple decision-makers (Principales). If the pattern of Protohistoric socio- political organisation was characterised by a degree of intra-kin group differentiation and lack of political centralisation then the archaeological record should consist of repetitive patterns in the occurrence and frequency of latte size classes within settlements.

This expected pattern is found among settlements in the southern Mariana islands (Guam, Rota, Tinian, Saipan). No clear site hierarchy based on size of settlement, number of large latte or presence of oversized latte (with the exception of Taga which will be discussed below) was found. The two largest sites, Mochong and Pulantat, may not be representative of pre-contact settlements since they may have increased in size as a direct response to the Spanish presence in the islands. Internal divisions appear to have existed within settlements; each area consisting of equivalent units.

Perhaps in place of terms such as high and low status we may be better served by referring to internal divisions within Protohistoric Chamorro society as junior and senior positions. While senior kin may hold positions of authority in terms of their group (lineage, clan) within a settlement, they do not necessarily form a distinct social stratum (cf. Cordy 1983a).

Whether variation in latte size class within the 'large' latte group is indicative of intra-site levels of dominance is uncertain. However, it is rare for a single large latte to exist within a site. Even in settlements where 12 pillar latte are found, it is likely that there will be two latte of this size. The point here is that there is no evidence to suggest that a particular large latte,

representing a specific residential group, is dominant within a settlement.

Based on the above observations and interpretations, I argue that the archaeological configuration in the Marianas matches that expected from a society lacking a centralised authority and is, instead, organised on a local autonomous level. In this instance, differentiation takes on horizontal dimensions based primarily on the principle of seniority within one's kin groups. The clearest example of this ranking is reflected in the size classes of latte. Where multiple kin groups inhabit the same village the ratio of large to small latte repeats itself.

While I am in general agreement with Graves' depiction of Protohistoric Chamorro society as organised along local kin lines with autonomous villages serving as primary areas of influence for local kin leaders we disagree on how this is reflected in the archaeological record. Graves (1985:20) maintains that each latte served as the focal point for a corporate residential group, related to an unspecified number of apparently non-latte residences (he does not make this association clear). In contrast, I suggest that given the non-random occurrence of latte size classes, their intra-site spatial arrangement, and the lack of evidence for non-latte residences, corporate residential groups are reflected in the spatial patterning of latte within a site and that was the general pattern throughout the Protohistoric period.

If ranking of kin groups was also present there are no clear archaeological markers yet identified to distinguish them. The one possible exception is the dramatic increase in the size of latte at, at least, one site, Taga. Here the frequency of size classes and physical dimensions of nearly all latte were substantially larger than anywhere else in the archipelago with the exception of the As Nieves quarry on Rota. It must be emphasised that the differences here are on an order of magnitude over all other latte in the Marianas. Graves has suggested that this signals the emergence of a new social ranking, the paramount chief (1983, 1985), and poses the question of why did elaboration of an additional level of status ranking in limited communities occur on Tinian and possibly Rota late in prehistory.

Carneiro (1981) has offered the proposition that the smaller the area in which a chiefdom arises, the easier it will be to unify. Although inter-island contact was occurring in the Protohistoric period, interaction should have been more intense within each island. If power was becoming consolidated on Tinian, then we might expect that it would be manifested in a single village producing latte such as those at Taga.

Sanvitores mentions in some detail hostilities between two rival villages on Tinian, Marpo and Sugharon. Each had attracted its supporting villages until the entire island was aligned with one or the other of these villages (Garcia 1683 [Higgins 1938]). Perhaps dominance was being expressed through the construction of significantly larger latte. Unfortunately, latte in the Marpo area have been largely destroyed. The few that I have seen in that area would all fit at the upper range of dimensional variables.

Another common theme in Sanvitores' accounts is inter-village competitions. Could the increasing size of latte be an manifestation of such competitive activities, hostile or otherwise? This might explain why these true megaliths existed on a single island rather than found more generally within the archipelago. The only other example of latte of these proportions is found within the As Nieves quarry on Rota. However this spectacularly anomalous site may be explained, there is no evidence to suggest it was more than a local manifestation and holds no implications for regional development.

Towards a model of the Protohistoric period in the Marianas

It was noted by the Spanish in the late seventeenth century that most of the islands of the Marianas were inhabited and that the people shared a common language and culture. The existence of an extensive settlement pattern throughout the archipelago is supported by observation of latte on many of the islands (e.g. Marche 1889 [1982], Fritz 1904). That there was interaction among all the island in the Marianas is suggested by the similarities of language, architectural design (i.e. latte), pottery decorative styles and a homogeneous artefactual assemblage. There is no evidence to refute the proposition that social development and material changes within

the Marianas was solely the result of internal development.

The Protohistoric period was one of expanding settlement and this began at or only shortly before about 800 years ago. About this time, permanent settlements begin to appear in areas previously uninhabited. On the southernmost islands, which have evidence for the longest occupation, movement into the more marginal environmental areas began to occur. The settlement of Pagat is a example of this movement and settlement. At the same time, settlement of the more northerly islands as evidenced by a single horizon latte site at Pagan dated to just prior to Spanish contact (Egami and Saito 1973).

I characterised the Protohistoric as a period of expansion to emphasise the fact that movement was away from more heavily populated areas rather than simply increasing production in these more optimal areas. Two factors contribute to this. No evidence of subsistence intensification or storage facilities exists in the Marianas and the Chamorro were in the fortunate position of having numerous, relatively large, environmentally similar islands to populate. Although movement appears to have occurred throughout the archipelago there is no evidence that movement away from the Marianas occurred during prehistory. There is some suggestion that trade between the Marianas and atolls in the Carolines occurred but it is unclear if this trade began before European contact. It is likely that it involved movement undertaken by the atoll dwellers into the Marianas. There is no clear evidence of Protohistoric Chamorro materials found outside the Marianas.

The movement and establishment of new settlements was not simply the result of population growth though I would argue that this was an important factor as it is in any island setting. More importantly, movement into newer, particularly inland, areas in the southern islands and the initial settlement of the northern islands enabled the Chamorro to develop additional resource areas. By doing so, they increased not only their economic base but also improving their chances of successfully surviving the frequent but haphazard impact of typhoons.

The differential destruction cyclones caused within and between islands in the archipelago meant that after each storm some places

were completely devastated while others were relatively untouched or, at least, still capable of food production. However, as each typhoon moved through the archipelago on a different trajectory there was (and is) no pattern to the destruction; no areas in the Marianas can be considered 'safe' from typhoon destruction. In order to minimise the environmental stress (terrestrial and marine) imposed upon by this damage, expansion of the resource base or 'spatial averaging' (Isbell 1978), became necessary in order to increase the potential resource areas.

Given the amount of land area and environmental diversity within the Marianas, spatial averaging offered the most economical solution to the vicissitudes of environmental disruption. By contrast, attempts at intensification of local production could be rendered useless by storm damage. For example, it would do little good to intensify root crop production or maintain storage facilities (e.g. breadfruit storage pits) since these cannot be effectively protected during cyclones. To reemphasise, extending one's range by establishing new resource bases in separate geographical areas could assist in maintaining an adequate production of food.

As Isbell (1978:305) has argued,

> ...for a system to endure significant energy fluctuations it must not develop efficient energy flow based on highly specialised roles. Rather it must be composed of essentially redundant individuals...or the system must stabilize its population below the level of even severe perturbations.

The idea that environmental perturbations (particularly typhoons) have influenced the definition of social relationships has been proposed for other vulnerable areas in Micronesia. Alkire (1965, 1978) has demonstrated how extensive interaction networks among the atolls of the central Carolines have served to curb the impact of typhoons in this area. Similarly, Parker and King (1984) suggest that minimal social differentiation among groups on Truk may reflect a response to frequent environmental disturbances.

Why this spatial averaging occurred at the later stages of

Marianas prehistory and not earlier is not completely clear but I propose that it is related to the pattern of population growth and the environmental diversity of the Marianas. If population growth in the Marianas is assumed to have been primarily internal without significant influx from outside the archipelago and that the initial population was small, then there should have been an initial, slow growth in population with later figures demonstrating exponential increases in late prehistory. As population grew, new settlements would have been established in other optimal areas until these areas (at least in the southern islands) had been filled. As these areas filled movement began to occur into more marginal and/or northerly islands. Even this pattern could be successful only with an already established exchange network.

The impact of typhoons may also have affected the nature of Chamorro society. If development and consolidation of power structures begins with control of the economic base, then it is unlikely that any one group would have had a stable enough base from which to consolidate power and over time extend its influence beyond the confines of the village or sustain power over a long period of time. I do not believe it is simply coincidental that the only other high island area in Micronesia which is not characterised by a highly stratified social organisation is the Truk group, the only other high island area to regularly be hit by typhoons.

Spanish reports that goods were exchanged among groups within and between islands of the archipelago, has been noted though the nature and range of materials in these exchanges is not known. I have argued that a support system may have been necessary for more marginal areas such as Pagat to be permanently settled. Evidence for this is found in the presence and abundance of goods, specifically food (shellfish) and source materials (basalt), at Pagat.

The question of the nature of Protohistoric social organisation has been a prime concern in this analysis. The 'Polynesian' type of social system as proposed by Thompson is not in evidence during the Protohistoric period. Nor would Cordy's characterisation of Chamorro society as chief and commoners be accurate. I argue that Chamorro society was not characterised by a central, hierarchical institution of government but rather was organised along kin lines in largely

autonomous villages. Whether village were confederated into loose districts is unclear but the spacing of settlements with large latte may suggest some regional pattern.

This is not to suggest that Protohistoric Chamorro society was not complex; rather the axis of complexity differs from earlier characterisations. Social divisions reflecting horizontal differentiation was marked but little, if any, regional differentiation was instituted until European contact and political (vertical) growth was a direct result of contact.

Even if one were to accept Thompson or Cordy's characterisation of Chamorro society, arguing, not unreasonably, that the ethnographic record is sufficiently vague and incomplete to be interpreted in a variety of alternative ways, it still does not alter the fact that the archaeological patterns (particularly in terms of latte) are inconsistent with their interpretations and do not support their models.

Each habitation site in the Marianas consisted of multiple residence groups. The configuration of these groups was uniform resulting in a repetition of intra-village patterns throughout the islands and in both coastal and inland settlements. In this way, each village can be viewed as a microcosm of the larger regional pattern. That is, the presence and relative frequencies of latte are virtually the same at intra-settlement, regional, and inter-island levels. The primary sources of variation are in site size (number of latte) and the presence of 12 and/or 14 pillar latte.

Based on current evidence, the composition of residence groups are argued to consist of a number of 6 and 8 pillar latte spatially related to a 'central' larger latte. Virtually all activities occur immediately in and around each latte with minimal assemblage variation to suggest specialised activities were spatially segregated. Cookhouses are adjacent to latte but whether each latte had its own cooking area or shared one among other latte is not yet known. This contrasts with Graves' arguments which implies that each latte (regardless of size) served as the focal point of a residence group with the remainder of dwellings consisting of non-latte structures.

Use of the Ethnohistoric Record

Accounts of early visitors to unfamiliar areas consist of their observations in his/her own cultural terms. The task of the archaeologist is to ascertain the usefulness of these accounts in deriving archaeological implications. As shown in Chapter Three, the approach to analysis of Chamorro ethnohistory has largely been descriptive and characterised by an uncritical acceptance of the literature. Until recently, the use of sources such as Freycinet, which date well after the Protohistoric period, was unquestioned and cited frequently. As a result, many misconceptions have existed about Chamorro society.

Thompson was studying Pacific anthropology at a time when prevailing models of movement, settlement, and origins of social differentiation involved notions of wave migrations of separate ethnic groups who maintained their socio-cultural integrity as they moved into and across the Pacific (Brown 1919, Dixon 1920, 1929, Handy 1930, Buck 1938). Micronesia was still seen as a major highway through which the Polynesians moved from Asia towards their eventual homeland in the east. Associated with this view was the belief that when Polynesians reached previously settled islands, such as the Marianas, they successfully invaded and set themselves up as rulers, thus establishing the systems of social stratification recorded later by anthropologists.

It should come as no surprise then that Thompson emphasised those observations of Sanvitores and Freycinet which suggested social stratification. The manner in which she presented Chamorro ethnography (1945, 1969) was, in large part, an attempt to argue a Polynesian presence in the Marianas.

Subsequently, Cordy (1983a) correctly questioned the usefulness of Freycinet and other later works in depicting Chamorro society at contact. But Cordy,like Thompson, emphasised selected portions of available sources. Cordy's focus was upon Chamorro socio-political organisation and he attempted to distinguish the presence and number of decision-making levels. His study contains at least two major problems. First is his selective use of quotes; he prefers to extensively cite Sanvitores rather than compare and contrast

relevant observations from other sources. Secondly, Cordy completely accepts the accuracy of the early accounts even to the point of emphasising Sanvitores' use of the term lineage instead of social class (implicitly accepting the accuracy of the translation) to argue that the priest was consciously describing kin relations rather than class distinctions.

This relatively uncritical use of the ethnohistoric record is also seen in the works of Ueki (1983) and Cordy (1981b) on Kosrae. While I am not in a position to critically assess their usage of the Kosraean material, they both appear to approach this material as if it were a catalog of empirical 'facts' through which one moves, picking out the appropriate bits. Little attempt is then made to point out or discuss the implications of any inconsistencies or discrepancies in these accounts. Rather the emphasis appears to be on identifying the presence and number of decision- making levels.

Related to this argument is the lack of attention paid to original texts. In the Marianas as well as most other parts of Micronesia, initial descriptions and accounts were not originally written in English. As demonstrated from Burney's accounts, mistranslations and/ or embellishments can occur which significantly alter the original meaning. Whenever possible, research should return to original sources at least to verify key passages. Not to do so can lead to the problems outlined here regarding aspects of Chamorro society.

The ethnohistoric record is an important source of information but it does not exist as an impartial, objective baseline. Analysis of these materials should always proceed within a highly critical context. The information these sources may provide is often not there for the 'taking'; it must be extracted with great care (cf. Groube 1977).

Problems in the Archaeology of Social Complexity

To argue that the growth of social complexity must be gauged entirely or even primarily in terms of vertical differentiation is to oversimplify our task of understanding and documenting the growth of social organisation. Furthermore, this approach may mask

important developmental processes. The idea that the vertical either effectively monitors the horizontal (i.e. Tainter) and/or that horizontal variation is too problematic to identify and measure(i.e. Cordy) must be abandoned if we are to proceed with the study of social complexity. That societies are growing and expanding organisations must be at the center of our concept of social differentiations.

The idea that chiefdoms and other social formations exist as a definite constellation of traits is also misleading (Yoffee 1979). For example, because variation in housing in Protohistoric Chamorro society existed it would be unwise to extrapolate the existence of centralised networks of social and economic interchange. All too often the demonstration of only one trait is argued to be sufficient to assume the entire set of attributes predefined for these stages of development.

Equally important, the simple application of energy expenditure as a (the?) central measurement must be more closely examined. Important questions are raised by this method which are rarely considered in the literature. For example, are all variations in energy expenditure indicative of specific social groups and if so how can horizontal and vertical differentiation be identified? On a more practical basis at what level of variation are social groups differentiated. That is, do the presence of a few extra stones on a platform sufficient to argue a separate group? Certainly not all variation has specific social meaning, what is it then that is actually being measured? In this sense the situation from the Marianas is quite instructive.

As demonstrated in Chapter Four, latte vary in many physical dimensions potentially related to energy expenditure - the number, height and/or shaping of pillars and the area defined by the latte arrangement. The initial practical problem is one of identifying a variable or set of variables which best delineate distinct levels of energy expenditure. However, this raises a more serious theoretical problem.

As Hayden and Cannon (1983) suggested, analysing variation at the individual household level provides little useful information since this is where the greatest variations are to be expected; this has

been demonstrated for latte.Analysis, therefore, is more useful when examining groups of similar households. For latte groups were represented by size classes. However, even these exhibited statistically significant differences between subsets of the same size class. This raises the question; is there a correlation between statistically separate groups and socially differentiated groups? Hunter-Anderson demonstrated variation in house platforms on Yap where various groups of platforms were not significantly distinct yet the ethnographic data indicated that quite distinct social differentiation existed. In the Marianas we may ask; is a small/low 12 pillar latte (as found at Pagat) socially equivalent to a large/high 12 pillar (e.g. Mochong, Unai Dangkulo) even though the physical attributes and ultimately energy involved in its construction, is significantly less. How would an 8 pillar latte like ML-13 at Mochong, with a stone volume in excess of that from the 12 pillar at Pagat be compared? Again, the question of determining objective levels of measurements and comparison must be further explored.

On a very gross level the implications of energy expenditure are quite clear in differentiating levels of complexity. That is, the amount of labour and the attendant managerial positions involved in the construction of the pyramids at Teotihuacan are many orders of magnitude greater than that required to construct latte. When the differences are on that order of magnitude problems in the application become trivial. The problem arises when the differences can be barely discernible between groups and even statistics provide equivocal results. Yet archaeologists treat these differences as real, each with its own social meaning. While energy expenditure can be a useful measure in some instances its automatic application can be potentially misleading.

Future Research

Sorting through the existing interpretations and theories regarding latte has often proved as cumbersome as attempting to find these features in the field. That is, much time and effort must be spent clearing away the dense overgrowth which prevent a clear view.

Hopefully this thesis has cleared some of the interpretive 'bush' surrounding latte or, at the very least, made us aware of the necessity to do so.

The analyses and proposed model of Protohistoric Chamorro society has raised numerous questions and has served to direct research into areas seldom considered before in the Marianas. Thus, not only are additional data sets required but new kinds of data must now be gathered from archaeological work within the archipelago. This brief discussion will not attempt to outline all areas requiring archaeological attention. Rather, aspects of research into the Protohistoric will be emphasised.

The Protohistoric period is characterised by movement and the creation of new settlement areas. To test this in more detail two major regions need to be examined. Inland sites from the southern islands must be tested to determine the presence of midden deposits and to collect samples for dating. If the model is valid then initial settlement or significant increase in inland sites should postdate 800 BP.

The other crucial area is the northern islands. No systematic survey has occurred in this area and only a single excavation (i.e. Egami and Saito 1973) has been reported from this region. Determination of functional site types (i.e. permanent habitation as opposed to short-term task specific areas) must be emphasised in conjunction with a more refined sequence. Again, the model presented here would predict a late occurrence of permanent habitation sites though the presence of earlier presence on these islands is not disputed.

Given that these northern islands are basaltic in composition and that basalt became a major source material for a variety of artefacts in the Protohistoric, research into the possibility of sourcing basalts in the Marianas should be given a high priority. Exchange of materials through the archipelago may provide information on the direction of movement for at least a portion of materials in the Marianas.

Despite the fact that latte have been the focus of archaeological consideration for more than a century I maintain that they still demand further attention. The documentation of

dimensional data, size class determinations (or estimates), and detailed site maps should become basic required survey data. While these kinds of data have been recorded previously, they are often missing from some reports.

To fully understand how Protohistoric settlements were organised there must be a greater emphasis on large scale investigation. It serves little purpose to continue to focus upon an individual latte as if it were separate from the settlement context.

As individual features, future excavations should be directed by specific sampling strategies. These must be designed to sample for the total population of cultural materials associated with a latte, which would provide data on the relative frequencies of these materials rather than data amenable only to presence/absence analysis. It is only through this kind of detailed analysis of assemblages that the question of function can finally be resolved.

On a larger scale, areal excavations in and around latte are crucial in order to sample for the distribution of associated materials allowing the examination of spatial organisation around these features. Future surface collection along the lines of that undertaken at Pagat can provide information relating to site configuration and should be undertaken in conjunction with an intensive excavation strategy.

There is no clear evidence in the mortuary patterns though this is an underanalysed component of Marianas archaeology. There are many excavated burials but little data have been generated. Grave goods are rare (though this may be a preservation problem). Nevertheless, Hornbostel indicates a significant variation in the manner of interment (e.g. depth of burial, orientation of body). I believe that this may prove to be an important component of research into the Protohistoric period

While I argue that, based on current evidence, non-latte residences do not exist, I do not completely discount the possibility that they may exist in some unexplored context. My research serves to specify areas where future research can be directed. For example, the inland pottery scatters must be examined in greater detail including excavation. Additionally, the open areas within a latte site as well as the fringes of these sites must be

examined for the possible occurrence of these structures. Much more research needs to be done before this aspect of the Protohistoric period can be discussed with real certainty.

In conclusion, I submit that rather than providing definitive answers, this thesis has performed the equally important task of clarifying some of the questions to be asked about Protohistoric Chamorro society. The prehistory of the Mariana archipelago is a fascinating research topic and one that can contribute not only to Oceanic prehistory but to a wider investigation into the development of social organisation.

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APPENDIX A - DEFINING A LATTE FLOOR

Although it is a critical factor in determining association of cultural elements and dates, no explicit attention has been given to identifying latte floors; that surface prepared or otherwise which was used during occupation of a latte. The implicit assumption has been that it exists somewhere in the artefact rich layer immediately below the surface, often corresponding with a dark midden zone. I argue here that identification of floors may be accomplished by examining two interrelated aspects within a latte - the non-random clustering of cultural materials (including coral rubble) and the depth of pillar bases.

Spoehr (1954, 1957) was the first to observe a 'coral paving' at two of the three latte he excavated. He stated that, '[A]t Objan and Laulau House A, the remains of work areas paved with coral pebbles were found around the stone shafts and on the seaward side, indicating the presence of work areas under the raised floors' (1957:172). It is further described as rather thin (6-15 cm.) and having a limited distribution around the latte. Spoehr does not inventory the contents of these features beyond the non-specific term - coral rubble nor does he quantify this rubble or artefacts associated with the layer.

Concentrations of rubble, though lacking the apparent compactness of Spoehr's floors, have also been noted by Reinman (1977:33-34) at Nomna Bay (Guam) and by Moore (pers. comm.) at Tarague (Guam) and at Laulau (Saipan) (Terry Bonhomme pers comm.). Like Spoehr's, these observations were impressionistic and, except for the Laulau analysis which is still in progress, no attempt at quantification was made. The question which should be asked as each latte is excavated - is there any evidence to suggest a flooring or other prepared covering? It appears that unless a discrete feature, such as Spoehr reported, is uncovered it is assumed that no identifiable floor may be found nor even existed.

During excavations at Mochong in 1983 all coral material from every fifth bucket of deposit from each spit was collected and weighed. From these data, density figures per spit were calculated. This was done to examine the following alternative hypotheses:

IHo: If the presence of coral rubble is part of the natural matrix then a random distribution of this material should occur both vertically and horizontally.

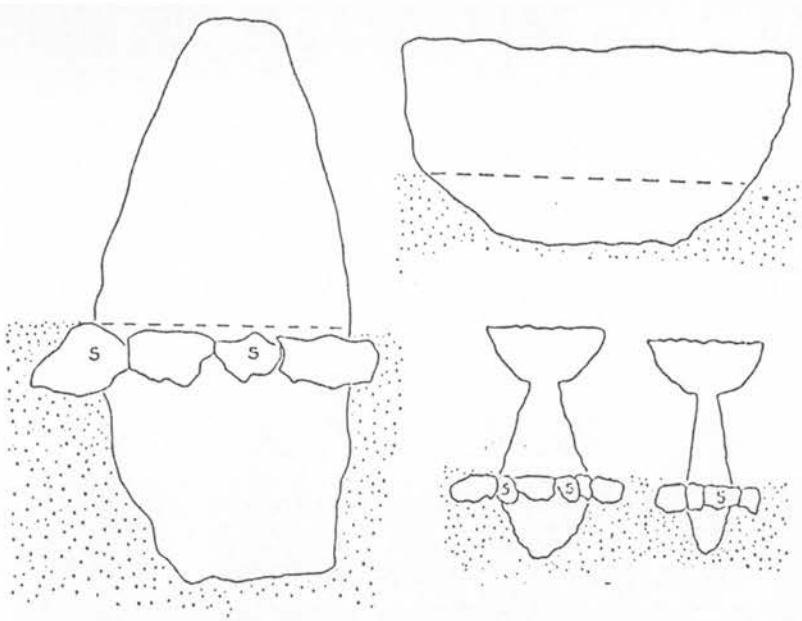
IH1: If a paving exists as a culturally derived deposit then there should be a non-random distribution of rubble localised within and around latte and it should be associated with similar non-random densities of other cultural materials.

The other aspect under consideration indirectly involves the construction of latte, specifically the placement and securing of pillars. Hornbostel was very specific about pillars being placed in a prepared pit. At Epau (Ypao) he noted that pillars extended about 32 inches (c. 80 cm.) below the surface (Figure A-1a) (Thompson 1932:8) and that at Orono a similar depth (c. 70 cm.) was noted (Figure A-1b) (Thompson 1932:12). Hornbostel further observed pillar support stones on the present surface, thus implying that no soil accumulation had occurred since occupation, a commonly held belief among Pacific archaeologists at that time.

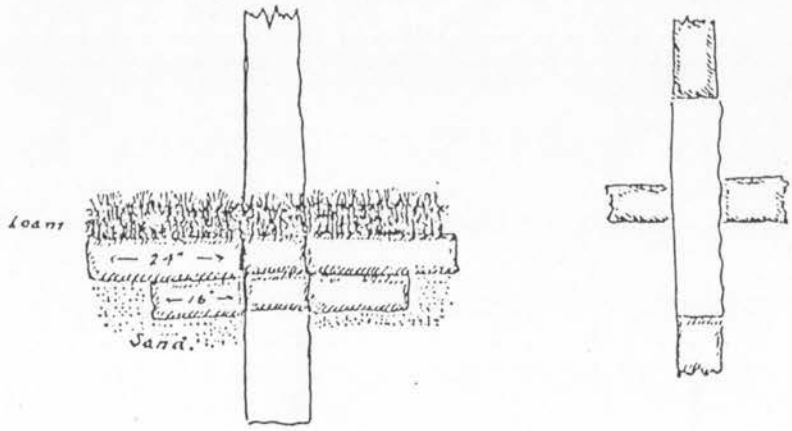
Kurashina and Clayshulte (1983:4) reported the excavation of an upright pillar at Tarague and state that it 'shows the bottom of the upright [pillar] [was] sunken into a circular pit about 30 cm deep and secured by coral support blocks.' No stratigraphic profile of this pit was provided.

However, during survey and mapping of latte at Mochong and Dugi I observed that pillars appeared to sit on or only slightly in the current ground surface. Assuming no significant erosional processes (e.g. slope movement) are at work, a second set of alternative hypotheses are proposed:

IIHo: If the pillar sits on or slightly below the occupation surface then there should be no evidence of a prepared pit and the 'paving' and maximum densities of cultural material should be at or near the same level as the pillar base.



A) Epau (Ypao), Guam



B) Oruno, Guam

Figure A-1 Pillar Base Configurations per Hornbostel (from Thompson 1932)

IIH1: If the pillar is secured into the ground then: 1) evidence of a prepared pit should be discernible in the profile; 2) coral rubble and cultural materials should sit above the bottom of the pillar; and 3) support stones should be found around the base of the pillar.

In order to gather appropriate comparative data to test the above hypotheses, excavated materials must be converted into densities per cubic metre. The following classes of materials were used in this analysis: 1) coral rubble; 2) unworked igneous stone; 3) pottery; 4) chipped stone; 5) general artefacts.

An 8 pillar latte (ML-13) was excavated at Mochong (Ward and Craib 1983). One test pit (TP-7) was placed between the rows of pillars and the other (TP-8) was located immediately outside the inland row of pillars. This was done in order to profile one side of a standing pillar. Both test pits were 2 x 2 metres.

Figures A-2 and A-3 illustrate the stratigraphic profiles for each unit. For purposes of examining the hypotheses, attention is directed to Strata I and II. Stratum I is a shallow, disturbed root zone found in both test pits in the top 20 centimetres. Stratum II is a thick, dark midden layer containing cultural materials associated with the Protohistoric period. This stratum was found between 20-70 cm below current surface. No coral rubble lens, indicative of a 'floor' was observed.

The original base of the pillar exposed in TP-8 was difficult to locate precisely given the decomposed nature of the limestone. However, it does not appear to have been deeper than 40 cm below present surface and most probably sat between 35-40 cm., almost 30 cm. above the bottom of Stratum II. There are no breaks in the horizontal orientation of Strata I or II around the pillar suggesting a prepared pit. Smaller, decomposing rocks of limestone were observed around the pillar base. Although all limestone at this depth was extremely friable, the pillar retained its basic outline and thus these smaller stones were judged to be support stones rather than broken portions of the pillar.

The stratigraphy of TP-7 was more complex due to the presence of three burials, one of which was excavated (the others were observed in side walls). This was an extended burial which had been placed

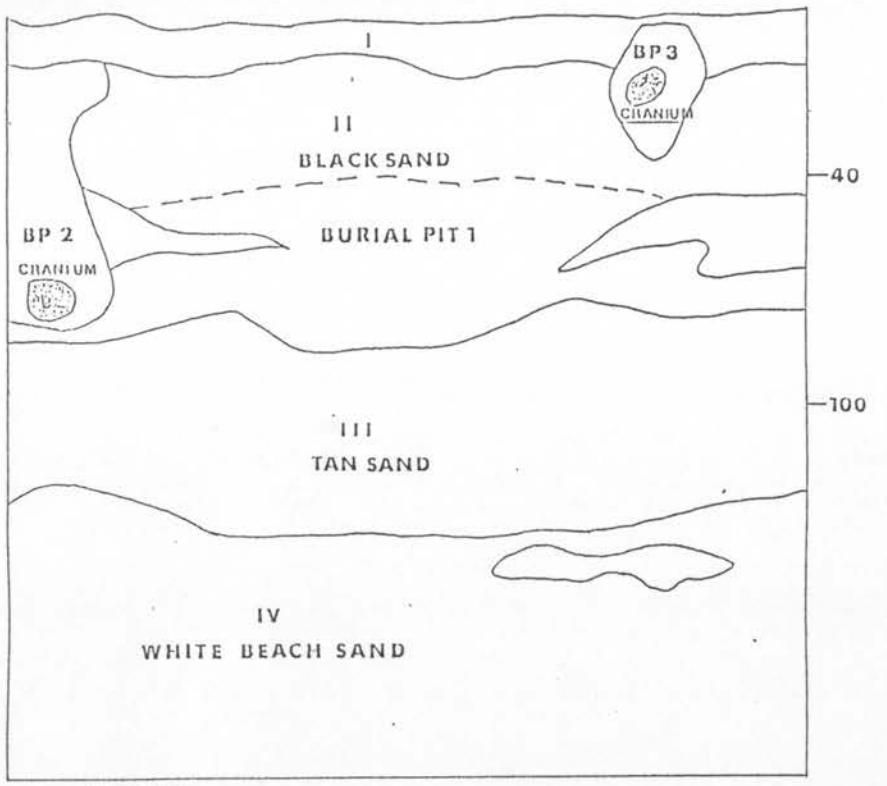


Figure A-2 Stratigraphic Profile - TP-7

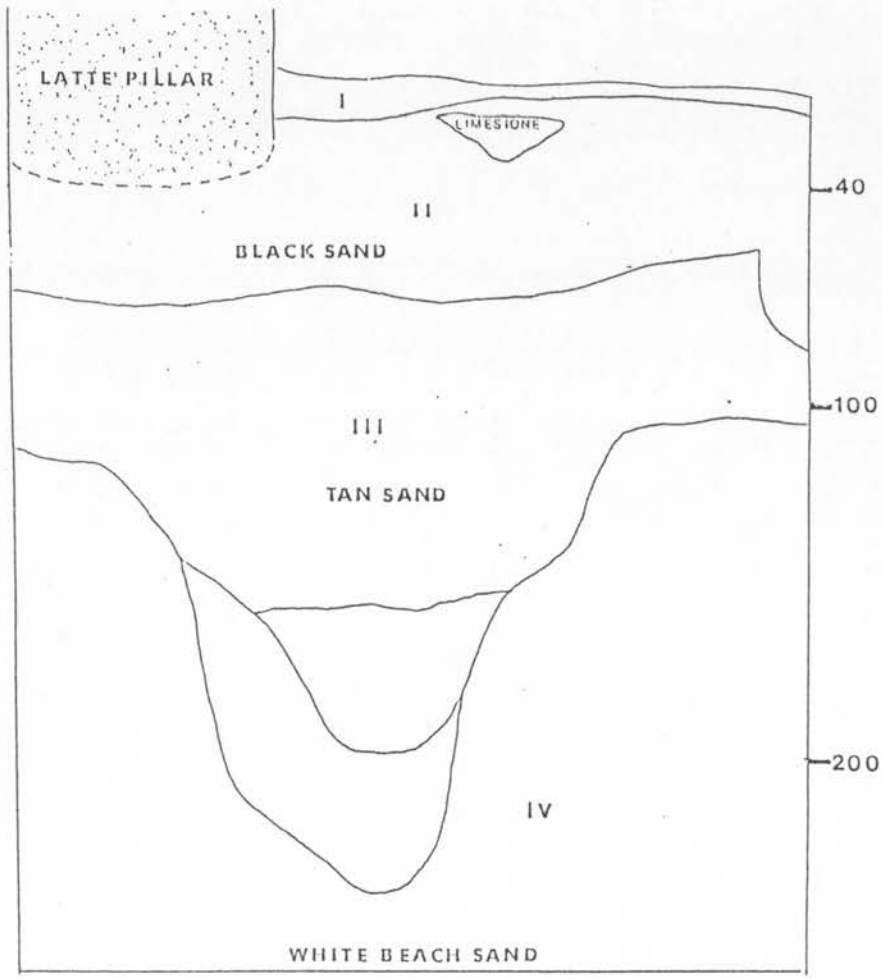


Figure A-3 Stratigraphic Profile - TP-8

into a prepared pit and covered with white beach sand. This pit was found 40-90 cm below present surface.

Given the absence of a prepared pit around the pillar, the first part of hypothesis IIH1 can be refuted. If the pillar was set on or near ground level during occupation then it would be expected that the living surface would be found at or near the 40 cm level.

Vertical Distribution of Coral Rubble

Figure A-4a shows the densities of rubble through the first six spits of TP-7 (a value for spit 5 was not obtained). A significantly greater amount of coral rubble is observed in spit 3 at a depth of 30-40 cm. A similar pattern of variation in coral rubble density per spit in TP-8 is illustrated in Figure A-4b. Clearly there is a gradual increase in the amounts of coral rubble, peaking at Spit 4 and dropping away below. Peaks of nearly 60 Kg/cu.m occur in Spits 3 and 4 (i.e. 20-40 cm), decreasing slightly in Spit 5 and dropping sharply to a low of about 5 Kg/cu.m in Spit 9. Spit 4 sits between 30-40 cm below surface, placing it nearly level with the base of the pillar.

When density profiles of TP-7 and TP-8 are compared, it becomes apparent that the peaks occur at the same levels and then drop sharply and continuously. I argue that while this may not be as discrete a feature as the 'floors' reported by Spoehr, it does, in fact, constitute a purposeful ground cover.

There is clearly a non-random distribution of coral rubble within Strata II with the highest densities at or slightly higher than the base of the pillar. On this basis Stratum II was divided into two components IIa, representing the latte floor, and IIb a deposit laid down prior to construction of ML-13. If the coral rubble distribution is a valid indicator of a specific occupational event at this latte then it would be expected that all classes of cultural materials to peak at or above this same depth. This is examined in the next section.

The occurrence of a coral covering in TP-8 (i.e. on the inland side of a latte) contradicts Spoehr's observation that paving only extends beyond the latte on the seaward side. The question that now

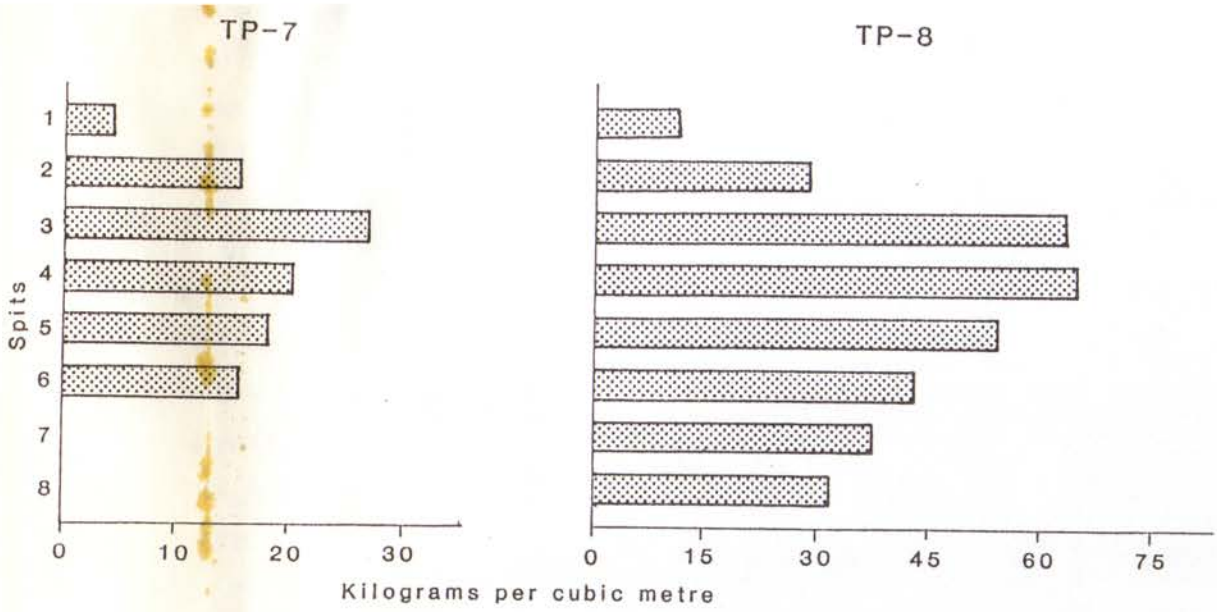


Figure A-4 Relative Densities of Coral Rubble (per Spit)

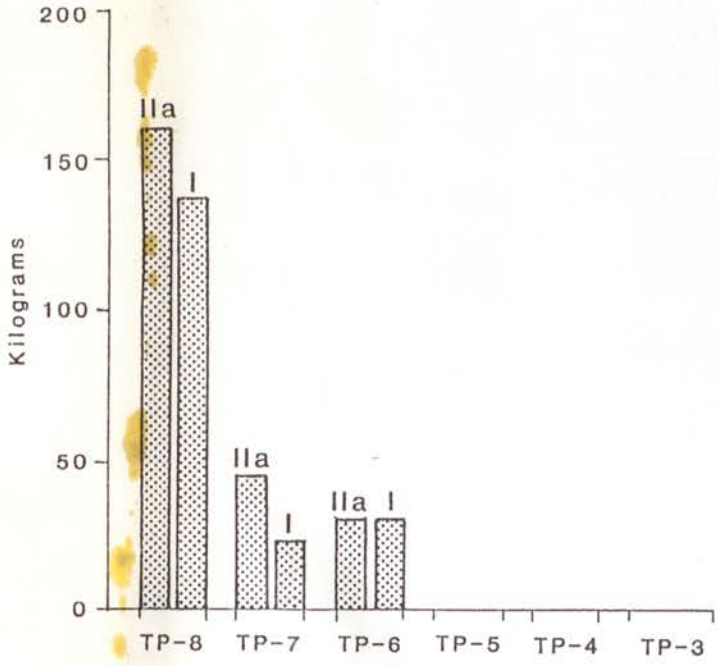


Figure A-5 Horizontal Patterns of Coral Rubble - Stratum II

arises is - perhaps this paving is not specifically associated with the latte but represents a more general surface covering within the settlement (e.g. Ulithi - Craib 1980, Kapingamarangi - Leach and Ward 1981). To investigate this, attention must now be directed to the more northerly test pits at Mochong, excavated during the same field session.

Figure A-5 shows the horizontal pattern of coral rubble distribution for Strata I and II along the sampling transect. A clear trend of clustering of coral rubble around ML-13 is observed.

Two patterns of non-random clustering of coral rubble around latte has now been demonstrated. Vertical distribution shows a clear clustering of rubble at and slightly above the 40 cm level. This becomes an important benchmark in that it corresponds to the level of the pillar base. I have included spit 4 in TP-7 and spit 5 in TP-8 as part of IIb in that they appear to represent a 'treadage zone' intermediate between II a and b.

The horizontal distribution also suggests that such a layer may indeed have been a specific component in the construction of this latte. Given the dispersed sampling locations along the transect, it is not possible to identify a specific cut-off point, though the general trend is one of decreasing rubble away (seaward) from the latte. What needs to be investigated now are similar transects in various directions from latte. A further working hypothesis would be that as latte are set closer together, the more uniform the density of coral rubble; the decrease exhibited in Sampling Transect A may be a function of its cross-cutting the former strand zone.

Distribution of Cultural Materials

Figure A-6a-d illustrates the density per spit of a variety of cultural materials from TP-7 and TP-8. The same basic pattern is exhibited here as was found for coral rubble. The peak values are observed in spits 3 (TP-7) and 4 (TP-8) both sitting between 30-40 cm below present surface.

When these figures are converted to density per Stratum the trend becomes even clearer (Figure A-7a-d). For example, artefacts appear in association with the rubble covering. Highest densities within

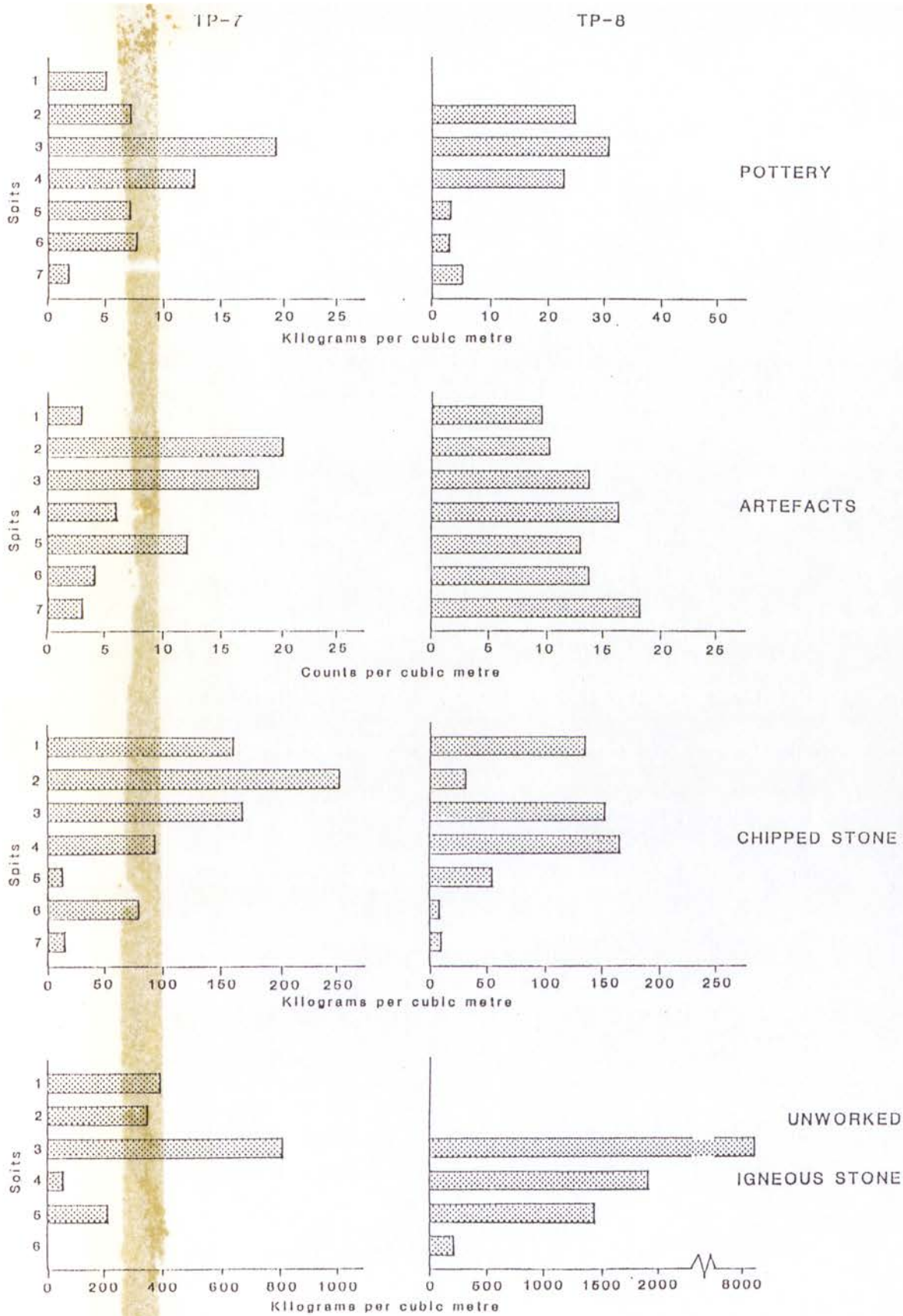


Figure A-6 Density per Spit of Selected Cultural Materials

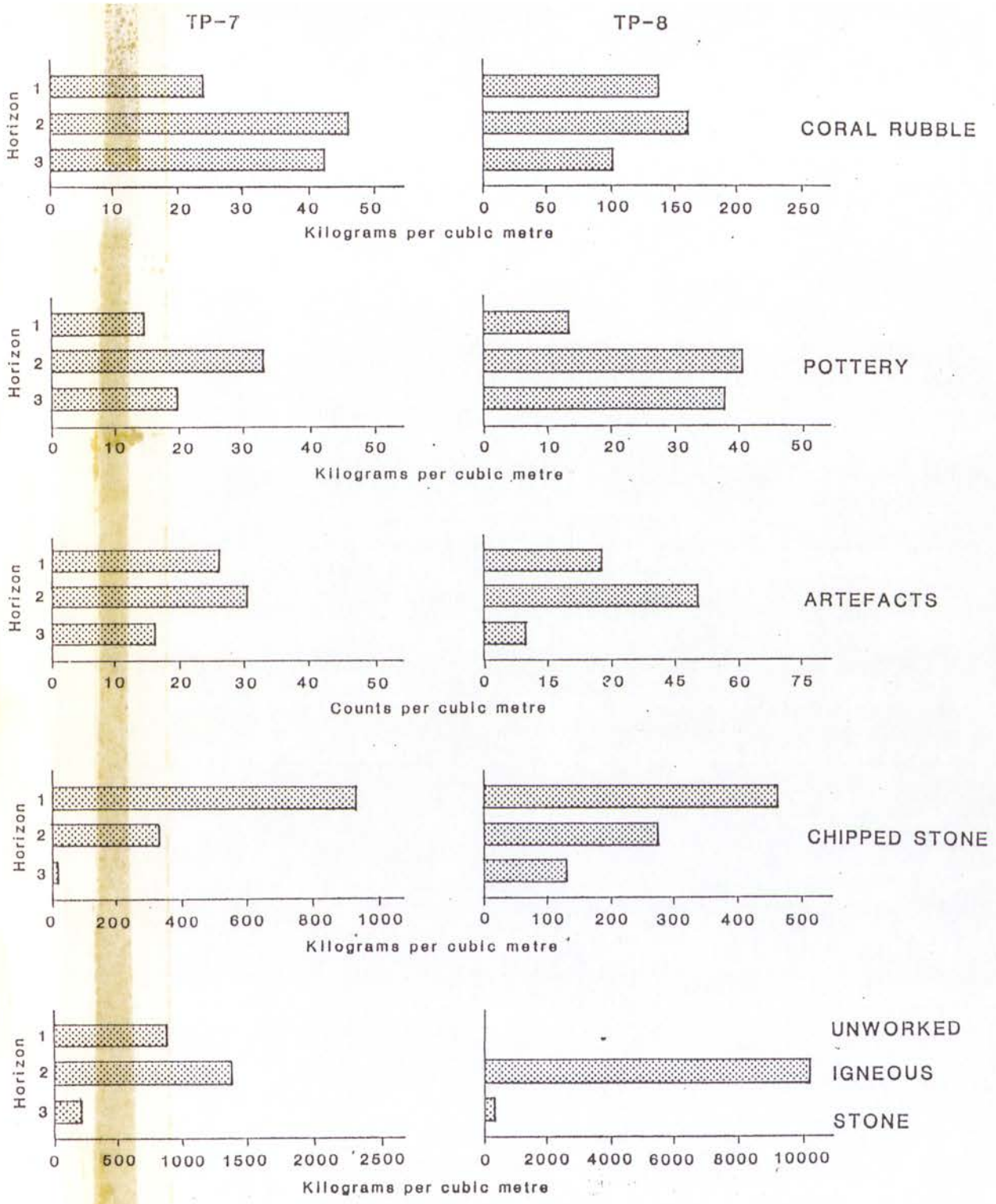


Figure A-7 Density of Cultural Materials Per Stratum

the first 70 cm of deposit are found between 20-40 cm and then falls away to virtually nothing below this level. Although nearly equal densities of pottery are noted from Horizon IIa and b in TP-8 this is most likely due to a pottery feature located in spit 7 which contained a dense concentration of ceramics.

I argue that Stratum IIa represents the occupational surface of ML-13. A radiocarbon date from Spit 4 (35 cm) in TP-8 indicates that occupation occurred about 540 $\pm$ 60 BP, well within the Protohistoric Period and virtually at Spanish contact. This differs from the date associated with Stratum IIb of 830 $\pm$ 50 BP derived from Spit 6 (60 cm) in TP-8. These are quite separate dates even to two standard deviations.

Stratum IIb is unlikely to have been a living surface prior to the construction of the latte as suggested by the minimal amount of artefactual material. This virtual absence is unlikely to be the result of a clearing/cleaning of the area before latte construction given the relatively high densities of larger materials such as pottery sherds and coral rubble.

Reviewing the above data, the important points are:

1. The base of the pillar, profiled in TP-8, sits at 40 cm below the present surface and exhibited no evidence that it ever sat within a prepared pit.

2. There is a consistent, non-random clustering of coral rubble in TP-7 and TP-8 which reach their highest densities at or near 40 cm.

3. A similar non-random clustering of cultural materials also occurs at the same depths in TP-7 and TP-8 and corresponds to the level of maximum coral rubble densities.

4. The top of the burial in TP-7 is level with the the base of the pillar.

5. There is a general dispersion of coral rubble and cultural materials as one moves away from the latte.

Based on the above points, the series of hypotheses presented at the beginning of this Appendix can be evaluated:

Null Hypothesis I has been refuted since there does not appear to be a random distribution of either coral rubble or cultural materials. It is therefore argued that the coral rubble and cultural materials excavated in and around latte ML-13 are part of a purposefully constructed deposit and that the floor of the latte is represented by the concentrations of materials at or near the 40 cm. level.

Further, it appears that the coral rubble covering has a larger areal extent than originally proposed by Spoehr. Further analysis of latte at other sites is required to determine whether consistent patterns of areal distribution of these pavings exist.

On the question of the relationship of the latte pillar to any proposed floor, Null Hypothesis II has not been refuted but rather the alternate hypothesis, arguing for the pillar erected in a prepared pit, must be rejected. Again, only through further testing at other latte sites can the discrepancy between the observations of others (e.g. Hornbostel, Kurashina and Clayshulte) and the findings at ML-13 be resolved.

This brief exercise holds important implications for assessing association of archaeological deposits and their contents with latte. A clear break in the occupational sequence in the area of ML-13 has been demonstrated within a deposit (i.e. Stratum II) which is undifferentiated geologically or in archaeological content. While observable variations among these two variables may occur in some instances and prove useful as markers of latte occupation, we must not simply assume that they must exist. Attention must be paid to microstratigraphic variation within a variety of materials.

A wide range of materials were collected during surface collection and excavation at Pagat. This section describes the cultural materials. Although detailed attention has been given to pottery analysis in previous work in the Marianas, there are few clear-cut typologies for other classes of artefacts.

This presentation is not an attempt at a detailed description of the material culture at Pagat but rather will introduce a series of functional classes. This differs from the usual manner in which archaeological materials from the Marianas are categorised. Often artefacts are classified under the major headings based on source material (i.e. Stone. Shell, Bone) and then further grouped in more or less functional categories (e.g. adzes, fishhooks, files). However, this fails to consider that source material often cross cuts formal or functional types.

This classificatory scheme begins with a set of functional classes derived from ethnohistoric sources and/or comparisons with other assemblages. It is widely recognised that an item may function in many ways given various contexts. It is further acknowledged that some classes of artefacts can be grouped in more than one functional category but are included here in the group which they most generally function.

Processing Implements

Mortars

A total of 50 mortars were recorded at Pagat. Most were large, heavy single-holed mortars made of basalt while three were multi-holed and made from bedrock limestone. The number of mortars is quite high and may indicate that little collection has occurred since the village was abandoned. Stone mortars are often carried from sites and placed near modern houses for decoration and/or use. Given the size of the mortars at Pagat and the steep cliff, it would be most difficult to remove these from the site area. Likewise, transporting the basalt mortars to Pagat would have involved a

considerable amount of energy.

Safford (1905) has suggested that mortars were used to process Cycas seeds and to hull rice. No other food items were mentioned nor have been identified in earlier reports. Chamorro state that some medicines were prepared in mortars and stone bowls.

The basalt mortars were all brought to Pagat. Whether these came as unshaped pieces of stone or already functional is unknown. These mortars are large, flat slabs of basalt usually about 30 cm thick. The surface area varies in size (X=1500 sq. cm) but is roughly circular in outline and contains a single hole placed in the approximate centre of the stone. The hole is relatively small (c. 10 x 10 x 8 cm). The estimated mean weight of these mortars is roughly 25-50 kg.

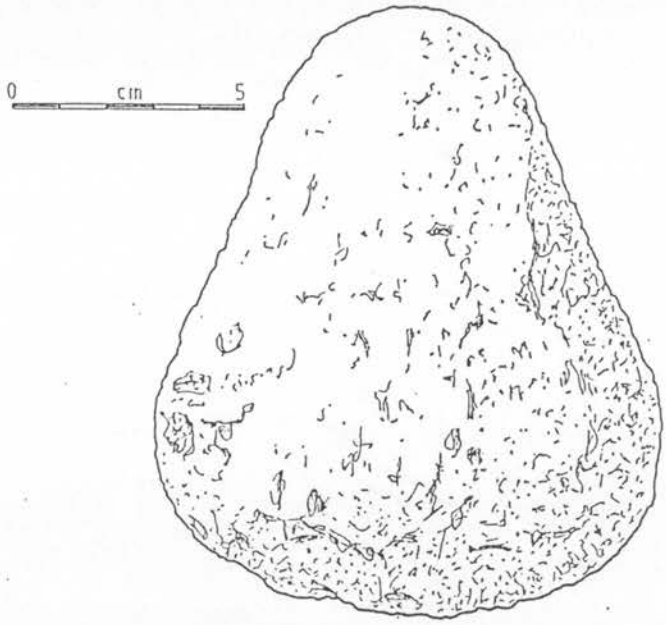
Limestone mortars appear to have been made in naturally occurring outcrops and invariably contain numerous holes, each roughly the size of those in the basalt mortars. Numerous holes are possibly the result of softer surfaces.

Pounders/Grinders

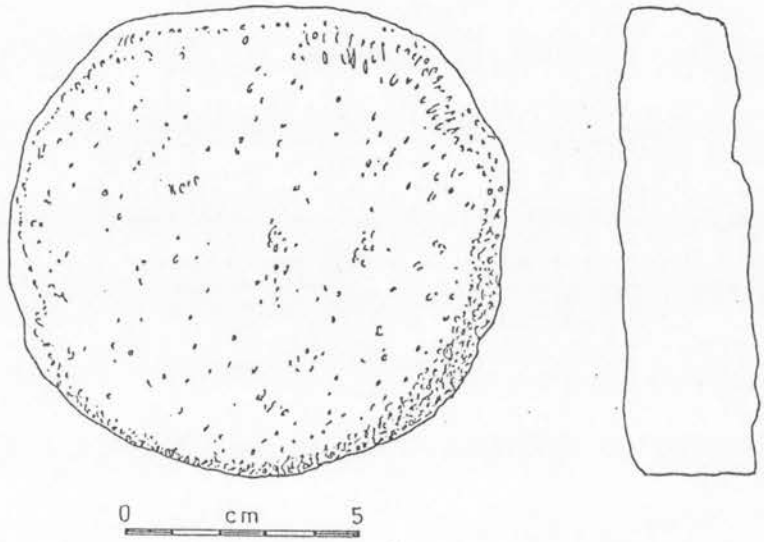
Nearly all of these implements represented in the collection are fragments, only five whole pieces were collected. Some (n=11) of the broken pieces exhibited evidence of being fire-affected and may have been used as hearth stone after breakage. The few whole specimens exhibit two basic forms which are also observed in the fragments.

The most common form is a long (X = 20 cm) cylindrical basalt pestle. These are made from coarse-grained olivine basalt and vary in the amount of polish (non-wear) applied to the body. Both ends are blunt and exhibit crushing wear with no signs of grinding facets.

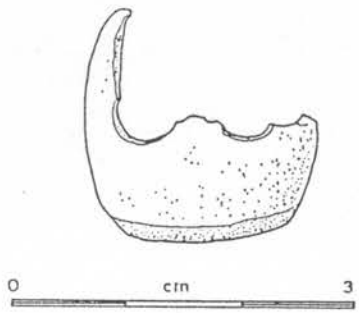
The second type of pestle is more tapered in outline, vaguely reminiscent of Polynesian pounders. Only a single example (P82-369) of this type was found at Pagat. It contains a rounded base (10 cm diameter) and tapers towards a narrower (5.2 cm), rounded top (Figure B-1A). The overall length is 12 cm. Like most pounders, the source material is coarse-grained olivine basalt. Similar forms have



A) Tapered Pestle



B) Coral Mano



C) Shell Grater

B-1 Processing Tools

been illustrated from Truk (Takayama & Intoh 1976; Parker and King 1984).

Source material for grinders include stone (basalt) and coral. While most were fragmentary, these implements appear to have been well-shaped, bifacial manos (this Spanish term has been adopted by Chamorros). The single coral example (P82-1873) best illustrates the general morphology (Figure B-1B).

Most of the basalt mano fragments show signs of being fire-affected, suggesting that they were used in hearths after they had ceased to function as grinders.

Peelers/Graters

A single fragment (22-1526) of a grater was recovered from Layer II. These implements have also been described from Tarague (Ray 1981). They consist of a small piece of shell (unidentified), roughly oval in outline, containing two perforations in the center (Figure B-1C). A series of small 'teeth' are notched at one end.

Other perforated and ground-edge shells, identified elsewhere in the Pacific as graters were also recovered. Whether these are, in fact, peelers, or a function of natural fractures is currently being investigated (T. Bonhomme pers comm).

Stone Bowls

Two fragments of small, shallow bowls were found during the surface collection. Both are rim fragments, representing about one-quarter of the original diameter. Each bowl was shallow (c. 8 cm with a mouth diameter of approximately 15 cm. The range of functions of these is unknown though local tradition describes their use in the preparation of medicines.

Thompson (1932) illustrates a variety of these bowls. Though they come in numerous shapes, none of her illustrations match the fragments from Pagat.

Storage

Pottery

This was the most numerous artefact class encountered at Pagat as it is at all sites in the Marianas. Preliminary analysis of the sherds indicated that it belonged to the late ware, common throughout the Marianas. No detailed analysis of the Pagat sample was undertaken for this thesis but is being performed by Dr. Michael Graves, University of Guam. During surface collection a few sherds of a glazed ware and blue-white porcelain were collected. What association, if any, these have with the Protohistoric occupation of Pagat is uncertain.

Fishing Gear

In marked contrast to the rest of Micronesia, archaeological examples of prehistoric Chamorro fishing gear are quite numerous. This is largely due to the more durable source material (e.g. marine shell, bone, stone) used in the Marianas. Pagat has yielded a variety of fishing gear (Table B-1).

Table B-1 Fishing Gear

Gorges	31
Hooks	8
Shank	1
Points	14
Weights	14
Total	68

All types of fishing gear were present in Horizon 1 and none at all in Horizon II. In contrast to the heavier and stronger weights, the smaller and more fragile hooks, barbs and gorges appear not to have survived on the surface, though found in some numbers in subsurface context.

Gorges

This is the most numerous (n=31) class of fishing gear from Pagat. The majority (n=31) consists of unfinished specimens. Two of these pieces still retain the row of 'teeth', characteristic of Isognonom sp.

The preponderance of gorges over other elements of fishing gear is also found in samples from other sites in the Marianas. The use of gorges is specifically documented by Zamora who briefly describes Chamorro fishing with a 'two-pronged hook' which are suspended from 'calabashes' (coconuts?) and used to catch flying fish (Driver 1983) The use of gorges with floats is also described from other areas of Oceania (Anell 1956).

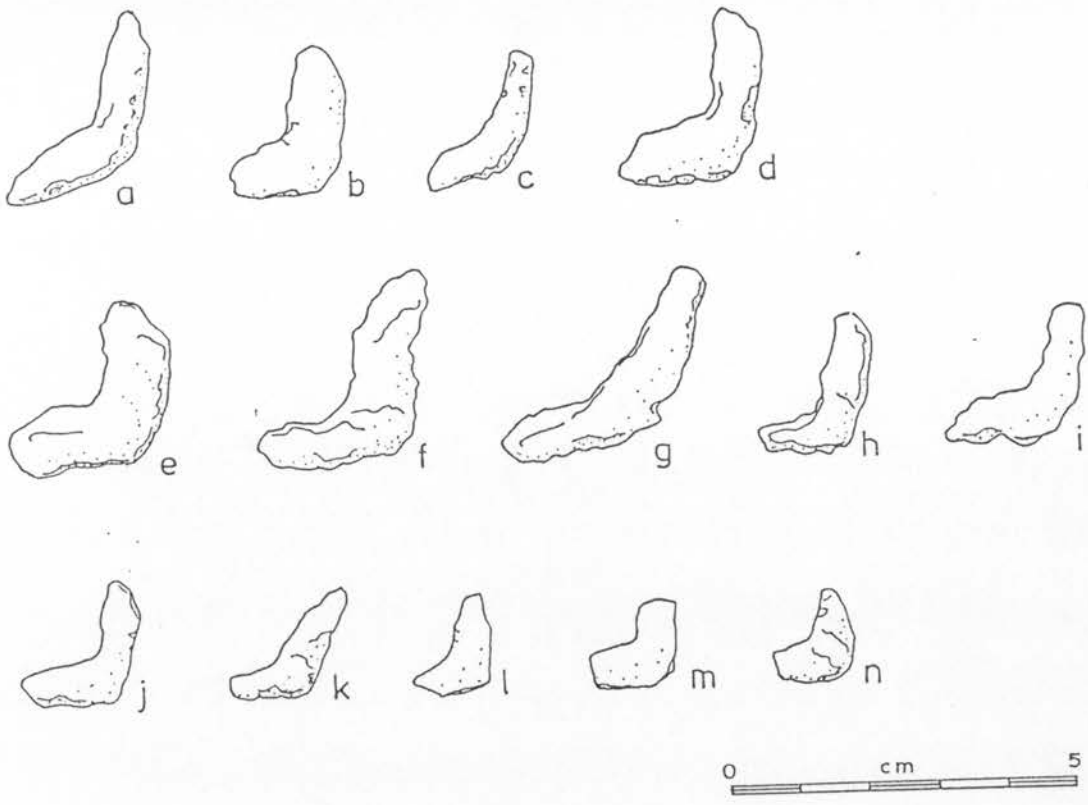
The largest number of pieces are preforms (n=14) (Figure B-2A), all of which have the distinctive L-shape. The legs are wider than finished specimens though the relative lengths have already been formed. The surfaces are rough, suggesting that the fine polish observed on the finished pieces was the last step in manufacture.

The finished gorges are small, thin, L-shaped pieces of shell (Figure B-2B). The legs are angled nearly 90 degrees to each other. A notch is formed where they intersect, serving as the point of line attachment. Invariably, the legs are of different length.

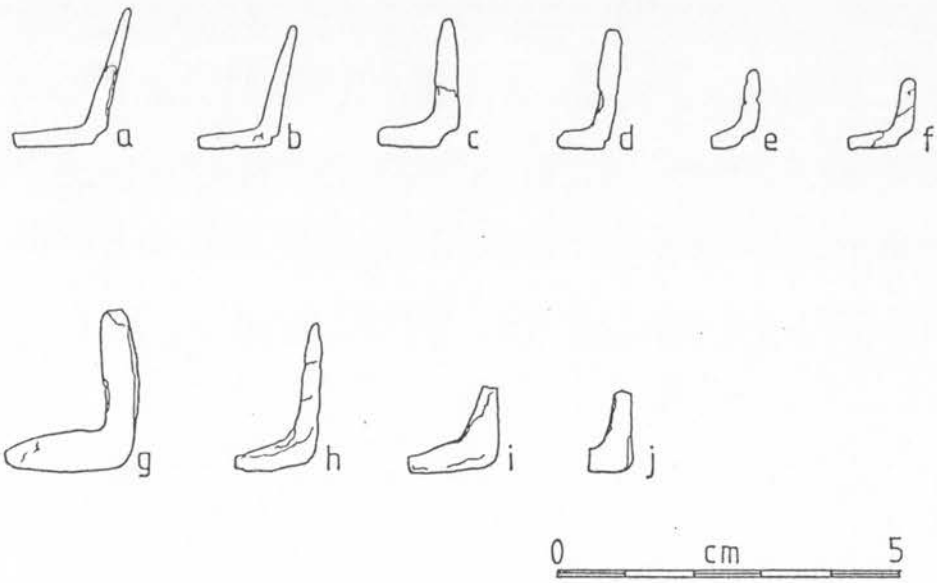
Hooks

Eight hooks were recovered (Figure B-3 a-h), only one of which (B-3b)is a complete specimen. Two of the unfinished hooks still retain the natural striations of the shell and can be positively identified as Turbo spp and Isognonum sp. Though they vary in size (due in part to being unfinished), all exhibit a J-shape. This hook form is described in other reports (e.g Spoehr 1957,Egami and Saito 1973, Reinman 1977) and appears to be the only one-piece form yet identified. The single, completed hook possesses a single notch for line attachment. Illustrations from other reports suggests that the number of notches used as line attachments may vary significantly.

Some preforms exhibit manufacturing scars which may identify two separate methods of manufacture. The first involves the creation of

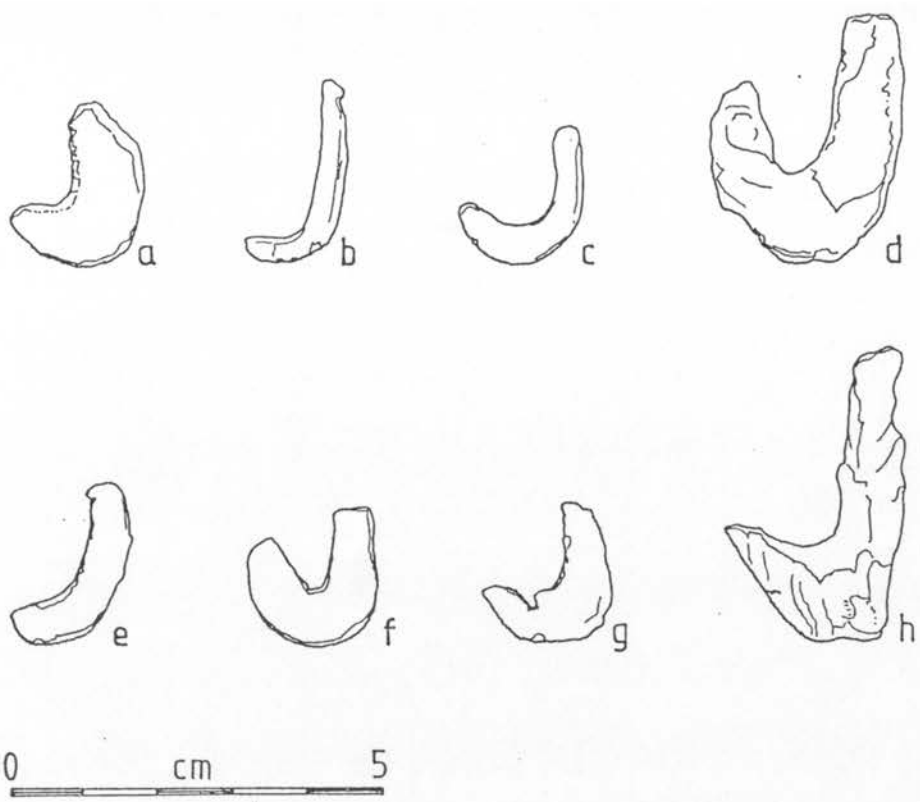


A) Unfinished



B) Finished

B-2 Gorges



B-3 Fishhooks

a large hole in a squarish shell blank. The edges of the perforation are created by a series of small (>1mm) holes (B-3a); the center is then removed and the blank cut/snapped in half. The second method simply involves cutting a wedge from the outside edge to the center of a blank (Figure 3f).

Points

A sample of 14 points from composite trolling lures were recovered from the excavations; all were made from bone (Figure B-4). Because of the grinding involved, it is impossible to determine the kinds of bones used. However, two finished specimens and a preform may offer a clue.

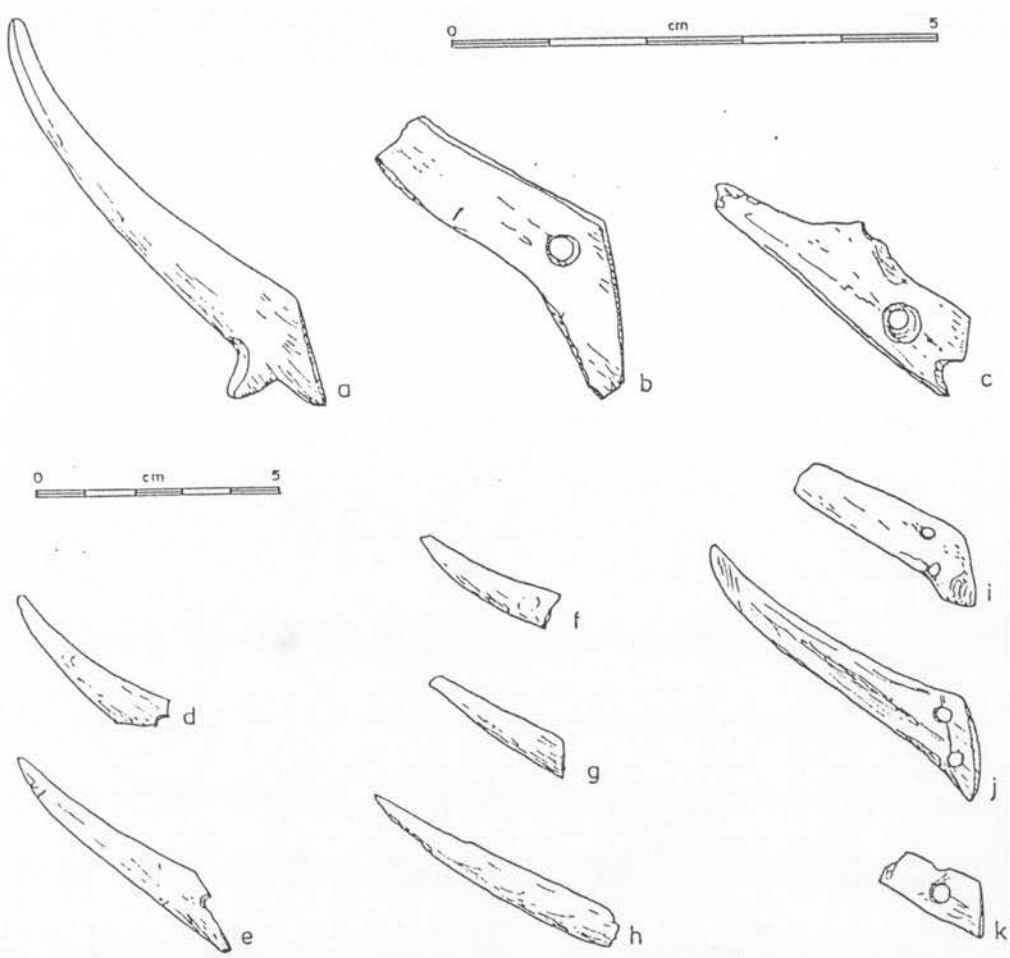
A point preform (22-1211) has been shaped by minimal grinding along two sides leaving most of the piece in its natural configuration. The natural striations, grooving, and overall morphology suggest it to be a vertebral process from a large, pelagic fish, most probably the dolphin fish (Coryphaena hippurus). Several vertebrae with identical intact processes are found among the extensive faunal sample recovered from Pagat. Two, nearly completed, points (22-250/22-1471) still retain portions of the natural morphology of the bone and strongly suggest a similar skeletal element.

Though only a single preform has been identified, a hypothetical manufacturing sequence is proposed:

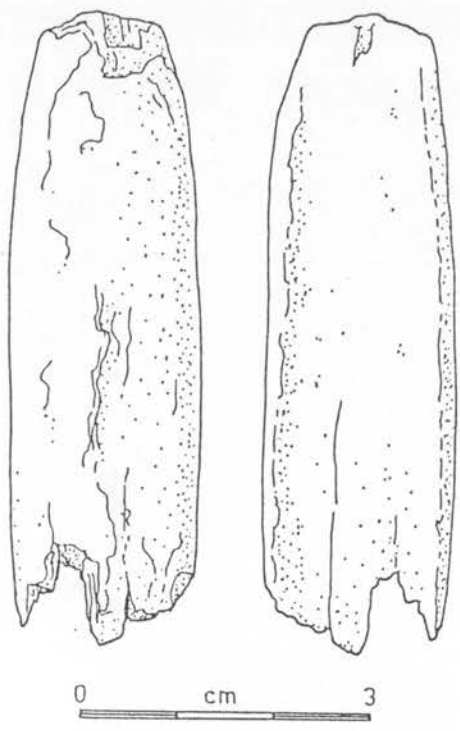
Stage 1: detachment of the process from the vertebra;
Stage 2: grinding on all sides of the blank into final shape;
Stage 3: knobs formed at the base.

Specimen 22-250 does not have its sides ground; whether this is intentional or represents an unfinished point is unclear.

Given the relatively large sample size of the points from the Marianas (including Pagat), it is curious that only a single definite shank has been identified. Three possibilities could account for this: 1) shanks were made of non-durable material; 2) shanks have been recovered but not recognised; 3) shanks exist but



B-4 Bone Points



B-5 Possible Shank

simply have not been recovered archaeologically.

Pigafetta mentions Chamorro fishing with hooks made of bone (Skelton 1969) but provides no further description. The only specific account of composite hooks comes from Cooke (1712) who visited Guam in 1710. He provided a rather poor illustration of a fishhook and offered the following description:

> The fishhooks these people use, are made of a large bone, with a small one fix'd in it, looks white and when tow'd in the water, the dolphins (Coryphaena hippurus) takes hold of it, and is caught.

The greatest morphological variation among these points is in the shape of the base. Since all but two of the points are broken, collection of metric data was restricted. The following classification is based entirely upon base configuration using the Pagat sample and points illustrated in other reports from the Marianas.

Point 1: This point has a very flat base and is characterized by a knob-like projection proximal to the base on the bottom of the point (Figure B-4a). The knob projects about 5mm from the body of the point, diagonal to the long axis of the base. Only a single specimen was recovered from Pagat though an identical point is illustrated from Tarague (Ray 1981).

Point 2: The base of this point tends to be slightly convex and is characterised by an alignment of two perforations near the base (Figure B-4j). Similar points have been recovered by Reinman from Guam (1977: Figure 41j) and Egami and Saito from Pagan (1973: Pl VI:11,13).

Point 3: This is characterised by a single specimen and may represent an unfinished example of Point 2. The base is flat, slightly convex, but does not contain the well-formed point at the bottom of the base (Figure B-4i). Two aligned perforations are found near the base. This specimen exhibits one hole which is well formed and the other is either unfinished or poorly made. No similar specimen has been found in the Marianas.

Point 4: This appears as a form distinct from those described above. The base is elongated so that it forms a convex tail

containing a single perforation (Figure B-4b). No similar specimens have been found elsewhere.

Point 5: Although this form is represented by a single specimen, it appears to differ greatly from the above. The base has a double perforation but differs from the above forms in that the base is notched and exhibits a well-defined groove running along the bottom of the shaft (Figure B-4c).

Shank

It is suggested that a broken piece of worked Tridacna spp. (P82-1560) may have served as a shank for a composite fishhook. Unfortunately, the piece is broken and there are no marks (e.g. knobs, attachment points) to positively identify it.

This piece is roughly rectangular in section with the sides ground flat (Figure B-5). The top is slightly convex and the bottom slightly concave. The body is consistently 20 mm wide, tapering slightly at the finished end; it is relatively thin - 8mm.

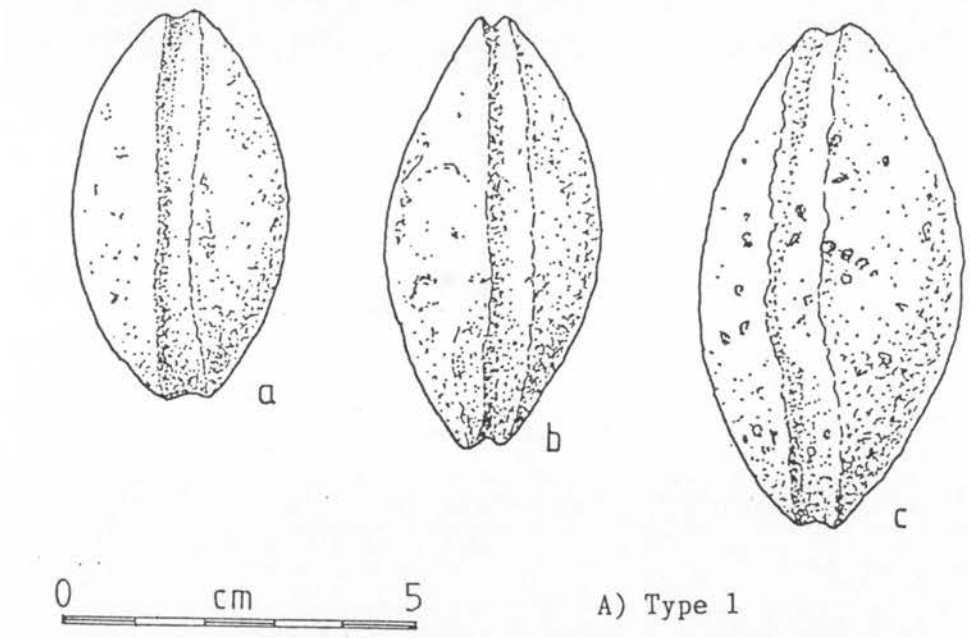
Weights

Fourteen worked pieces of limestone and shell have been classified as weights. These vary in size and shape and are tenatively classified into four types based on morphology.

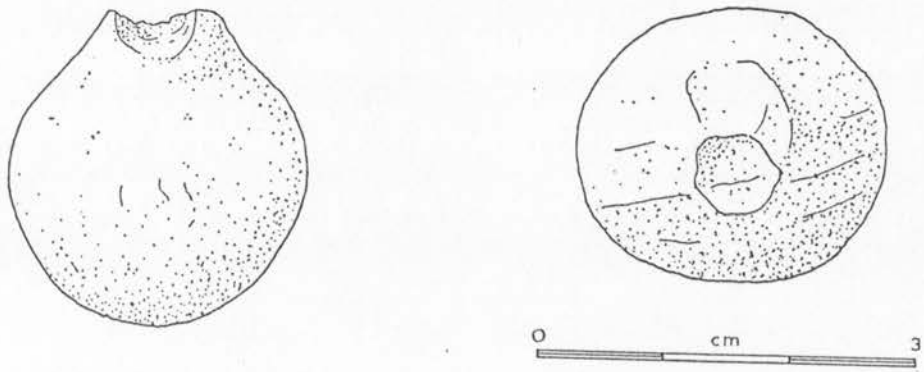
Type 1: These weights resemble slingstones in size and shape differing only in the presence of a longitudinal groove running around the entire stone (Figure B-6A). All three specimens are well-made with a well-defined groove. All are limestone. There are no ethnohistoric descriptions of the use of these stones as weights but similar styles have been identified elsewhere in the Pacific (e.g. Marquesas - Suggs 1961; Tuamotu - Emory 1975) and in the Marianas (Spoehr 1957; Ray 1981).

Type 2: This is a heavy (253 gms), roughly hemispherical piece of limestone. The flat top of the specimen contains perforations on both sides possibly for cord attachment. Each perforation was biconically drilled. The body is only roughly shaped.

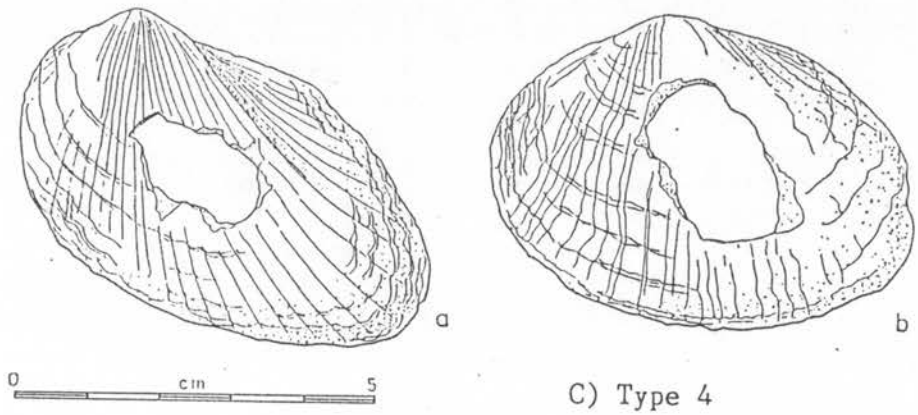
The exact function of this specimen is unknown though it



A) Type 1



B) Type 3



C) Type 4

B-6 Weights

resembles the Poio, a fishing device described by Hornbostel (Thompson 1932).

Type 3: This weight is represented by a single specimen (22-61), a small, round piece of shell (?) (Tridacna) which has been ground into a circular shape (Figure B-6B). The top part of the weight was broken but appears to have been a small knob-like projection which was biconically drilled (the scars are left on the top of the weight).

Type 4: These weights are perforated bivalves (Anadara sp., Tellina sp.) similar to those reported elsewhere in the Pacific. The shells are unmodified except for the rough, but purposeful, perforation in the center of the valve (Figure B-6C a-b). Eleven of these bivalves were identified.

Fabricators

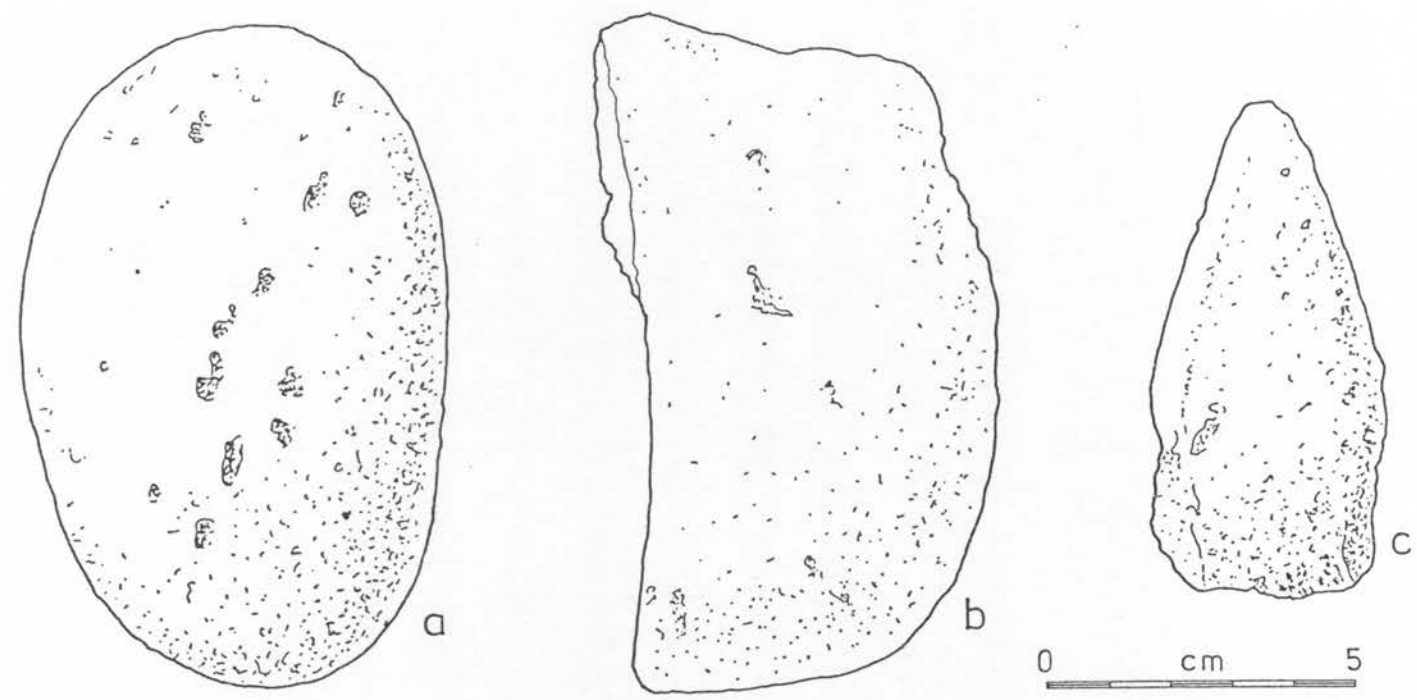
Abraders

These items were used in a variety of contexts though the primary function would have been finishing and smoothing. Most abrading implements appear to have been selected for texture rather than size or shape. Generally, little modification on the specimen occurred except smoothing due to wear. This category includes scoria fragments, coral files and sea-urchin spines.

Scoria

Nearly 1600 grams of scoria (n=201) was collected from Pagat. All of it is exotic to the environs of the northeast coast and, perhaps to the entire northern plateau. Most of the sample was recovered during the surface collection though small (5-10mm) pieces were found in the excavations.

Very few shaped specimens were found. Only three examples of purposeful shaping were observed among the large sample (Figure B-7 a-c). Figure B-7 a and b were rounded with slightly convex front and back. The third piece (B-7 c) was was ground to a point. Most specimens exhibit one or more smooth facets, resulting from abrasive



B-7 Shaped Scoria Abraders

wear.

The specific functions are unknown but these probably were important in the manufacture of shell adzes, possibly in the manufacture of pottery, wood-working, and shell bead manufacture (Kirch and Yen 1982).

Coral Files

Scores of finger coral (Acropora spp.) fragments were recovered from both surface and subsurface contexts though very few pieces show any trace of shaping (n=31). Use of these as files is suggested by the smoothed facets found on or near the tips.

Sea Urchin Spines

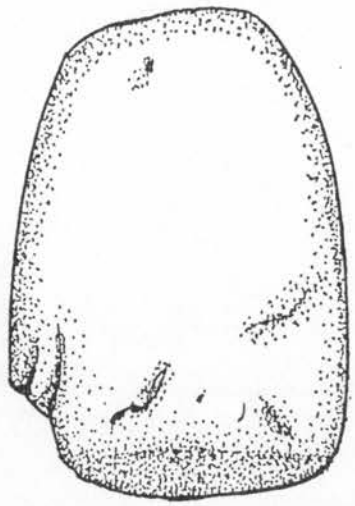
Like the finger coral, numerous sea urchin spines came from the excavations but only a small percentage (<10%) show any signs of modification and/or use (n=12). Often the natural breakage resembles a beveling which can be mistaken for shaping.

Gouge

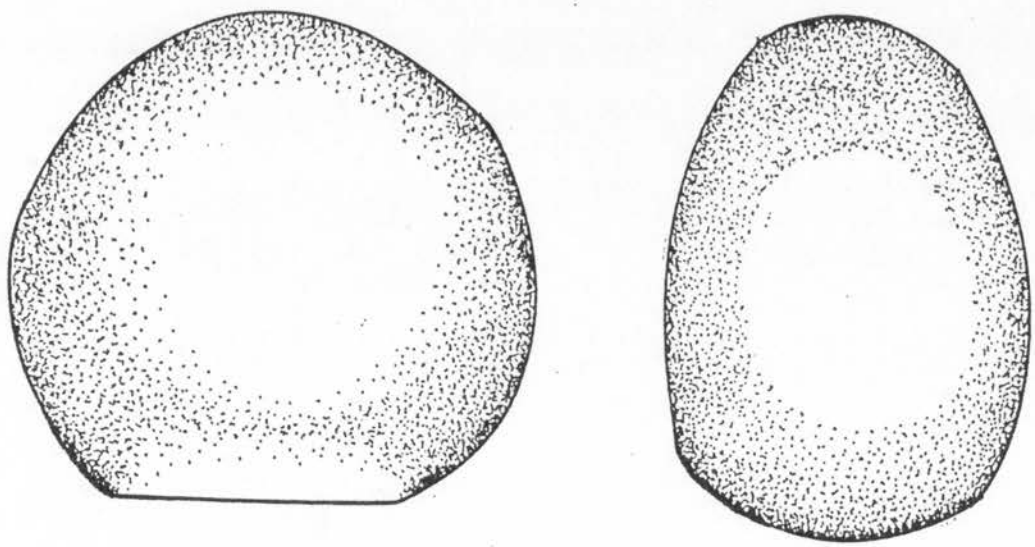
A single spire-ground Terebra spp., forming a small gouge-like edge, was found. Terebra adzes have the opposite end ground for cutting. A spire-bevelled Terebra tool is rare in Micronesia and the Marianas are the only area in western Micronesia where this occurs.

Hammerstone

A sample of 17 probable hammerstones were collected at Pagat. Most were basalt though some chalcedony and a single limestone hammer were also found. These have been identified by the battering wear around some or all of the edges. Most hammers are roughly circular in shape and appear to have had little shaping. The notable exception is a small, cylindrical hammer (P82-1509) (Figure B-8).



B-8 Shaped Hammerstone
(Actual Size)



B-9 Smoothing Stone
(Actual Size)

Smoothing Stone

A rounded river cobble of fine-grained basalt was collected from the surface (provenience unknown) at Pagat. It contains three well-defined, finely-polished facets (Figure B-9) which appear to be the result of grinding or polishing action. No other artefact of this configuration has been described from the Marianas.

Weaving/Thatching Implements

Previous archaeological descriptions of these implements have identified them as awls and needles (Spoehr 1957; Reinman 1977). Remarkably, no artefact in this class was found in the massive Hornbostel collection. It seems highly unlikely that his excavations would not have yielded such specimens. The absence is probably due to his recovery technique or lack thereof. Apparently no bone sample other than burials were observed or collected.

There are no accounts from the Marianas which specifically identify weaving or the implements used. However, the general form is similar to weaving implements elsewhere in Micronesia (i.e. Kapingamarangi - Buck 1950).

Seventy-nine whole and fragmentary specimens were collected at Pagat; all came from Horizon I. All are made from bone but positive generic identification is not possible since most specimens are highly polished splinters. Given the lack of land mammals in the Marianas and the length of these implements, the possible sources can be narrowed to human, turtle and/or cetaceans.

Most implements are fragments, only two complete specimens were found. The total sample consists of a minimum number of 33 implements, calculated from tip fragments.

All of the tip fragments were observed under a low power (12x) microscope to detect wear. All specimens exhibited a general rounding and polishing restricted to the tip, extending down the sides no more than 2-3mm. There was no wear observed which would refute the assumption that these implements were used in weaving.

Needles/Awls

Two complete specimens (22-315; 22-1182) show the complete morphology and all fragments appear to conform to this general shape. These implements are long, narrow, and thin pieces of polished bone which are perforated at one end (base) (Figure B-10). The tip is often twice as thick than as the base and is usually round in cross-section. Some specimens have a slight curvature of the tip. The base tends more towards flattened elliptical in section and rounded or pointed. When a break occurs along the perforation the resulting fragments may appear as a tip fragment (Figure B-11) with a shortened body and has previously been identified as such (e.g. Reinman 1977: Fig. 41q). However, it appears (from the lack of wear polish) that none of these fragments were used after breakage.

Pin

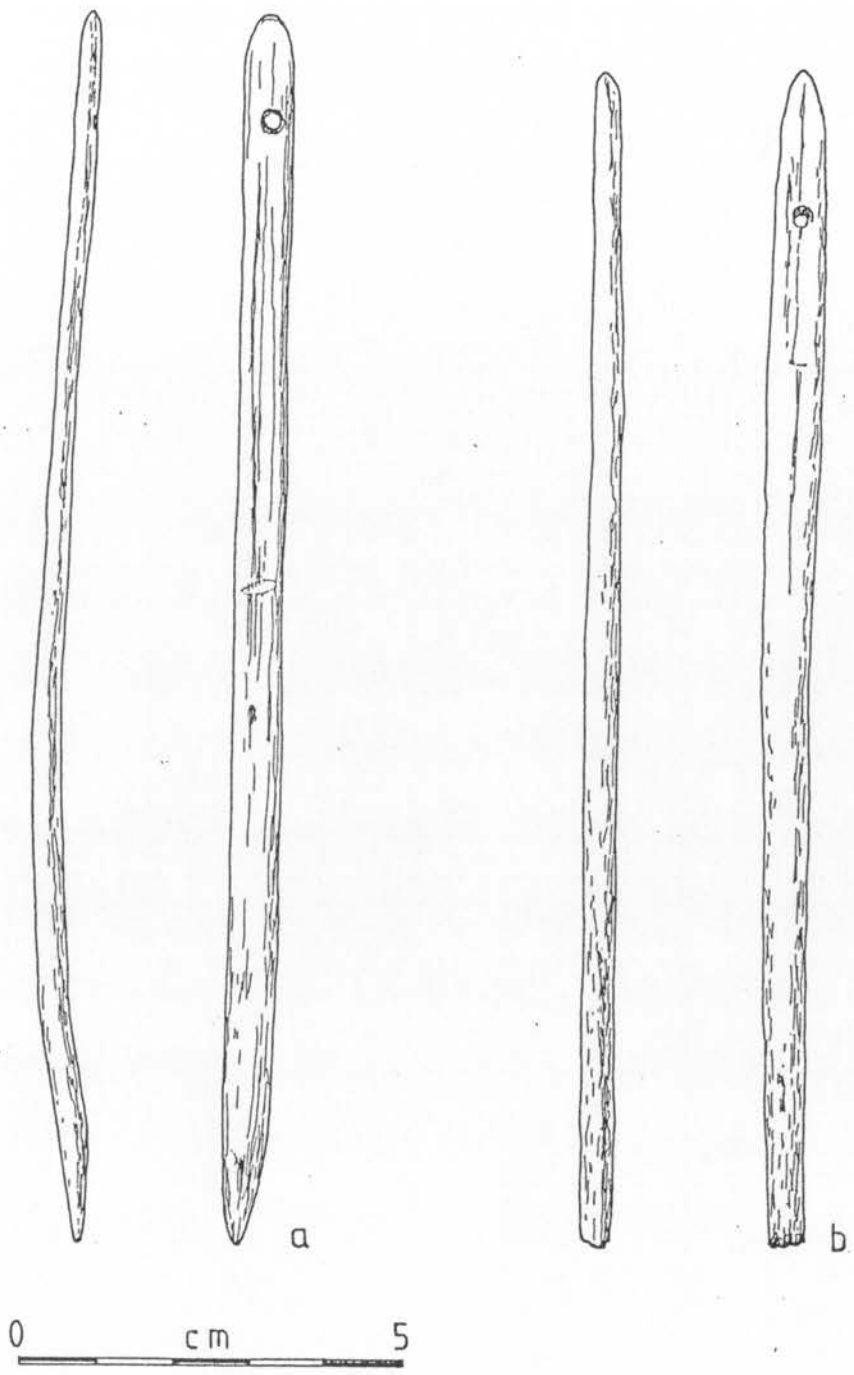
A single, completely polished specimen was recovered. It differs from the above group in that it is ground to a very thin, sharp point and contains a series of narrow (1mm) grooves cut along the body (Figure B-12). Whether this short piece represents a complete implement or a tip fragment of a larger specimen is unknown.

Adzes

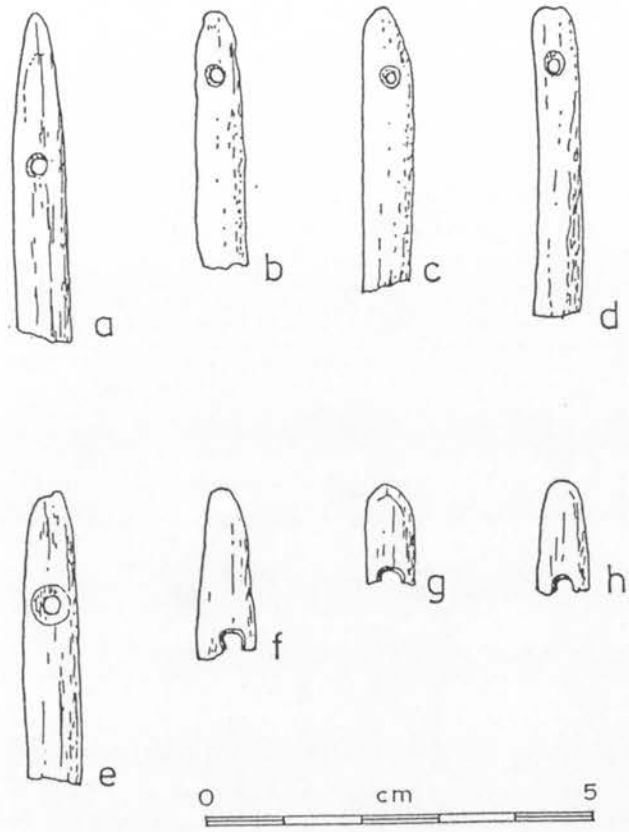
Until recently, adze typologies created in the Marianas initially separated classes of adzes based upon source material and then sought formal types within these classes. Reanalysis of some of these samples have shown that adze forms often cross cut source material (Craib 1977) and this approach has proved useful elsewhere in the Marianas (Ray 1981).

Unfortunately, adzes have proved to be poor temporal markers in the Marianas. As Ray (1981:196) points out, all the basic adze forms have been found throughout the Marianas sequence.

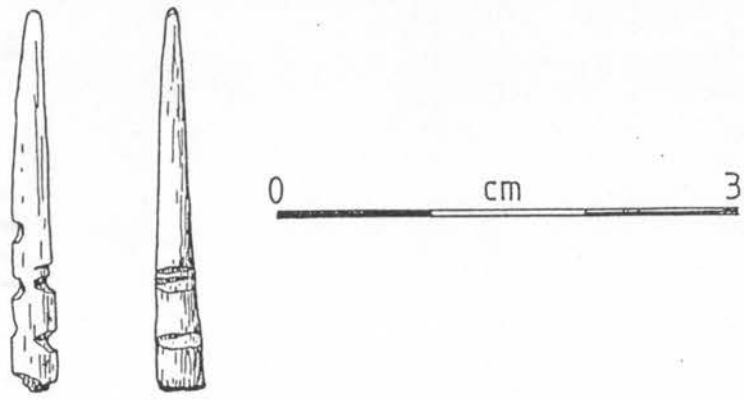
The analysis of adzes in this section involves the construction of morphological types. While the sample of whole adzes from Pagat



B-10 Thatching/Weaving Implements



B-11 Thatching/Weaving Implements - Fragments



B-12 Bone Pin

is small (n=14), nearly all finished fragments can also be typed. The process of creating formal types will be discussed below.

One hundred and thirty-four adzes of various form, source material, and stages of manufacture were recovered from Pagat. Most (65%) were collected during the surface collection (Table B-2). Nearly all (96%) of the subsurface specimens were found in the top 30 cm of Layer I (Table B-3).

Material

Shell and stone adze blades comprise the Pagat sample. Stone blades are relatively rare (Table B-4). The ratio of finished shell to stone adzes is 9:1 (Table B-5). Whether this reflects the relative frequencies in use at Pagat during occupation or is a product of curation processes is presently unclear. However, most archaeological reports from the Marianas describe more shell than stone adzes.

The only exception to this pattern is found in the Hornbostel collection and may reflect the more haphazard collection methods he employed. Given the large amount of stone blades in his collection it may also show why so few stone blades have been found subsequently!

The stone is basalt, varying from andesite to olivine in composition. Most of the blades are made from fairly coarse-grained stone which contrasts significantly with the chipped stone artefacts. While the source of the basalt is presently unknown it is possible that both basalt types came from Mt. Santa Rosa about 5 kilometres northwest of Pagat.

Tridacna spp. and Terebra maculata comprise the shell source material at the site. The species of Tridacna probably include maxima and squamosa, obtained from the immediate environs of the site. Unlike most other areas of Micronesia which utilise Tridacna in adze manufacture, the Chamorros used only the outer portion of the valve. Only in two instances are hinge adzes represented in the Marianas (Moore 1983).

Terebra maculata is not found along the northeastern coast of Guam. In fact, it appears to be rare in many areas around the island

Table B-2 Adze Provenience

	n	%
Surface	87	65
Layer I	45	33
Layer II	2	1
	134	99

Table B-3 Adze: Subsurface Distribution

	n	%
Layer I		
0-30 cm	33	69
30-60 cm	12	25
Layer II		
60+ cm	3	6
	48	100

Table B-4 Adze: Source Material

	n	Finished	Unfinished
Stone	23	7	16
Shell	122	64	58
	145	71	74

Table B-5 Shell:Stone Adze Ratio

	Shell:stone	
Pagat	64:7	9:1
Thompson 1932	950:1634	1:2
Spoehr 1957	48:21	2:1
Takayama & Egami 1971	8:2	3:1
Reinman 1977	45:17	3:1

(Stojkovich 1977). This may account for the fact that this material generally makes up only a small portion of any adze sample in the Marianas.

Shell Adze Manufacture

Lithic analysis , from microscopic wear analysis to replicative studies, has received considerable attention in the last few decades. Much of the analysis has provided significant data regarding the manufacture and use of stone tools. Studies of adze quarrying and manufacture have proved instructive (e.g Cleghorn 1982). Yet virtually no attention has been given to the manufacturing process of shell adzes.(Brief summaries are provided by Kirch & Rosendahl 1973 and Kirch & Yen 1982). Only a single article on experimental fracturing of Tridacna has been published (Cleghorn 1977).

Very little ethnographic data from Oceania is available on the manufacturing of shell adzes. Shell was rapidly dropped with the introduction of metal into the Pacific beginning in the sixteenth century. It is commonly stated in the Südsee volumes that though shell specimens can still be found, adzes were all of metal and that the knowledge of shell adze making had been lost. An important exception was Kubary's brief description of adze making in Nukuoro (cited in Davidson 1971).

> The large Tridacna shells are divided by means of the pumice stone (te honana) into smaller pieces and are then ground into the desired shape ...Thanks to the abundance of cast away pumice stone the Nukuoro shell axes are distinguished by a sharp cutting edge and a consummate polish.

Various manufacturing stages are represented in the Pagat sample. In fact, there is nearly a one-to-one ratio between finished and unfinished blades. Unfinished blades of Tridacna predominate the sample (78%). No unfinished Terebra were found.

Generally, the unfinished adzes are given short mention and then largely neglected in favor of the 'more important' finished adzes containing all or most of the morphological attributes used in

creating a formal typology. In this section Technological types will be identified in an attempt to describe the manufacturing process involved in adze making.

Lithic analysis provides numerous technological and descriptive terms for reduction sequences and, although precision of definition may vary between authors, there is a core of accepted terms. The usage of terms in the study generally conform to the accepted usage in lithic analysis. Mention will be made where it differs.

The roughout-blank-preform-product continuum can also be demonstrated in the reduction sequence of adzes made from the dorsal portion of Tridacna valves. The only modification to this sequence would be the elimination of the 'blank' stage. If, by strict definition, a blank is a preliminary stage where the final product still remains undefined (e.g. Crabtree 1972:42), then it technically cannot exist in the adze sequence in that, most often, even roughouts have the basic adze outline immediately upon its removal from the valve.

Because this process is a continuum, the identification of stages is subject to great variability. Using Kubary's model, two basic stages are involved: 1) fracturing of the Tridacna valve; 2) grinding of the fragments into shape. Since he makes no distinction between the hinge and dorsal portion of the Tridacna it is a bit unclear whether he is describing both. The sequence suggested in the Pagat sample is somewhat more involved.

This proposed reduction sequence was developed in a fashion which worked backwards from the finished product; all finished adzes were examined for technological variables (Table B-6) and any consistent co-variations of these. Additional variables were observed on the unfinished specimens and a list of technological variables was constructed (Table B-6).

Roughouts

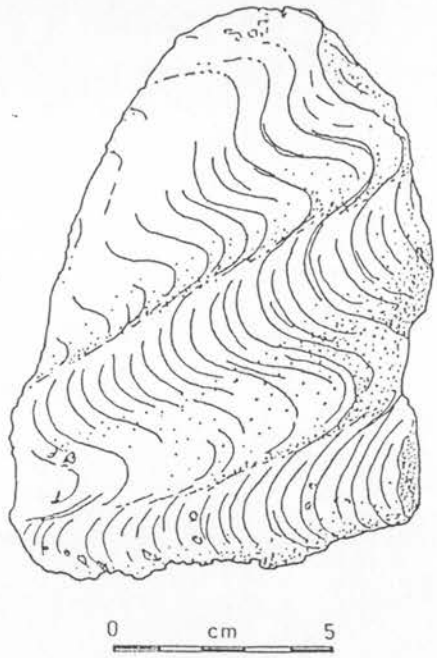
These pieces had relatively few recognisable technological variables present and were identified primarily because of their size (Table B-7) and the portion of the shell they represent (Figure B-13). It was found that all Tridacna adzes in the Pagat sample came

Table B-6 Technological Attributes -
Tridacna Adzes

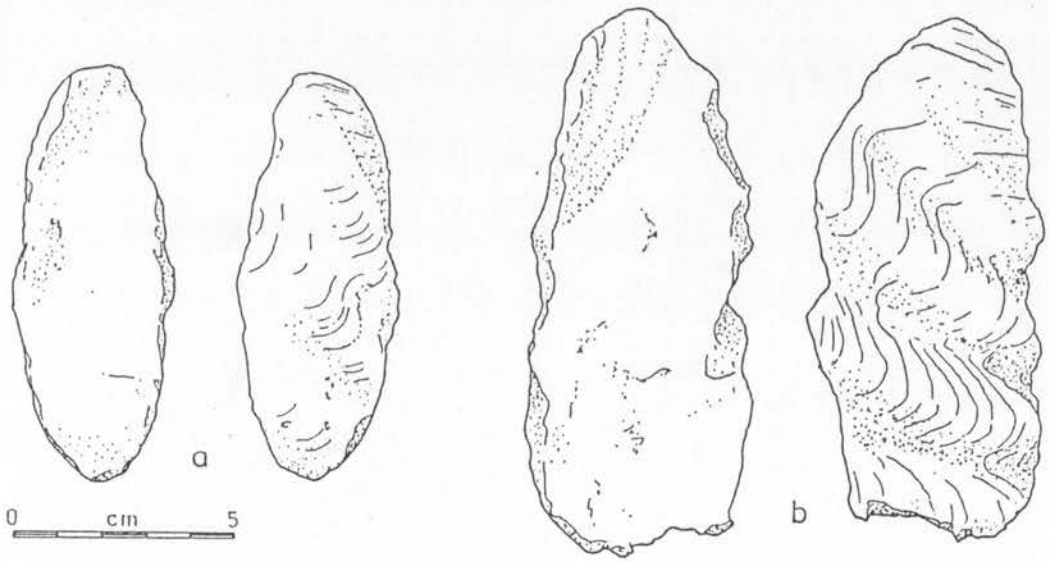
1.0 Grinding
1.1 sides
1.2 back
1.3 front
2.0 Beveling/Grinding of Cutting Edge
3.0 Flake Scars
4.0 Poll Shaping

Stage	n	Grinding 1	2	3	Beveling	Flake Scars	Poll Shaping
Roughout	8	-	-	-	--	--	--
Rough Preform	32	-	-	-	--	+	+
Fine Preform	23	^	+	-	^	^	+
Finished Adze	53	+	+	^	+	_	+

- absent
^ variable
+ present



B-13 Adze Roughout



B-14 Adze - Rough Preform

from the dorsal posterior (as defined by Rosenwater 1965) quarter of the valve. This was determined by examining all shell pieces for specific landmarks. Because of this apparent pattern it should be possible to distinguish between roughouts and shell debitage.

Table B-7 Adze Roughout Dimensions

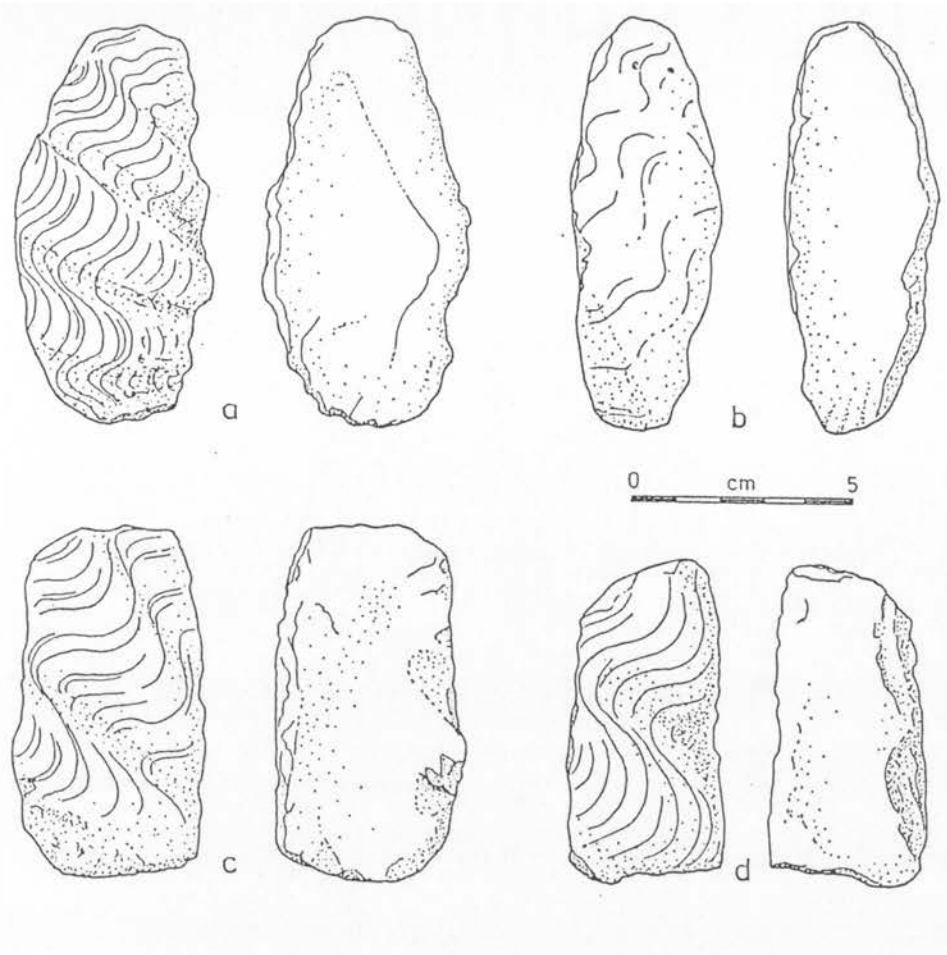
Catalog Number	L	W	TH	L/W
P82-108	121	46	9	2.63
P82-1084	106	49	12	2.16
P82-1170	121	78	12	1.55
P82-1242	110	60	11	1.83
$\bar{X}$	114	58	11	2.04
s	7.7	14.8	1.2	0.5

While, in a very strict sense, this process is a reduction sequence, it is not as three-dimensional as implied in lithic analysis; there is no thinning process since the natural thickness of the Tridacna places severe limits on this variable. As will be seen, in all phases of the sequence there is a consistency in thickness which is directly related to the natural morphology of the shell. However, an overall reduction of the size (L/W) of the shell pieces is exhibited.

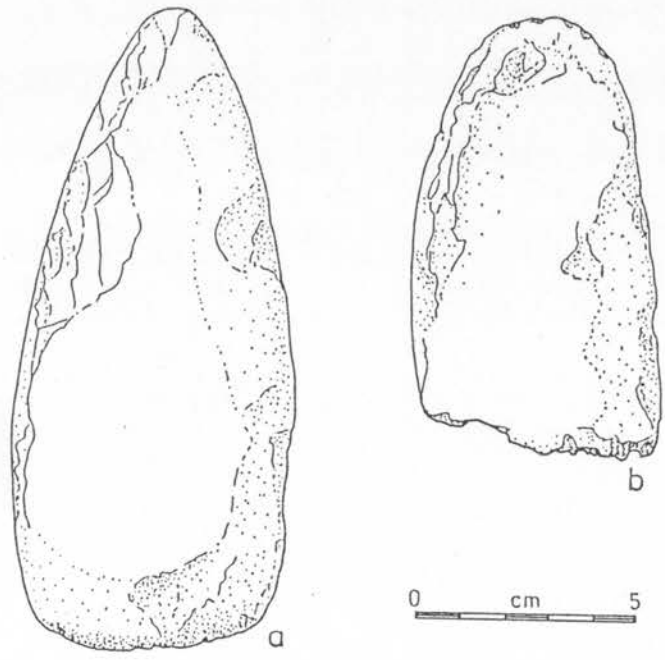
Rough Preforms

These pieces are characterised by a series of flake scars on the interior face of the shell which represents the process of shaping the poll and straightening the sides (in outline) (Figure B-14a-b, B-15a-d). As a result, they show a general decrease in size and more definite shape then the roughouts (Tables B-8, B-9). Thus these are preforms since we can distinguish between the triangular and rectangular outlines which continue to distinguish the final adze types (see below).

The pattern and morphology of flake scars suggest they were the result of direct percussion occurring on the exterior edge of the



B-15 Adze - Rough Preform



B-16 Adze - Fine Preform

Table B-8 Rough Preform Dimensions - Triangular

Catalog Number	L	W	TH	L/W
22-18	-	44	11	-
22-32	-	50	10	-
22-60	88	49	9	2.2
22-212	105	58	14	1.8
22-368	-	58	12	-
22-749	-	51	13	-
22-750	-	54	14	-
P82-74	80	36	6	2.2
P82-298	111	48	11	2.3
P82-427	-	43	11	-
P82-550	132	56	12	2.3
P82-1103	-	46	13	-
P82-1596	100	55	13	1.8
P82-1775	-	48	10	-
P82-1797	77	54	10	1.4
P82-1922	-	49	12	-
P82-1935	102	45	14	2.3
P82-2007	-	50	12	-
P82-2008	-	53	12	-
P82-2095	-	-	10	-
P82-2289	-	42	14	-
$\bar{X}$	99.4	48.9	11.7	2.0
s	17.9	6.3	2.0	0.3
n	8	19	20	8

Table B-9 Rough Preform Dimensions: Rectangular

Catalog Number	L	W	TH	L/W
#1	85	24	9	3.54
#2	78	35	11	2.23
#5	72	32	12	2.25
22-39	98	45	9	2.18
P82-124	70	29	12	2.41
P82-426	95	37	7	2.57
P82-634	81	40	11	2.03
P82-1503	92	44	9	2.09
$\bar{X}$	83.9	35.7	10.0	2.41
s	10.5	7.3	1.8	0.5
n	8	8	8	8

shell. Only primary flake scars were observed and it is unlikely that any secondary flaking would be performed in this sequence.

Fine Preforms

This stage is differentiated from the preceding one by the initial appearance of grinding. By the end of the rough preform stage the general shape and size of the adze has been formed by flaking. The remainder of the manufacturing process now involves grinding of the back, sides, occasionally the front, and bevel, respectively.

The fine preforms exhibit more variety of technological variables than any other stage (Table B-6); flake scars, ground back and sides can be observed on some specimens (Figure B-16a-b). Grinding of the adze back appears to be done as much to remove the irregular surface created by flake scars as an attempt to straighten the natural morphology of the shell. The sides begin to be ground and may be completely finished during this stage. The preparation of the bevel is begun and the shape of the edge is suggested but any grinding or straightening of the bevel is absent. The last production activity involves the grinding/shaping of the bevel.

Formal Typology

The formulation of adze typologies for the Marianas has been done largely on an ad hoc basis with few attempts to create a single, integrated classification (cf. Ray 1981). Thus we have numerous schemes to choose from (Table B-10). Part of the problem is due to the initial sorting of stone and shell blades prior to the creation of formal types. This practice still occurs (e.g. Kirch & Yen 1983) though source material has been shown to cross-cut morphological types (Craib 1977). Unfortunately, appropriate nonmenclature for Marianas or Micronesia adzes has yet to be consolidated and thus adzes in this thesis will be referred to by descriptive terms.

Table B-10 Adze Terminology Concordance

Type Name	Thompson(1932)	Spoehr(1957)	Reinman(1977)	Ray(1981)	Craib(1977)
Triangular	1	1	Triangular	VI a&b	1A
Rectangular A	2(shell)	1(shell)	Quadrangular	VII	1B
Rectangular B					
Circular	1(stone)	1(stone)	1	I	8
Quadrangular	2(stone)	2(stone)	2	IIIb	9
Plano-convex	**	**	**	**	5&6

** Illustrated but not included in adze typology.

Triangular

All blades of this type were made from the dorsal portion of Tridacna spp. This is the most common material for this type of adze. In fact, this is the most common shell adze form in the Pacific.

Seven whole, finished Triangular adzes were collected though broken blades of this type were the most numerous in the adze sample. This type is characterised by a triangular to trapezoidal outline, dependent upon the configuration of the poll (Figure B-17a,c,f,g). The cutting edge is straight to slightly curved. Grinding occurs along the bevel, usually on the back, and occasionally to flatten the sides. Grinding along the sides exhibits the most variability. The front of the adze had little if any grinding and usually exhibits the natural striations (ribs) of the the Tridacna valve. There is no consistent size class of these adzes though there does seem to be consistency in the relative dimensions, suggesting that if resharpening is occurring, it involves more than just regrinding of the bevel.

Rectangular A

This adze type is similar to the Triangular in most dimensions and is also manufactured from the outer portion of Tridacna except that it varies from it in outline which is consistently rectangular. The corners or the poll are distinct and shaped suggesting that these forms are not simply ends of a continuum (Figure B-17 b,d,e,h). Additionally, the shape of the cutting edge is more variable in this type than among Triangular adzes, with the former exhibiting a more wide curved rather than straight edge bit.

Rectangular B

This adze form appears to be unique to the Marianas (Craib 1977). Manufactured from the dorsal portion of the Tridacna spp. it differs from Triangular adzes in its rectangular outline and from Rectangular B in its diminutive size (Figure B-18). Given the

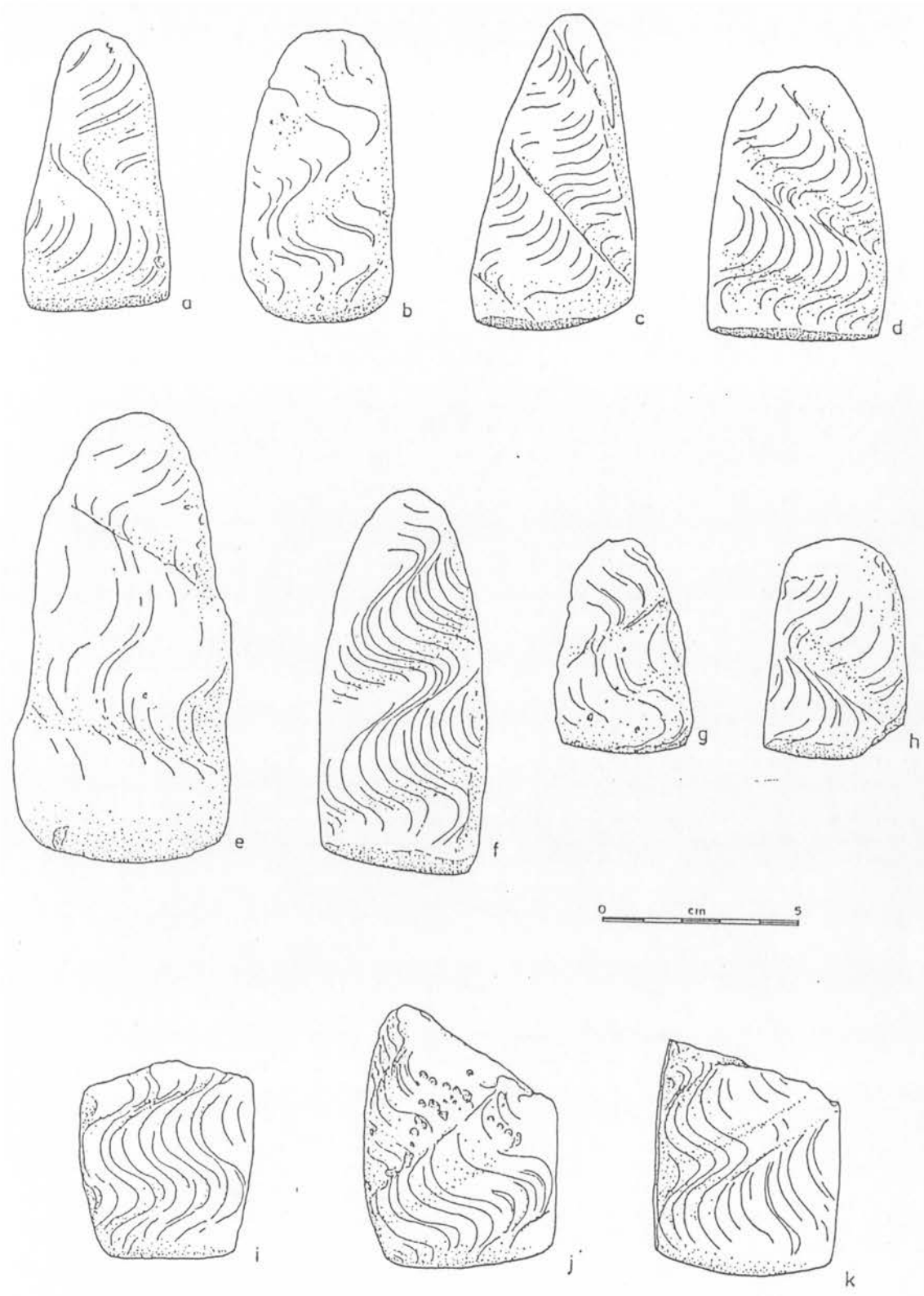
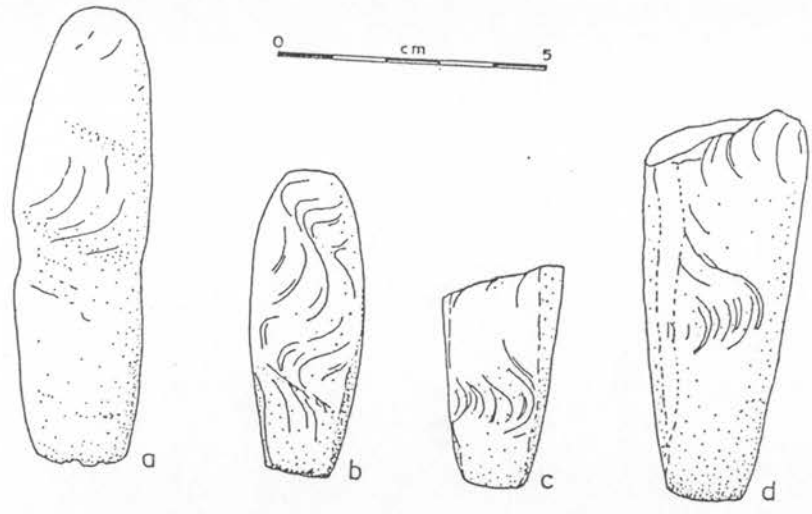
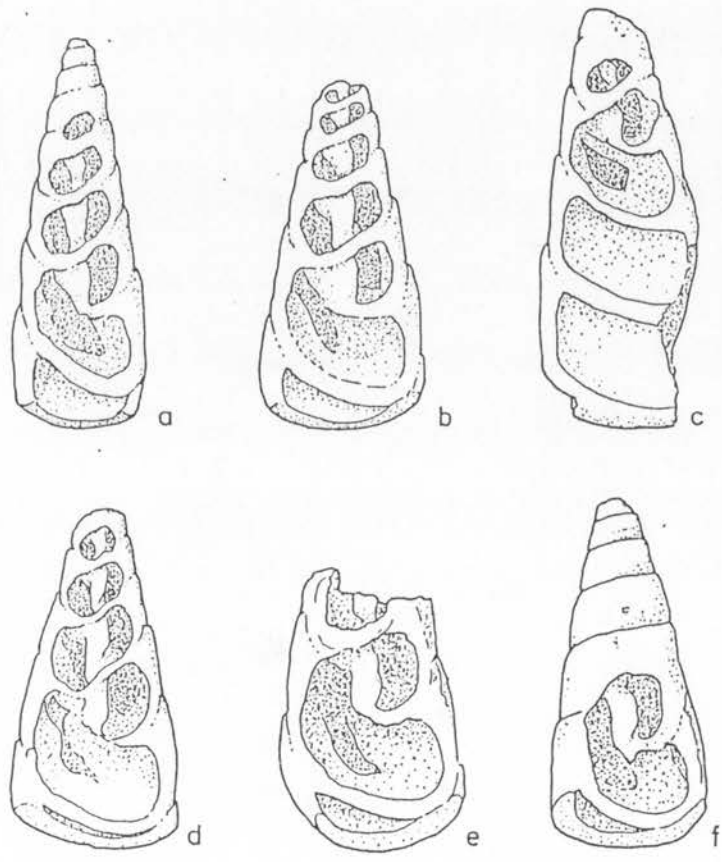


Figure B-17 Finished Adzes
Triangular (a,c,f,g)
Rectangular A (b,d,e,h)



B-18 Rectangular B Adzes



B-19 Planoconvex Adzes

reduction in size of all morphological variables, these specimens cannot represent smaller, resharpened Rectangular A blades. A striking feature of these blades is the narrow cutting edge (X=14.0±2.9mm). Except for the size, these adzes are similar to most dorsal Tridacna adzes in manufacturing sequence, portion of shell used, minimal grinding and uniform thickness.

Planoconvex

This adze form is represented at Pagat by seven blades made from Terebra maculata. Elsewhere in western Micronesia this type is also made from the heel of Cassis cornuta (Craib 1980) and the hinge of Tridacna gigas (Craib 1977). No stone specimens of this type have been described from Micronesia.

This adze is characterized by its thick, plano-convex cross-section and U-curved cutting edge (Figure B-19). All adzes made from Terebra fall into this type largely as the result of the limitations of the natural morphology of the shell.

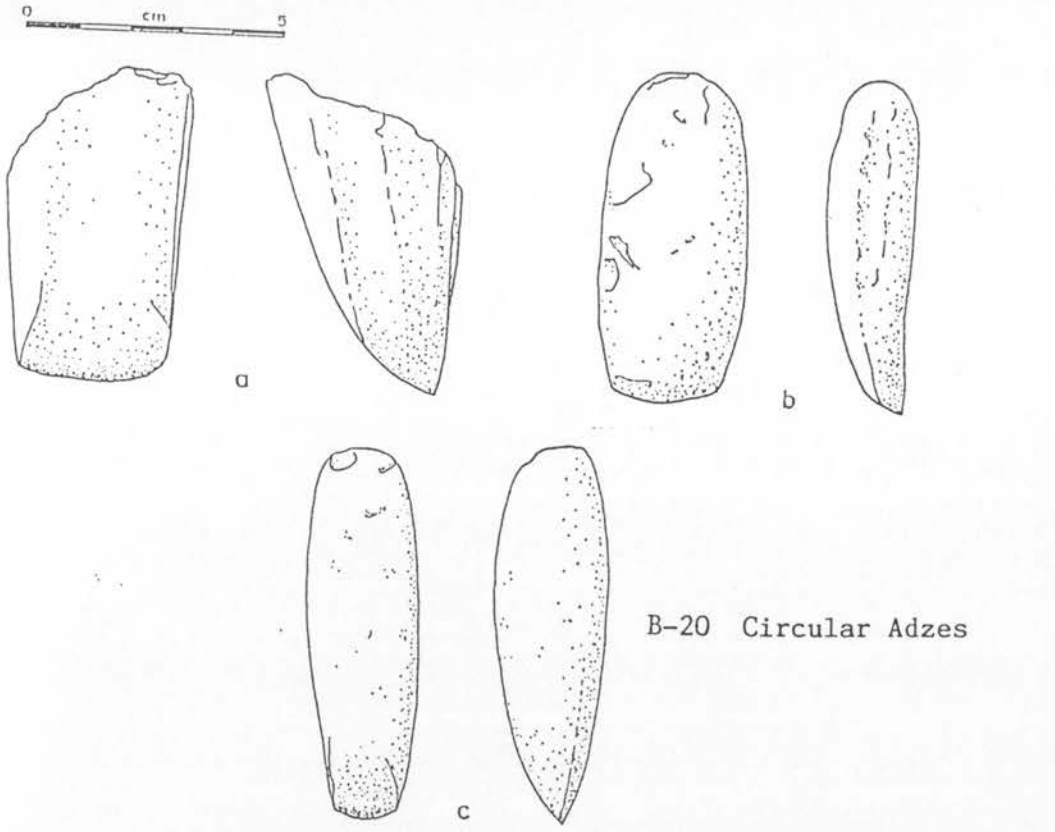
Nearly all metric attributes of the Terebra adzes are limited by the natural morphology of the shell. There is usually no apparent selection for specifically sized shell (Craib 1977) though the Pagat sample, admittedly small, is consistent with the single exception of the large specimen (22-59). If this adze is excluded, the variation in most attributes is slight.

Only three specimens were found in subsurface contexts, all in Layer I and less than 30 cm deep.

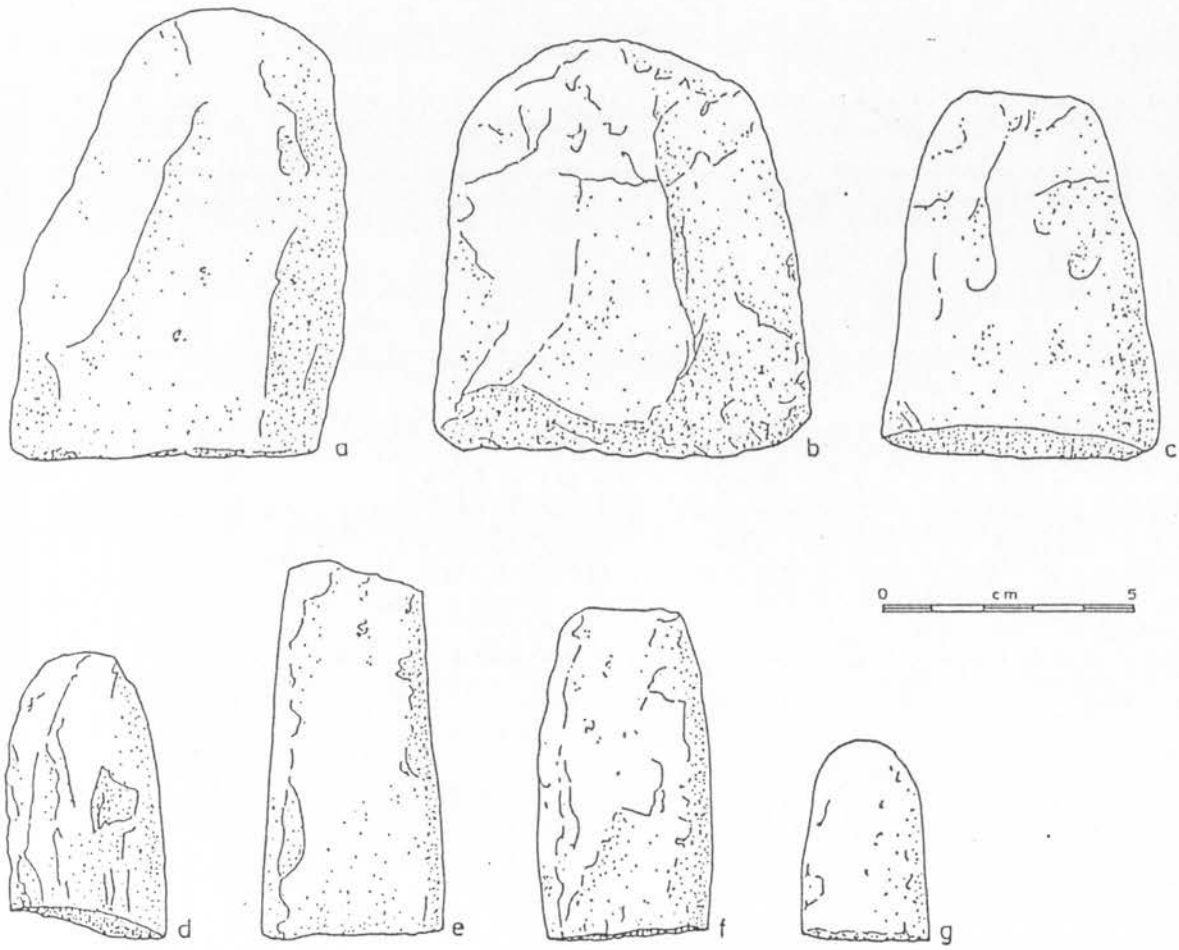
Circular

This type is unique, within Micronesia, to the Marianas (Craib 1977). It is characterised by a circular cross section. The cutting edge varies from wide curve to U-curve (Figure B-20 a-c). In the Spoehr and Reinman samples, all morphological variables of this type are consistent between blades with the exception of length. Craib (1977) has suggested that this was due to resharpening.

The single, whole blade from Pagat (P82-1000) (B-20c) is significantly smaller in all dimensions than the above samples.



B-20 Circular Adzes



B-21 Quadrangular Adzes

Its overall diminutive size (L-75mm; W-22; TH-15) suggests it forms a smaller subtype of circular adzes rather than representing a resharpened and/or reformed larger adze.

In addition to the whole, finished blade, two finished fragments were recovered; a poll fragment (P82-1984) and an edge portion (TP F-1). Both of these fragments represent the larger classes of Type 3 adzes.

Quadrangular

This adze form is represented in the Pagat sample by four finished (though broken) blades and 16 preforms. All examples of the quadrangular adze were made of basalt (Figure 21a-g).

Chipped Stone

The Marianas are unique in Micronesia as an area of substantial use of stone as artefactual material. This is generally recognised in the use of basalt for adzes, mortars and pestles, yet it is becoming clear than an extensive chipped stone industry existed as well, at least during the late prehistoric period (Craib 1983d). While chipped stone implements and debitage appear in nearly all excavated sites, it is a largely overlooked component of assemblages. It has been suggested by McCoy (1982) that the manufacture and use of small, amorphous flakes is widespread but overlooked in the Pacific and may be part of a Pan Oceanic small-tool tradition.

Only a single reference to the use of stone tools (other than adzes and mortars) is found in the ethnohistoric literature. Zamora relates a second-hand account of the butchering of fish where a 'flint (pedernal) knife' was used. No more details of the implement are given. Zamora went on to state that 'now [1596] they all use iron [knives].' While this may be an exaggeration it indicates that the use of metal was apparently already quite common in the Marianas, less than a century after contact.

Nearly 800 pieces of chipped stone were recovered from Pagat. Since there is little formal patterning among this artefact class,

there is no clear distinction between tools and debitage. Flakes were struck by direct percussion from cores in order to 1) reduce cores into suitable forms for use as tools; 2) to produce specifically shaped cutting edges; 3) to produce flakes with appropriate edges. From the presence of cores, finished and partially finished tools, and a large amount of debitage, it appears as if most stages of manufacturing are represented at Pagat.

Despite the descriptions in earlier reports (e.g. Dilatush 1950; Spoehr 1957), there does not appear to be any evidence of edge retouch in the Marianas assemblage. It is difficult to determine from the photographs and illustrations these authors provide whether the specimens they describe are, in fact, retouched. However, none of the specimens in the extensive Pagat sample are retouched though some exhibit use-wear or possibly core preparation scars which give the appearance of edge retouch. This probably what the earlier reports are describing.

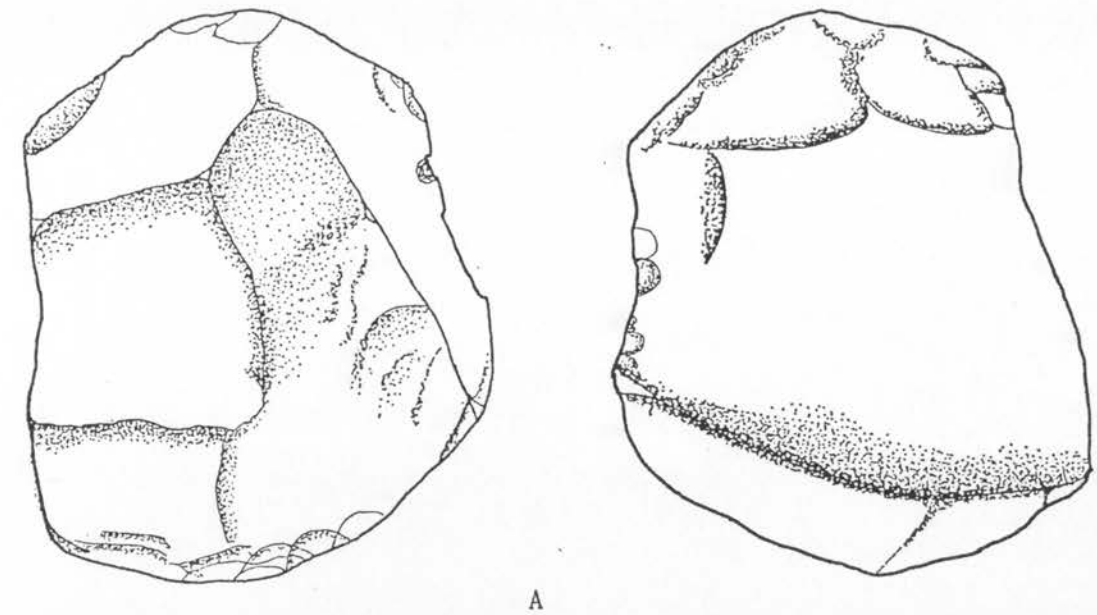
There is little variation in source material from Pagat. Basalt predominates the sample (99%) with local chert/chalcedony forming the remainder. The basalt is largely fine-grained olivine which has not apparent sources in northern Guam but is commonly found in the south. The chalcedony is siliceous stone which is known to occur in the older, uplifted marine limestone and is likely to have been collected in the environs of Pagat.

There is little formal patterning among the chipped stone. The closest to a morphological type are the 'circular scrapers', previously defined and described by Spoehr (1957) and Reinman (1977). These are bifacially flaked large flakes with a circular, convex edge. All other tools are defined by the presence of use-wear and have no consistent shape.

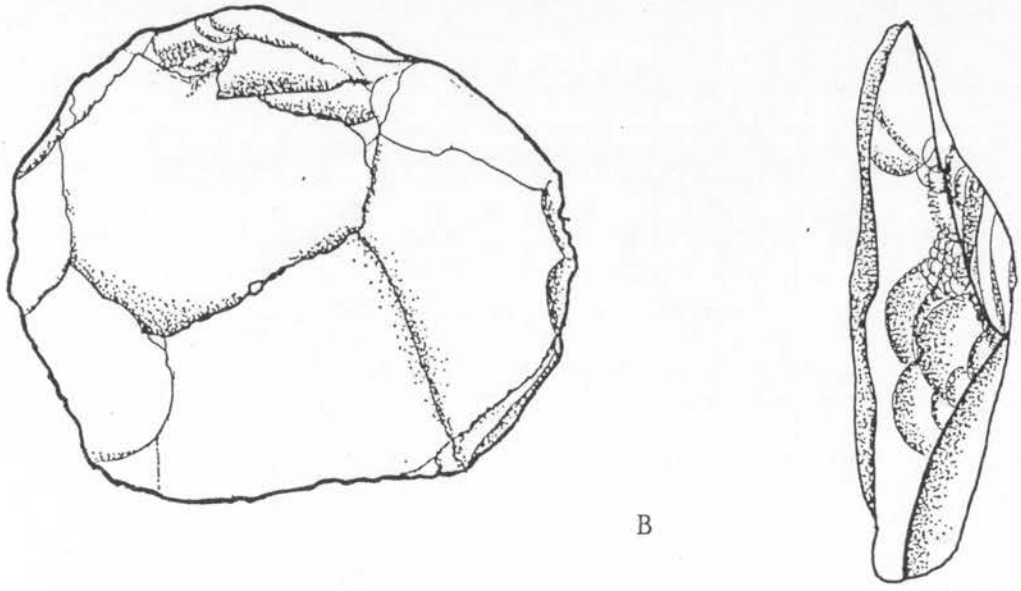
Circular Scrapers

There are large flakes, roughly circular in shape (Figure B-22a-b). While a few specimens look as if they were purposefully shaped, most others look as if they were selected specifically for their edge shape. All (n=15) were made from basalt.

While the shape is relatively consistent there is much variation

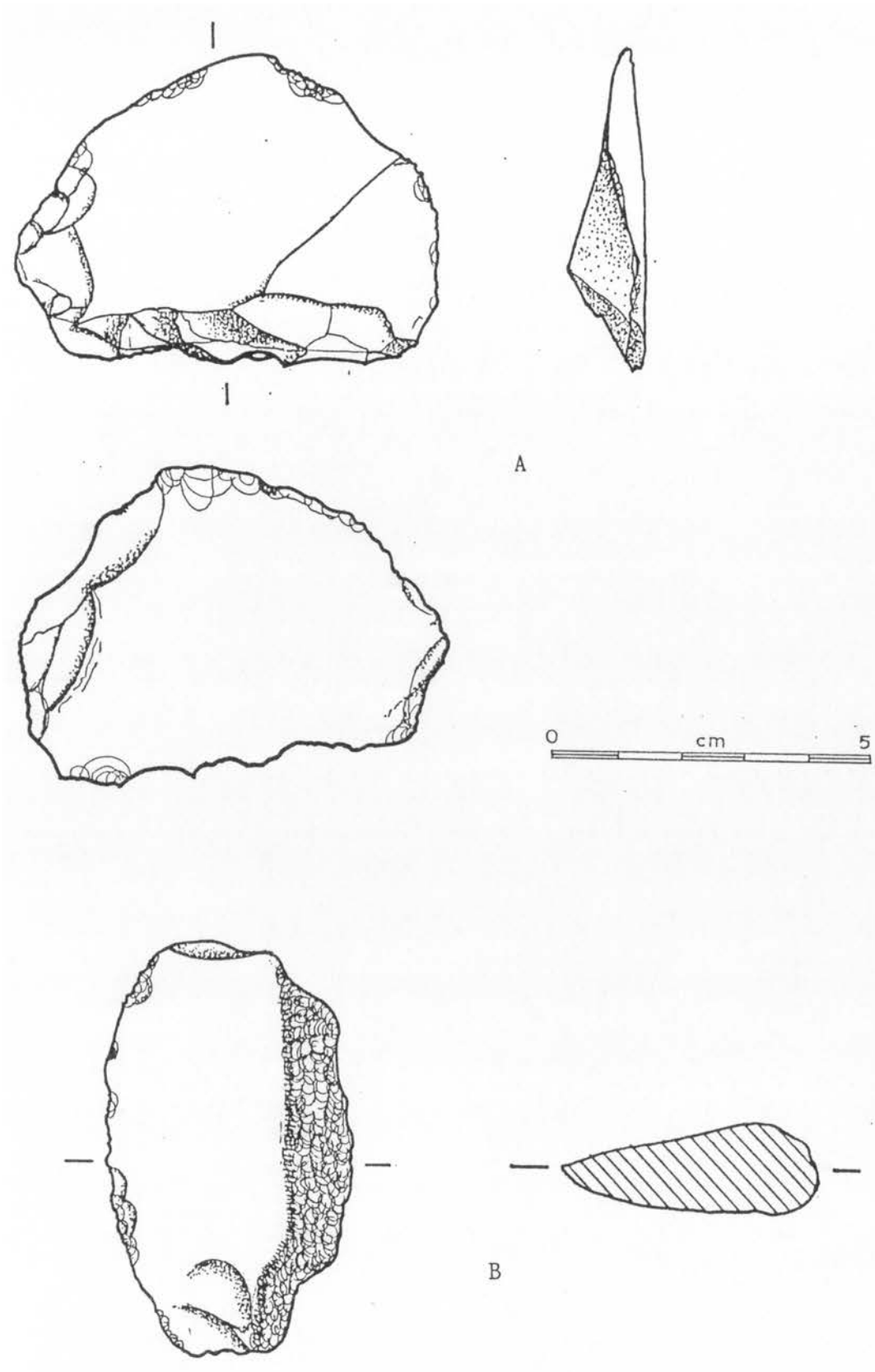


A



B

B-22 Circular Scrapers



B-23 Stone Knives

in size (Table B-11). All edges are rather thick (X= 10 mm) and exhibit a moderate (X=30 deg) edge angle. Wear on these pieces appears consistent; a rounding/slight polish along most of the edge. The wear is limited to the edge itself not extending along either side. Given the wedge-like appearance of some of these specimens, they were examined for possible evidence of use in this fashion. No crushing along the top was observed nor striations which would be expected to occur along both sides on the cutting edge. It is most likely that these implements were used in a cutting/scraping fashion in a relatively soft media (e.g. wood, fiber).

Knives

A small number (n=7) of stone flakes exhibited a long straight low-angled edge with some evidence of chipping wear (Figure B-23a-b). These were designated as knives.

Amorphous Pieces

The ones identified here are large, heavy cores and large flakes. None display any shaping but all have rounding/polishing use-wear similar to the circular scrapers. All are made of basalt.

Weapons

This class of artefacts is mentioned frequently (if little detailed) in early Spanish accounts. Numerous authors (Pigafetta 1521; Loyasa 1526; Garcia 1668) describe two types of weapons - slingstones and bone-tipped spears. The latter are further described as being made from human and/or fish bone.

Slingstones

Generally, slingstones are not found in large quantities within village sites but rather large caches have been recorded from various strategic (i.e. defensive) localities (Thompson 1932; Dilatush 1950; Ray pers. comm.). These caches have been found to

Table B-11 Circular Scraper Dimensions

Catalog Number	L	W	TH	WT.
#1	83	81	33	22.5
#2	86	77	22	20.6
#3	72	72	35	23.1
P82-56	79	69	29	20.6
P82-263	160	--	23	38.6
P82-291	87	71	19	16.8
P82-342	72	72	25	24.5
P82-415	80	73	22	13.5
P82-435	67	60	21	11.7
P82-506	76	66	31	15.7
P82-583	57	52	23	7.8
P82-664	95	80	22	21.7
P82-1088	70	53	34	16.1
P82-1127	112	100	29	16.3
P82-1173	88	67	22	16.8
P82-1221	86	78	20	18.3
P82-1946	78	75	22	12.3
P82-2131	62	55	31	10.4
P82-2195	113	98	24	29.0
P82-2251	92	81	36	45.3
22-650	60	53	20	18.8
$\overline{X}$	84.5	71.7	20.0	20.0
s	22.7	13.3	5.5	8.9
n	21	20	21	21

consist of groups of 12-40 slingstones. The Pagat sample consists of 13 specimens.

Based on Hornbostel's sample of nearly 5000 slingstones, Thompson (1932) created a typology based largely upon body form. Four types were described - 1) elongate body with circular cross-section; 2) elongate body with flattened cross-section; 3) double conical; 4) subspherical. It appears that these variations in body form may better reflect stages of manufacture and/or individual craftsmanship rather than discrete types.

Thompson states that slingstones made from basalt were rare and that most of Hornbostel's collection was made from limestone; exceptions to this vary according to local geology. The entire Pagat sample is limestone. Slingstones are relatively small, shaped pieces of stone (or, more rarely, baked clay) round in cross-section and tapered at each end (Figure B-24a-h).

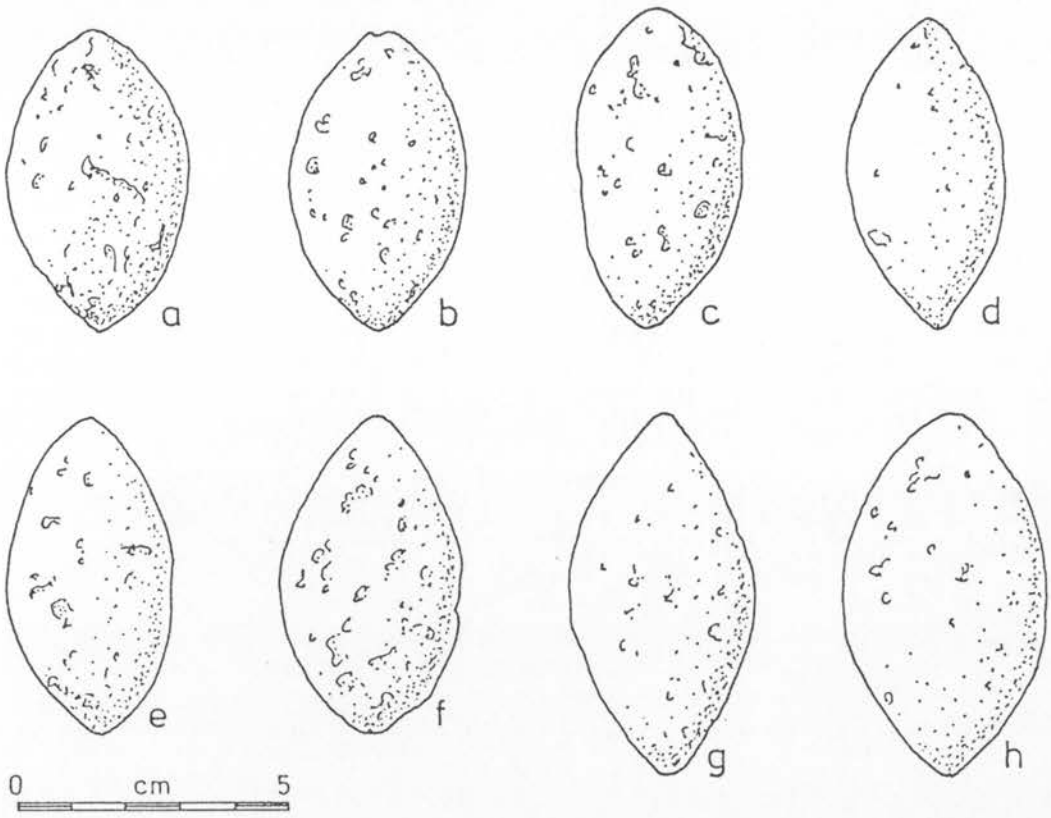
Spear Points

Pigafetta in 1521 (Skelton 1969) states that the Chamorro tipped their spears with points made of fish bone while Loyasa (1526-Burney [1803]) and Sanvitores (1668-70 - Plaza 1980)) comments that these tips were formed from human bone. Both sources may be correct although from the size (length and width) it seems more likely that most are fashioned from human bone.

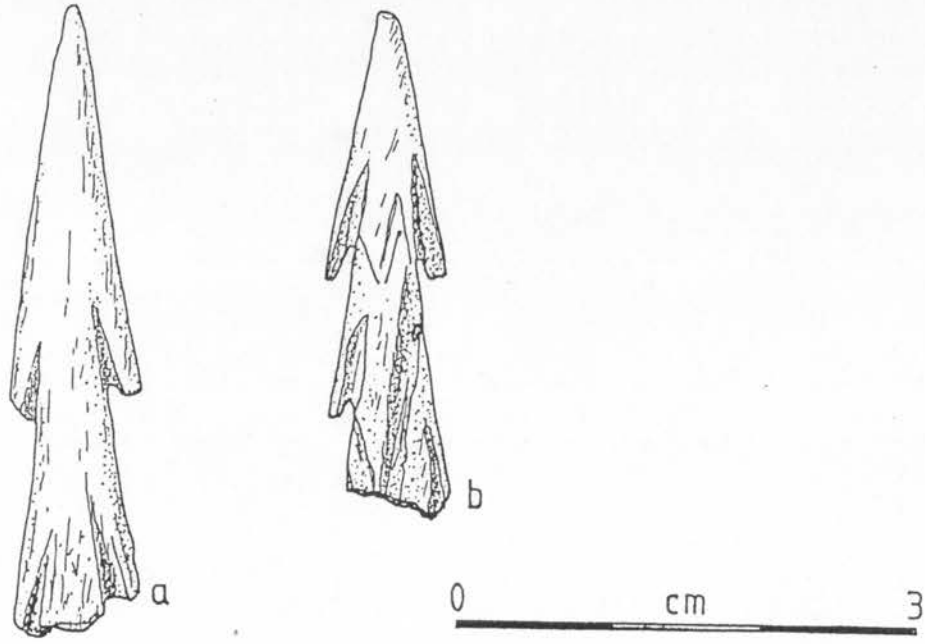
All of the Pagat sample is fragmentary but identified as spear points by the grooved notches which form barbs along one or both sides of the point. Thirteen pieces of bone exhibited this configuration. Two of these are tip ends while all other are body fragments; the bone is polished.

The two tip fragments (22-127;22-189) are narrow (X=12 mm) and have a series of barbs leading to a sharp point (Figure B-25). Most of the fragments appear as if they were finished and thus may represent discarded broken implements.

Both classes of artefacts have been described as weapons used in the skirmishes with the Spanish. Undoubtedly, these were also used in the internal warfare which was supposed to have characterised late Chamorro prehistory. It may also be that both types of weapons



B-24 Slingstones



B-25 Spear Points

were also used in hunting (i.e. flying foxes) and possibly for spearing fish (e.g Safford 1905; Freycinet 1829).

Ornaments

Previous attention to various forms of ornaments has been cursory, owing to the small sample recovered. General distinctions were based upon outline and/or source material. For example, Thompson (1932), describing 86 'perforated shells' differentiated between shell discs (further subdivided based upon shell genus) and 'crescent-shaped' objects (also of shell). Spoehr (1957) divided his sample of 16 ornaments into 'beads' and 'pendants' based upon the relative diameters of each specimen.

Ethnohistoric accounts of ornaments are rare and generally date well into the post-Contact period. Freycinet (1829) and von Kotzebue (1830) describe and/or illustrate long strings of turtle shell discs, similar to those found in the Carolines. No mention is given to marine mollusc beads or pendants.

Seventy-six specimens have been designated as ornaments. Seventeen percent of the sample were surface finds; virtually all (99%) excavated ornaments were from Layer I.

For the purposes of this discussion, the sample was divided into two major classes - beads and pendants. Beads are defined as centrally-drilled while pendants are perforated asymmetrically. The size and shape of the ornament is unimportant in making this initial division.

Marine shell is used for all of the ornaments in the Pagat sample. Spondylus spp. predominates, comprising 93% of the sample. Tridacna spp. is also present.

Pendants

Variation in source material is more pronounced among pendants than beads; shark's teeth and Spondylus and Tridacna shell were used. Each source material comprises a separate type, however the types are identified specifically by the pendant form and not the source material.

Tubular

This is a common pendant in archaeological assemblages in the Marianas (e.g. Thompson 1932; Spoehr 1957; Takayama & Egami 1971; Reinman 1977). Made from the hinge section of Tridacna (most probably maxima), these pendants are completely ground so that no natural shell striations are visible (Figure B-26A).

Four examples of this type were found at Pagat; two finished and two preforms. The preforms exhibits the general crescent shape of the pendant but still exhibit the striations of the outer shell and are significantly larger than the finished pieces.

Though variable in size, these pendants are uniform in shape; roughly crescentic in outline, each pendant exhibits a circular to oval cross-section. Each end is biconically drilled; the size of the perforations on each pendant was about 3 mm.

Though Spoehr has speculated that these may represent net weights the only context in which they have been found which suggests their function was reported by Fritz (1904). He notes a burial which had twelve of this type of pendant around its neck.

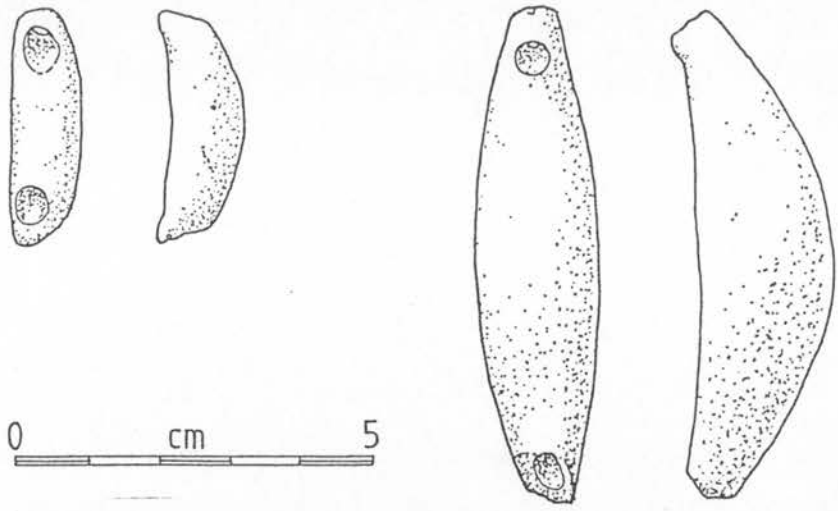
Oblong

These are made from Spondylus sp. and though variable in size, generally exhibits an oval outline with a length/width ratio of 3:1. Each of the three pendants of this type are perforated at one end and appear to be finished (Figure B-26B).

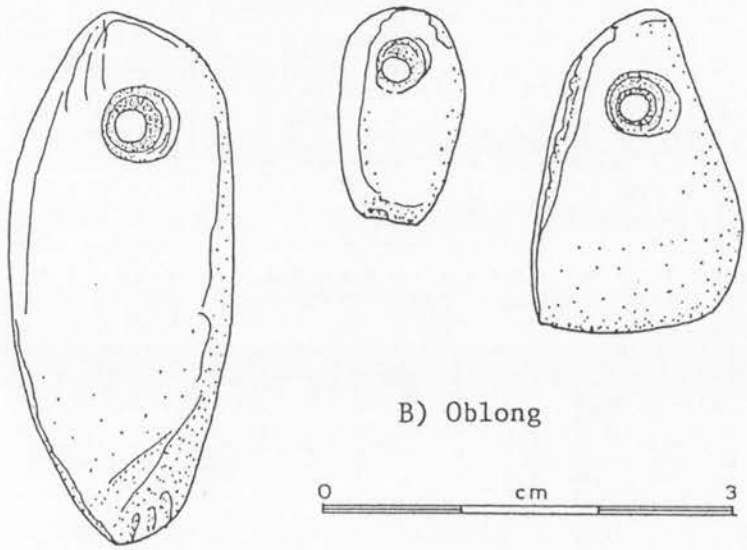
Shark's Teeth

There are no accounts of the use of shark's teeth in weaponry in the Marianas as there is from other parts of Micronesia (especially the Gilberts) and they are included here as ornaments.

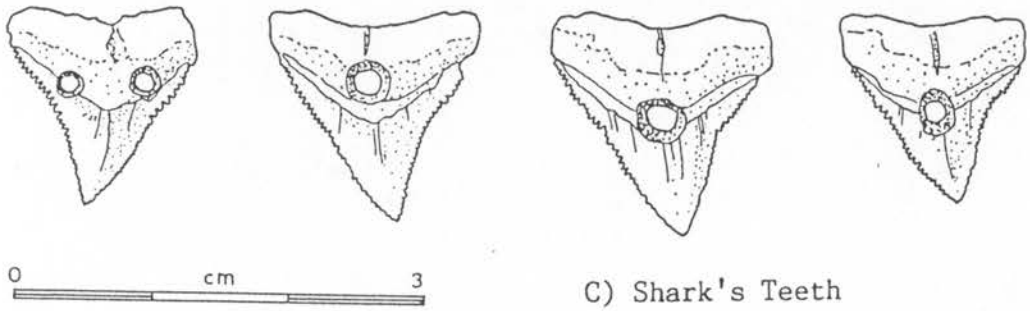
While the sample is admittedly small (n=4) these teeth are rather uniform in size (X=15 $\pm$ 0.82 mm) (Figure B-26C). Fourteen non-perforated shark's teeth were also collected but were much smaller (X=10$\pm$1.85 mm) and different in shape. From both ethnohistoric



A) Tubular



B) Oblong



C) Shark's Teeth

B-26 Pendants

accounts (Zamora) and faunal analysis (Appendix C), it appears that the Chamorro did not eat shark; these small, unperforated teeth may simply represent an unused portion of sharks' jaws.

Beads

Nearly all beads from Pagat are made from Spondylus sp. The presence of blanks (e.g. Figure B-27A) indicates that bead manufacture was occurring at the site.

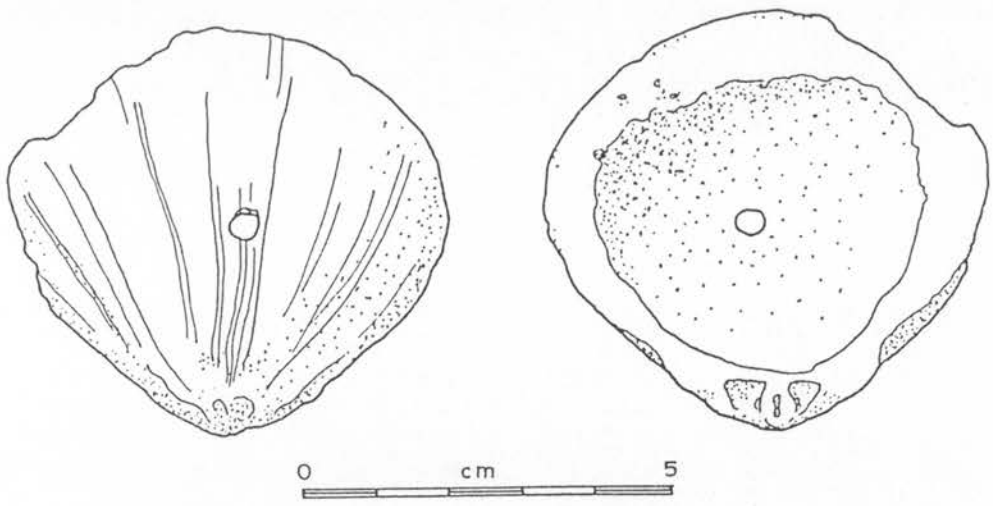
Outlines are almost always circular; the single attribute accounting for the greatest morphological variation is the cross-section. The major morphological types used here are based upon the following three recognised types of cross-section: 1) Dome; 2) Rectangular; 3) Bowl.

Bowl

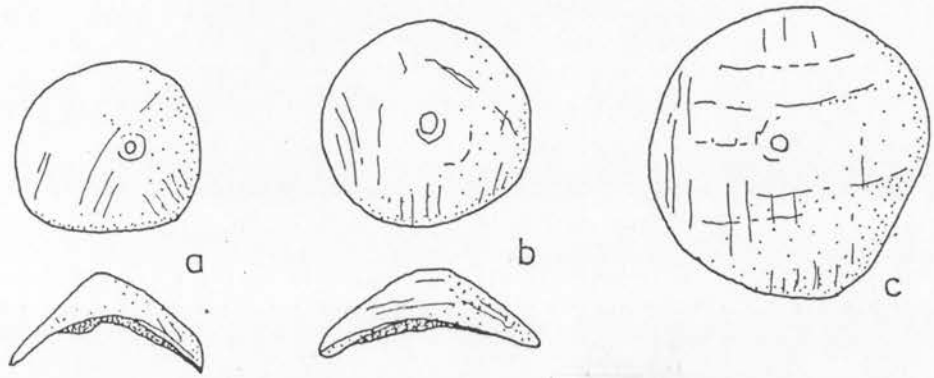
The 24 beads of this type were all Spondylus sp., which have a pronounced curvature due to the natural morphology of the shell (Figure B-27B a-c). Circular in outline, these beads were made so that the highest point of the curve is at the center of the bead. The perforation occurs at this point. Except for the shaping of the circular outline, these beads appear to have been little modified. The 'bowl' shape comes from the natural morphology of the Spondylus valve.

Dome

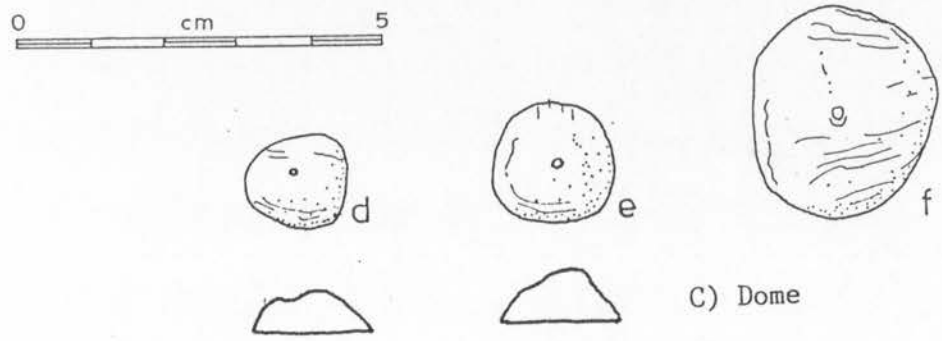
The eleven beads of this type were made from relatively thick ($\bar{X}$= 5.5 mm) portions of Spondylus. Each bead has been almost entirely ground into shape. The interior of the shell is ground flat while the 'dome' involves the shaping of the outer shell. Natural coloration and striations of the Spondylus can be observed on each of these beads. Like most bead types from Pagat, the size of the Dome beads varies greatly (Figure B-27C d-f). As the table demonstrates, the diameter ranges from 6 - 30 mm with a slight cluster at the low end.



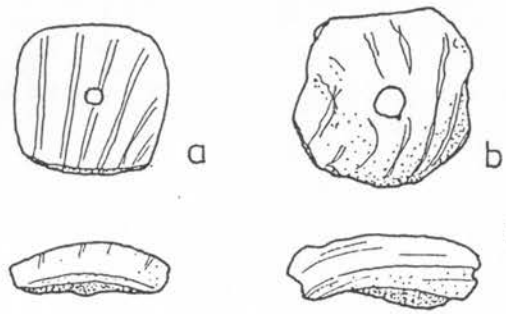
A) Spondylus sp. Blank



B) Bowl



C) Dome



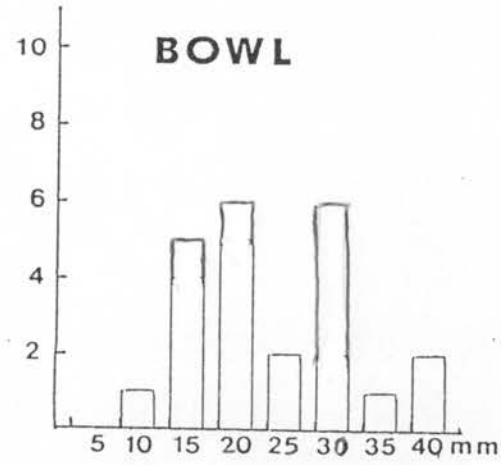
D) Rectangular

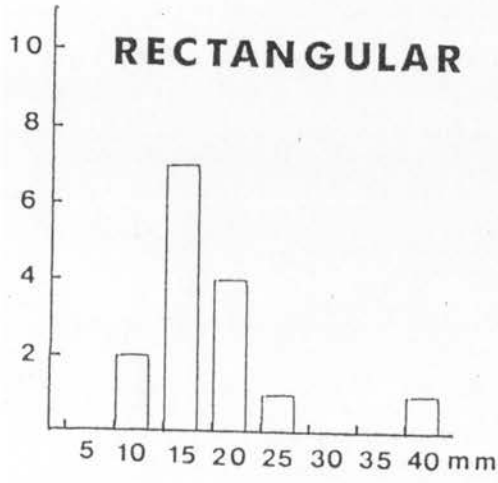
Rectangular

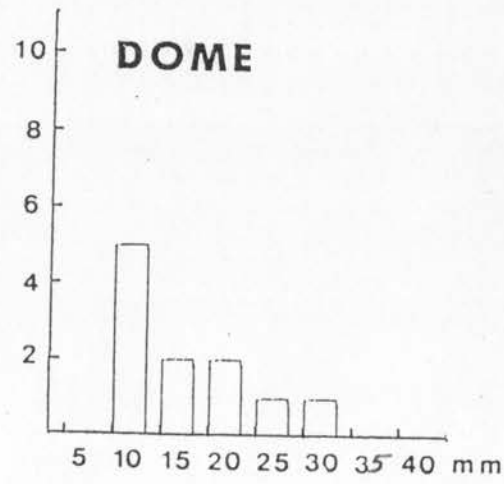
This was the most numerous bead type found at Pagat. All but two of the 23 beads of this type were circular in outline, the other two were rectangular (Figure B-27D a-b). These beads generally exhibit flattened tops and bottoms and have flattened sides, giving the rectangular cross section which characterises the type. Grinding appears to have been held to a minimum. After a general circular outline was obtained, the beads were perforated and finished.

Three of the rectangular beads were made from the top portions of very small Conus spp. All other came from Spondylus.

While measuring all of the beads in the Pagat sample, it appeared as if there were definite size ranges for each type. Figure B-28 illustrates the size variations among the types. In each case the sample is extremely small and thus the patterns cannot be taken as other than suggestive.







B-28 Variation in Bead Diameter

APPENDIX C - PAGAT MIDDEN ANALYSIS

Detailed midden analysis is only now beginning in the Marianas. Previous work provided general identification of major groups but seldom provided numerical data or stratigraphic provenience of materials. Two general classes of faunal material were collected at Pagat, bone and shell. Preservation of each was relatively good due to the local alkaline environment at the site.

It was found that some of the bags from earlier Pagat excavations (prior to the 1981-82 fieldwork), stored in the Guam Territorial Archaeology Lab, had broken and/or were unlabeled. Therefore, not all excavation units were used in this analysis. Given the horizontal range and large quantities of faunal material, it is argued that these units provide a sufficient sample with which to discuss procurement patterns at Pagat.

Bone

Slightly more than 5 kilograms (5033.2 grams) of bone were recovered from the excavations. During the initial sorting of bone it was noted that much of it was highly fragmented, forming long splinters. Whether this resulted from natural factors such as chemical weathering or from cultural activities (e.g. food preparation, trampling) is uncertain. The only specific observation of food processing, in this case butchering, comes from Zamora (Driver 1983) who described a fisherman cutting up his catch with a 'flint' knife.

Given the paucity of terrestrial fauna in the Marianas it would be expected that the bulk of the archaeologically recovered faunal material to be composed of marine species. Although there is some suggestion that pig, a type of fowl (chicken?) and dog were present in the Marianas, prehistorically, no conclusive evidence has yet been presented. The Limestone Forest community of the northern plateau offers a preferred habitat for the Fruit Bat (Pteropus spp.). It would be expected that the inhabitants of Pagat also hunted fanihi (Chamorro term for Fruit Bat).

Four primary categories of non-human bone were identified - fish,

turtle, rat, and fruit bat/bird. This latter category was the most general due to the fragmentary nature of the bone (epiphyses were usually missing) and the lack of a comparable bird bone collection. As indicated in Table C-1, bone was unevenly distributed between Horizons I and II. The density figures were computed for comparative purposes given the variation in excavated volumes between the two Horizons.

Some interesting and potentially significant differences are observed in Table C-1. First, Horizon II exhibits an overall density which is more than double that of Horizon I. Higher densities of both fish and turtle in Horizon II account for the overall differences between the horizons. Although fish accounts for over 90 % in each horizon there is more (378.37g v. 187.20g) in Horizon II. The most significant difference between the two samples is the near absence of turtle in Horizon I and its prevalence in Horizon II, where it accounts for nearly 10% of the bone sample.

Fish

Identification of the fishbone sample was undertaken at the Department of Anthropology, University of Otago, Dunedin, New Zealand. Dr. B.F. Leach has established a large type collection which he kindly made available. Instruction in the methods of identification was provided by Bruce Masse and assisted by Michiko Intoh.

Minimal number of individuals were calculated after entering the appropriate data (**Collection Area, Depth, Bone element, Fish identification**) into a computer program devised by Dr. Leach specifically for this task. Since some collection units were contiguous, they were combined into 'areas' in order not to inflate the counts of individuals. Thus, LTTE area represents the Latte set excavated by Reinman and AREC consists of the excavation units given the area C prefix. All other excavation units were treated as individual collection areas.

Table C-1 Vertical Distribution of Bone

	Horizon I weight / density (g/cu.m.)	%	Horizon II weight / density (g/cu.m.)	%
Fish	2858.6 / 187.20	93	1789.7 / 378.37	90
Turtle	15.9 / 1.04	>1	194.1 / 41.04	9
Rat	103.2 / 6.76	3	5.9 / 1.25	<1
Fruit Bat/ Bird	89.0 / 5.83	3	6.2 / 1.31	<1
Total	3066.7 / 200.83		1995.9 / 421.97	

Selected cranial elements (Dentary, Premaxilla, Maxilla, Quadrate, Articular) were used for the majority of identification. A category of 'special bones', distinctive to specific taxa, were also utilised (eg. dorsal spines of Ballistidae) (Table C-2)

Fish identification was generally made at the Family level (Table C-3). Variation among similar bone elements within the same species is often considerable. While the Otago collection has an extensive number of fish species, the number of individuals for each species is small so that the full range of intra-species variation is not available. Nor is any collection likely to be so complete for it is not only a sampling problem but also one of taxonomy. In some instances (eg. Diodon hystrix; Coryphaena hippurus) the bone elements are unique to that species (i.e. Diodon) or there is only one genus in that family (Coryphaena).

As indicated in Table C-3, 185 individuals, representing 14 families, were identified from the Pagat sample. Given the total weight of bone (4648.3 g) this is a relatively small count. No attempt was made to match pairs or count different sizes of similar elements. As a result, the MNI in this study should be seen as a conservative count. Additionally, most of the bone was highly fragmented (splintered). If all Ballistidae spines are disregarded and other elements are used to calculate the MNI for this family, the number drops from 64 to 11 but does not greatly affect the overall percentages.

Taxon	Identified Part	LEIE	AHIAG	PH2-1	IH2-2	IH2-3	IEA	IEB	IEE1	IEF1	IEG1	IEH1	D24G	D45P	D56G	D70M	LGJ-2	Total
Inshore																		
Acanthuridae	Buckler	3	3		2	1	1		2	1						3	2	18
Balistidae	Premaxilla		1												1			2
	Spine	14	15	2	4	1		4	3	1		3	1	3	4	1	4	63
	Dermal	4			1	1				1			1	1				9
Carangidae	Maxilla		1															1
Diodontidae	Premaxilla		2															2
Labridae	Dentary	4															2	6
	Maxilla								1									1
	Premaxilla		1											1				2
	Articular		3															3
	Quadrate		1															1
	Pharyngeal Cluster				1						1							2
cf. Cheilinus	Dentary							1										1
	Premaxilla			1													1	2
Lutjanidae	Dentary	4	2		1	1									1			9
	Maxilla	1	1						2									4
	Premaxilla	5																5
	Articular	2	1							1						2		6
cf. Gymnocrotaphus	Premaxilla			1		1												2
	Tooth		1						1									2
Scaridae	Dentary	2	1	1	2	1	1		1			1				1		11
	Maxilla		2		1						1	1						5
	Premaxilla	2	4		2				1	2				1		1	2	15
	Articular		1															1
	Quadrate		1		1	1												3
	Pharyngeal Cluster	10	4	3	10	2			6	3	1	2			2	1	2	46
Benthic																		
Serridae																		
Epinephelidae	Dentary		2						1									3
	Maxilla			1	2													2
	Premaxilla	1		2														3
	Articular									1								1
cf. Plectropoma	Maxilla															1		1
Lutjanidae	Dentary	1																1
	Maxilla															1		1
	Quadrate	1																1
Holocentridae	Dentary				1													1
	Maxilla		1													1		2
	Articular				1													1
Pempheridae	Dentary		1															1
Pelagic																		
Coryphaenidae	Dentary	1																1
	Maxilla									1								1
	Premaxilla				1							1		1		1		4
	Quadrate				1				2		1							4
Istiophoridae	Dentary																	
Totals		55	49	11	31	9	1	7	20	12	3	8	2	7	8	13		185

Table C-2 Skeletal Elements Used to Calculate MNI - Fish

While fishbone density was higher in Horizon II nearly all (94%) of the MNI came from Horizon I; 70% of the total MNI came from the top 30 centimetres of Horizon I.

These fish are found in three biotopes - inshore, benthic (bottom-dwellers), and pelagic (Table C-3). As discussed in Chapter Six, fish from the inshore biotope predominate, followed by benthic and pelagic fish. Five per cent of the MNI belong to the pelagic biotope where they would have to be taken by trolling. Recently, a similar assemblage of pelagic fish were identified from the Mochong bone assemblage (Mike Fleming pers. comm.).

All fish (except the pelagic families) could have been taken from the immediate environs of Pagat. Inshore and benthic fish may have been taken by angling or spearing while the pelagic fish would have been caught while trolling. The presence and numbers of gorges, hooks and trolling barbs in the Pagat assemblage supports this contention.

Turtle

A total of 210.0 grams of identified Turtle bone was recovered. Some of the larger unidentified pieces in the general bone sample may also be turtle but its identification was not possible. Turtle bone was limited in both horizontal and vertical distribution suggesting that these animals were not being consumed at Pagat in any great numbers. Turtle was recovered from only six units within the site. Unlike all other classes of cultural materials, the majority of turtle was recovered from Horizon II (Table C-1).

Due to the fragmentary nature of the bone, mostly consisting of the carapace, minimal numbers were not calculated. Any statements regarding early occupation or utilisation of the Pagat site and the collection of turtle must be tempered by this consideration.

Rat

The rat appears to be common in most bone assemblages from the Marianas (e.g. Takayama and Egami 1971, Reinman 1977, Ray 1981). Identification of the 109.1 grams of rat bone was not possible

Table C-3 Relative Frequencies of Fish By Families

Habitat Family	MNI	%
INSHORE		
+BALISTIDAE	64	35
+SCARIDAE	42	23
LETHRINIDAE	22	12
cf. Lethrinella	(8)	
cf. Monotaxis granoculis	(4)	
+LABRIDAE	16	9
cf. Cheilinus diagrammus	(3)	
+ACANTHURIDAE	12	6
+CARANGIDAE	1	0.5
DIODONTIDAE	1	0.5
BENTHIC		
SERRIDAE	11	6
EPINEPHELIDAE	(2)	
cf. Epinephelus	(7)	
cf. Plectropoma	(1)	
cf. Cephalophalus	(1)	
LUTJANIDAE	3	2
+HOLOCENTRIDAE	2	1
+PEMPHERIDAE	1	0.5
PELAGIC		
CORYPHAENIDAE	8	4
ISTIOPHORIDAE	2	1
	185	100

+ observed in biotope similar to Pagat (Stojkovich 1977)

beyond genus (Rattus) given the lack of a comparative collection. However, it is likely that all belong to a single species, R. rattus. That at least some of these rats were present at the time of occupation is suggested by the gnawing marks observed on other kinds of bones throughout the deposit. Such marks are more likely to be made on fresh bone as older, drier bone tends to shatter.

Minimal numbers were possible to compute using femurs; only a small number was derived (n=16). Distribution of the bone (by weight) was widespread occurring in most of the excavation units. The majority of the bone was recovered from Horizon I where 63% of rat bone was recovered in the top 30 cm.

Fruit Bat/Bird

These two classes are combined here due to the difficulty in differentiating the two. Again, comparative collections were limited (fruit bat only, no birds) and the Pagat bone consisted largely of only the shafts of long bone with epiphyses missing. This also precluded the calculation of minimal numbers.

A total of 95.2 grams of bone were identified to this class, 90% of which was recovered from Horizon I. Within this horizon, 63% of the bone came from the 0-30 cm level.

Reinman (1977) has suggested that chicken may have been present prehistorically in the Marianas though provides no discussion of how these bones were identified. Perhaps these bones belonged in this more general class presented here.

In summary, fish predominate the bone sample though a variety of other classes were noted. The only other marine species identified from Pagat was turtle. Land based species were rare in the deposit, reflecting their relative scarcity in the local ecosystem. No evidence of pig or dog were noted, supporting the argument that they did not exist in the Marianas in prehistory.

Shellfish

Distribution of shell density was calculated on both horizontal and vertical axes. Table C-4 illustrates the variation in density

between the two horizons.

Table C-4 Shell Density per Horizon

Horizon I	Horizon II
1031.2 + 441.1	1547.0 + 1975.4

Table C-5 lists the identified shell. Species identification was difficult due to the fragmented, abraded and bleached nature of the sample. The most secure identification was at the generic level.

In the case of Tridacna and Isognonum, there was the added problem of differentiating their presence as food remains or source material for artefacts. For example, ethnographic evidence suggests that often the Tridacna clam was extracted from the shell at or near the place of collection (Emory 1965, Craib 1983b). Presumably only when the shell was to be used as artefact materials were they brought back to the site. Although not as cumbersome, Isognonum, a shell not local to the waters around Pagat, were extensively used in the Marianas for the manufacture of fishhooks and gorges. For these reasons, I argue that the presence and quantity of these two genera of shell may have little meaning in terms of their dietary contribution but more accurately reflects their use as source materials.

Though the number of identified shells is nearly equally divided between gastropods and bivalves, the majority of MNI consist of a very few groups with gastropods predominating (Table C-6). Among the test pits there is a consistent ratio of gastropods to bivalves. This most likely reflects the simple fact that the meat per shellfish is significantly greater in most of the bivalves listed here so that it would take scores of gastropods to produce a similar amount of meat. Therefore, this ratio should not be taken as a specific preference for gastropods but rather, given the marine environs of Pagat, an economy of effort.

It should be noted that at least one shell (Strombus) which figures prominently in the MNI count is clearly exotic to the area; this small snail is found in and around mud flats and mangroves. Thus

Table C-5 Identified Shell

GASTROPODS	BIVALVES
+Conus	**+Tridacna**
+Cypreae	**+Chama**
+Strombus	**Quidnipagus**
+Turbo	**Isognonum**
Fissurellidae	**Fragrum-**
+Drupa-	**Fimbria**
+Trochus	**Gafrarium**
+Cerithium	**+Septifer**
Bursa-	**Arcidae**
Cellana	**Venus-**
Murex-	**Cardium**
Oliva-	**Mytilus**
Mitra-	**Codakia**
Nerita-	**Spondylus**
Lambis	**Vastcardium**
+Vasum-	
Casmaria	
Harpa-	

Shells not in Bold type comprise the Miscellaneous category

+ observed in biotope similar to Pagat (Stojkovich 1977).
- may be picked up accidently when collecting shells in sandy areas.

Table C-6 Relative Frequencies (%) of Shell (MNI) - Horizon I

	P82-1	P82-2	P82-3	1-2-4	1-2-6	C-11-J	C-22-L	C-22-K	TPD	TPE1	TPF1
GASTROPODS											
Conus	29	15	15	5	5	8	9	8	–	9	7
Strombus	17	33	12	15	18	12	16	16	11	15	22
Cypraea	11	7	8	4	4	1	10	7	4	3	1
Fissurellidae	10	5	9	9	36	49	18	23	36	1	29
Turbo	7	11	14	21	18	8	11	18	11	38	3
Drupa	4	6	9	3	1	2	2	–	–	6	7
Trochus	4	3	4	1	–	–	2	<1	–	6	–
Cerithium	3	3	5	–	1	2	3	2	14	4	4
Cellana	–	2	2	29	1	14	7	5	–	–	14
Misc.	3										
	88	87	86	87	81	91	86	79	79	84	89
Bivalves											
Chama	5	–	–	–	<1	–	–	–	–	–	–
Quidnipagus	2	5	4	7	7	3	5	7	11	9	3
Isognonum	1	2	3	3	8	2	2	4	7	4	1
Tridacna	1	2	4	3	1	3	2	4	–	3	3
Misc	3										
	9	9	11	13	17	8	9	15	21	16	11

Summary - Horizon I

	MNI	%
Gastropods	1776	89
Bivalves	204	11

Thus at least a portion of the shellfish was being imported from other parts of the island (or from other islands).