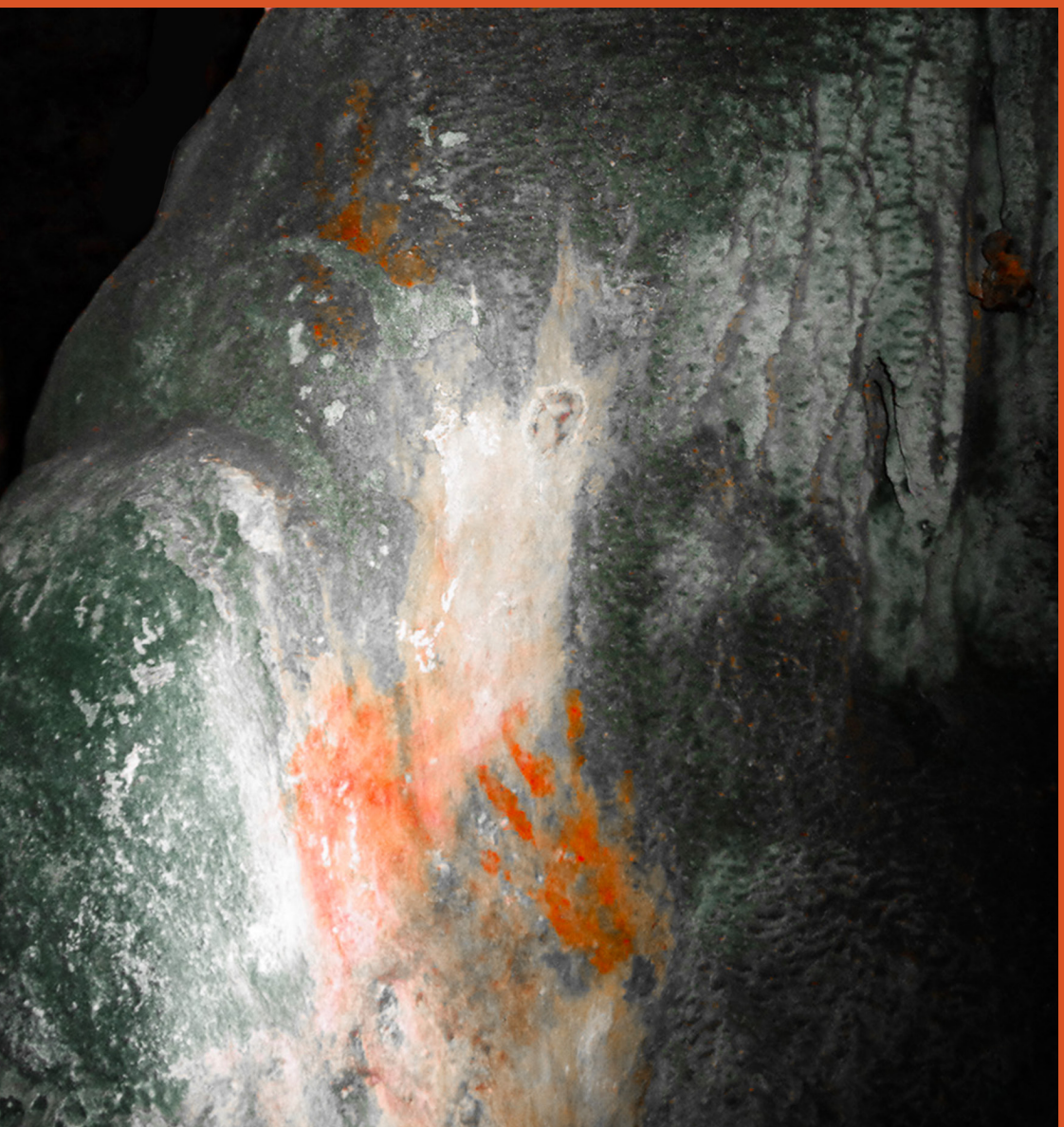
Rediscovering Heritage through Artefacts, Sites, and Landscapes:

Translating a 3500-year Record at Ritidian, Guam

Mike T. Carson



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Preface

This book is based on research since 2005 at Ritidian in Guam, synthesised here with all of the most current information and building substantially on prior published work. In April 2015 at the meeting of the Society for American Archaeology in San Francisco, Richard Pettigrew advised that I needed to explore more about the oldest site layers, and accordingly now more information is available. Meanwhile, the research expanded to cover more of the geographic extent of Ritidian. In August 2016 at the World Archaeology Congress in Kyoto, Jim Specht recommended for me to work on a comprehensive summary of all of the site findings, noting that many aspects needed to be articulated more clearly. The research findings indeed have been complex, and I am grateful for the opportunity to offer this book as a way to communicate the results.

External funding was granted by the Guam Preservation Trust (2008–11) and by the Chiang Ching-kuo Foundation (2015–16). Meanwhile, the requisite research permits were organised with the U.S. Fish and Wildlife Service (USFWS). Most recently, the studies at Ritidian have been accommodated within my assigned scope of work at the Micronesian Area Research Center (MARC), University of Guam (UOG), with special thanks owed to MARC Director Monique Storie, UOG President Robert Underwood, and UOG Senior Vice President Anita Borja-Enriquez.

I am indebted to the many professionals at Guam National Wildlife Refuge (GNWR) who have strengthened the research program and who have worked exhaustively with me in the field. In particular, Brian Leon Guerrero was intensively involved in the research, and Emily Sablan breathed life into the practical public outreach. Further support at Ritidian came from Steve Abele, Chris Bandy, Laura Beauregard, Matt Brown, Jeried Calaor, Jorie Clark, Jennifer Cruce, Gabe Cruz, Ryan Deregnier, Gerry Deutscher, Chris Eggleston, Joey Flores, Larisa Ford, Lauren Gutierrez, Latasha Hawk, Kyle Ngiratregd, Spencer Reardon, Ashley Riedel, Mariana Sanders, and Joe Schwagerl.

Several colleagues have offered insights, encouragement, and inspiration throughout the years of investigations. I was fortunate to work in the field with Hiro Kurashina and Dick Randall, whose prior research in many ways created the foundation of the work presented in this book. Additionally, Hsiao-chun Hung provided ongoing guidance, and she participated in an excavation session during May–June 2016. Further influential colleagues have included Vic April, Rosanna Barcinas, Jim Bayman, Lon Bulgrin, John Castro, Jeremy Cepeda, Bill Dickinson, Boyd Dixon, Judy Flores, Fran Hezel, Leonard Iriarte, Maria Kottermair, Patrick Lujan, Rita Nauta, John Peterson, Joe Quinata, Clynt Ridgell, Ben Santos, Rlene Steffy, Rebecca Stephenson, Brett Storie, and Dominica Tolentino. Numerous students from University of Guam, University of Hawai‘i, and elsewhere hopefully have retained fond memories of Ritidian, and ideally many more people yet will share in similar experience.

Chapter 1

Life, Lore, and Landscape of a Stirring Place

Ritidian or Litekyan is known as a place where people can engage first-hand with a unique landscape that has evolved through thousands of years of inter-related natural and cultural history, but how did this extraordinary landscape come to exist as it does today? The current work here concentrates on the contributions of archaeology for learning about the landscape heritage at Ritidian, while multiple perspectives and lines of evidence must be acknowledged as building a sense of what this special place means to people today. Beyond appreciating Ritidian as a complex site in itself, extensive research now has revealed the entire scope of cultural presence in the larger region, in essence constituting the framework for discovering or rediscovering an impressive depth and breadth of heritage.

In the northwest tropical Pacific, at the north end of Guam, Ritidian embodies the stories of the many people who have lived, worked, and visited here over the course of more than 3500 years (Figures 1 through 3). Their stories encompass the first footsteps on these remote shores, construction of a complex village, entanglements with foreign imperial powers, and much more. Their episodes of creativity, triumph, and heartbreak are embedded in the landscape itself, as witness to Guam's treasures of cultural and natural history.

Ritidian contains tangible material evidence from every time period of human presence in the Mariana Islands, all preserved in one place and providing a complete narrative of how people have lived in this remote corner of Pacific Oceania. These exceptional qualities make Ritidian ideal for learning about a deep heritage. The different pieces of information, however, are not all immediately accessible or comprehensible today, and hence this book offers a way for people to engage with the invaluable records of the past.

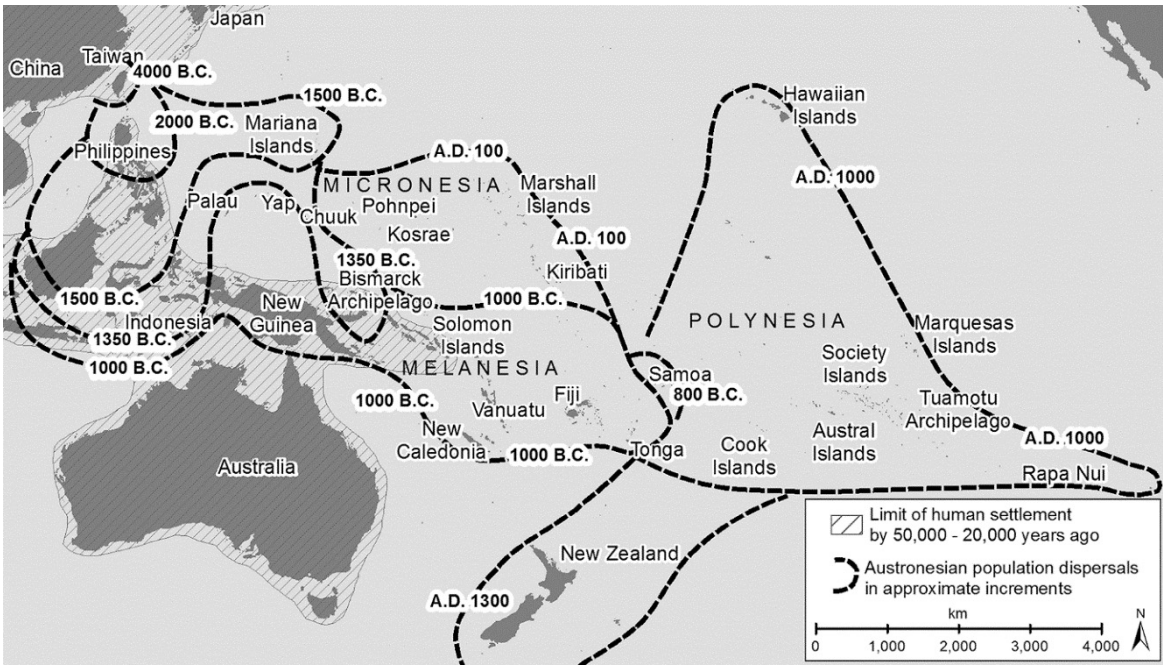

FIGURE 1. CULTURAL SETTLEMENT CHRONOLOGY OF THE ASIA-PACIFIC. THE REMOTE OCEANIC REGION IS EASTWARD (OUTSIDE) THE REGION INDICATED AS THE "LIMIT OF HUMAN SETTLEMENT BY 50,000–20,000 YEARS AGO".

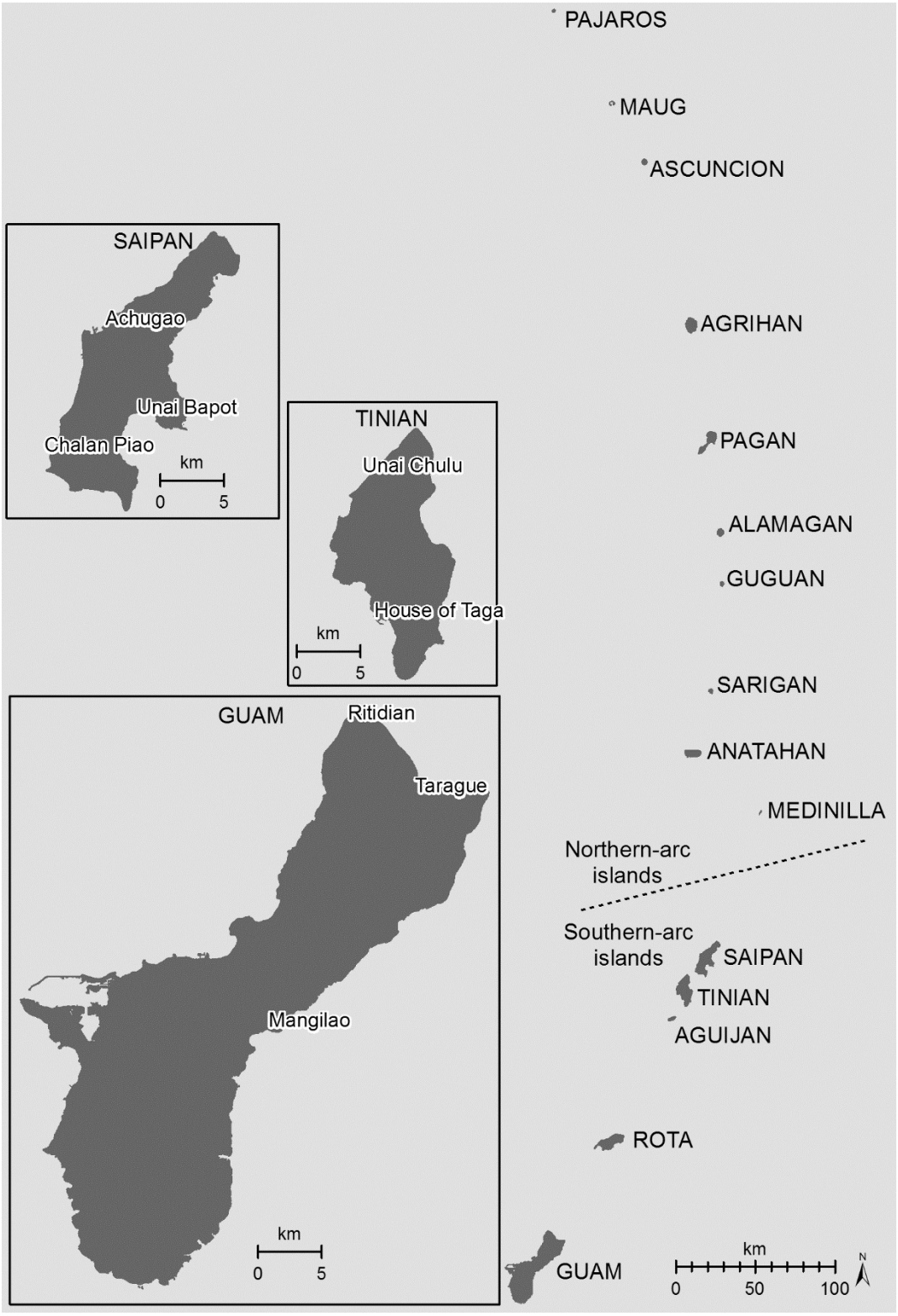

FIGURE 2. RITIDIAN AND OTHER KNOWN EARLIEST SETTLEMENT SITES OF THE MARIANA ISLANDS.

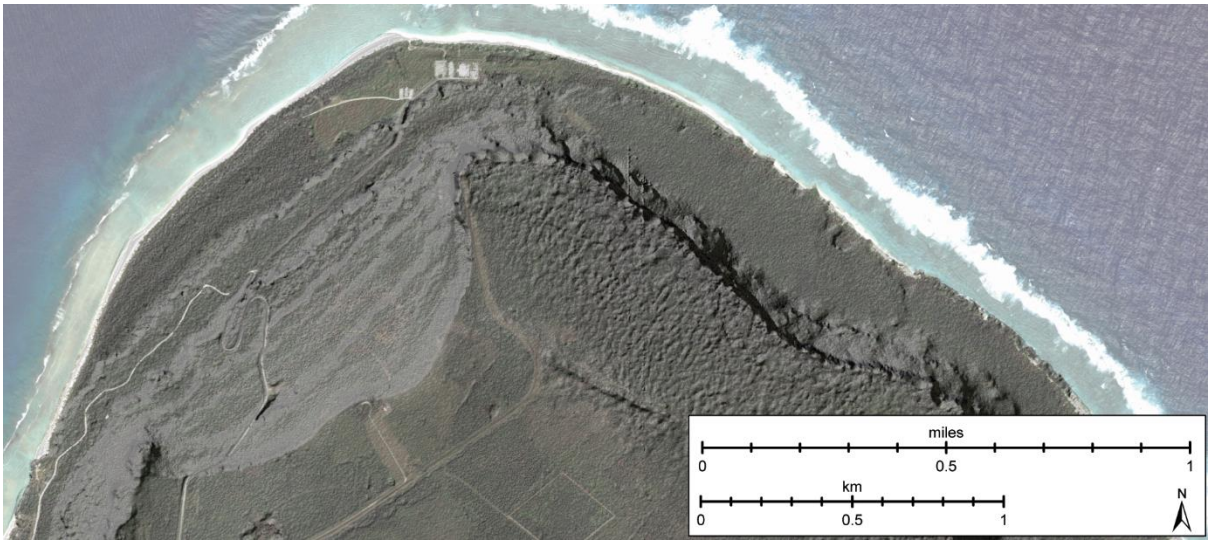

FIGURE 3. MODERN SITUATION OF RITIDIAN AT THE NORTHERN END OF GUAM.

The represented time range at Ritidian transcends periods of significantly different climate, sea level, coastal ecology, forest composition, slope erosion and deposition patterns, and dynamic cultural behaviours and expressions within those ever-changing contexts. This scope is true for the Mariana Islands overall, wherein the Ritidian Site has provided substantial supporting datasets. By presenting the evidence from Ritidian in a thorough sequence, the results here can clarify how people have inter-related with their landscapes through varied settings.

Ritidian has gained or regained a name of Litekyan, literally meaning "stirring place" in today's understanding of the Chamorro language. The stirring in this case may refer literally to the meeting of ocean currents, creating Guam's most dangerous offshore waters (Figures 4 and 5). Figuratively speaking in modern-day perception, Ritidian or Litekyan stirs the mind and the soul of everyone who comes to this enchanted place.

At present, the Ritidian Unit of Guam National Wildlife Refuge welcomes more than 90,000 visitors every year (Figure 6). People admire natural wonders, engage in scientific studies, and rediscover a profound and diverse heritage (Figure 7). This single place means so many things to different people, offering a precious experience to learn how this beautiful landscape has evolved and will continue to do so.

These values may become lost with impending plans for U.S. military use of the area, at the very least curtailing if not entirely eliminating public access (Figure 8). The place has changed through different hands of ownership, with different opinions of the legal issues that have accumulated over several decades. In any case, the lessons from Ritidian's heritage are commemorated here.

Whether given the name of Ritidian or Litekyan, this preserved ecosystem has become known as a rare scene of nature's raw power and elegance, matched with an equally magnificent cultural legacy of this unique place. As experienced today, this landscape continues to flourish independently apart from the modern world of high-density urban developments, instead still growing in its own ways and with its own long and complicated history. Clues of this inherited history are detectable in the natural setting, cultural traditions, written documentary archives, and archaeological remnants and ruins.

FIGURE 4. OVERVIEW OF RITIDIAN, JUNE 2017, LOOKING TO THE NORTH ACROSS THE CHANNEL TO THE NEXT ISLAND OF ROTA.

FIGURE 5. SEASHORE AT RITIDIAN, JUNE 2017, VIEW TO WEST.

FIGURE 6. PUBLIC ENTRANCE AT THE RITIDIAN UNIT OF GUAM NATIONAL WILDLIFE REFUGE, JUNE 2017.

FIGURE 7. GUIDED PUBLIC ACCESS AT THE *LATTE* VILLAGE COMPLEX IN THE EASTERN SIDE OF RITIDIAN, FEBRUARY 2016. DANIEL PANGELINAN STANDS AT THE STONE PILLAR WHERE HE HAD OFFERED A SHELL NECKLACE DURING A BLESSING CEREMONY AT THE INITIATION OF AN ARCHAEOLOGY FIELD SCHOOL SESSION IN 2009.

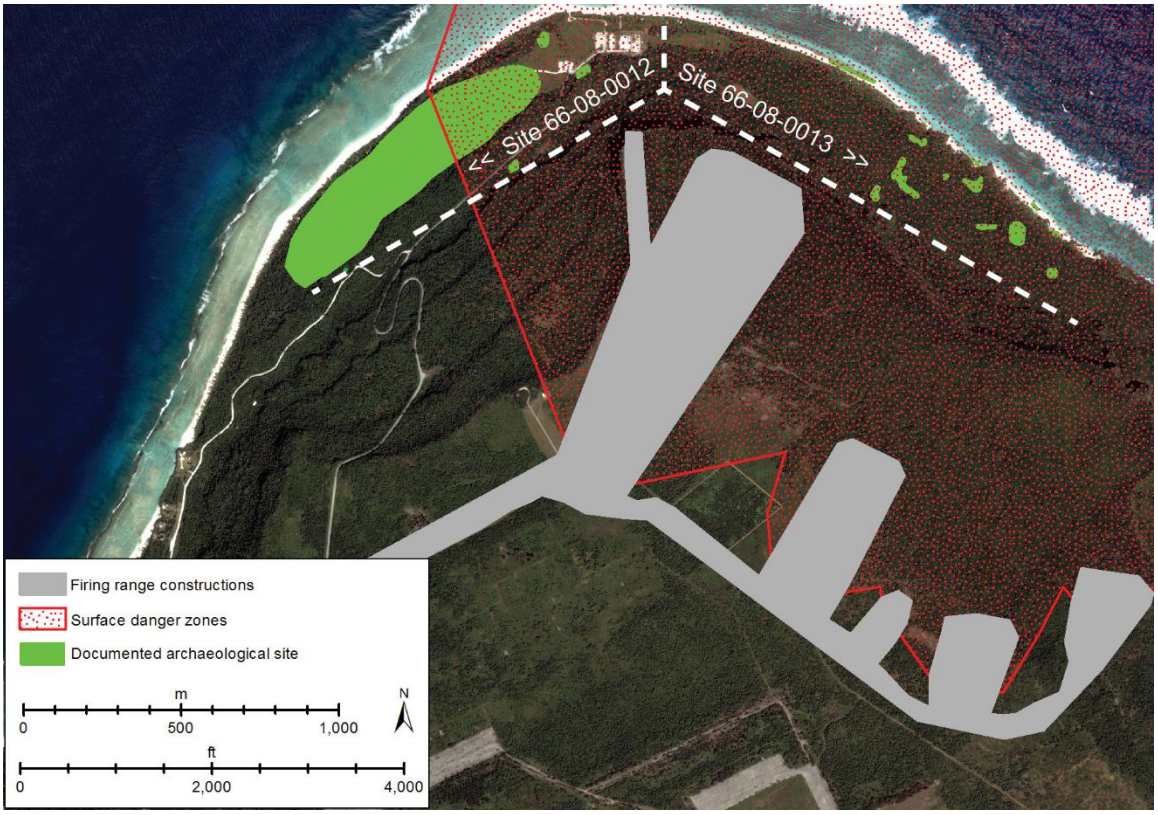

FIGURE 8. DOCUMENTED ARCHAEOLOGICAL SITE AREAS WITHIN THE RITIDIAN UNIT OF GUAM NATIONAL WILDLIFE REFUGE. THE SPECIFIED AREAS RELATE PARTIALLY TO SITES 66-08-0012 AND -0013 IN THE GUAM REGISTER OF HISTORIC PLACES. MOST OF THE RESOURCES ARE WITHIN THE "SURFACE DANGER ZONE" OF A U.S. MILITARY FIRING RANGE, CURRENTLY IN PREPARATION FOR CONSTRUCTION.

This book conveys a sense of the rich stories that have built Ritidian's layered memories and meanings. Those stories are told not through ordinary words but rather through the artefacts, sites, and landscapes that can be observed, experienced, and interpreted. Whenever we encounter these kinds of clues today, we connect between past and present, in essence translating the ancient clues into a language that we can comprehend.

As a translation or visitor's guide of the past, this book aims to give a voice to the past as a foreign place to speak for itself through hard data and visual representations. Ideally, multiple voices can account for the diversity of contexts over more than 3500 years in the Ritidian case. Although we always carry our modern bias and perspective, we can appreciate the past in its own terms if we are prepared to learn what those terms may have been. Much like when walking through a museum exhibit, the evidence from a multi-vocal and multi-layered past can be presented in chronological order, allowing visitors to make their own observations as well as to consider variable nuance and additional detail.

Translating the Past

In this book's representation of Ritidian's past, individual ancient people naturally cannot offer their own words, but rather the collective material traces from their lives can be studied, appreciated, and interpreted in various ways. As shown in the following chapters, the findings from archaeological sites, geological layers, and other datasets can be presented as material objects reflecting past cultural context or action. This material basis is absolutely necessary in archaeology. The next challenge, however, is to bring those

objects to life in a way that speaks meaningfully to us today, while maintaining a firm link between the material evidence itself and the expanded interpretation or translation of its meaning.

Whenever we in the present day study the past, we combine two modes of representing the subject matter, known by social scientists as the *emic* (sometimes called an insider's view) and the *etic* (sometimes called an outsider's view) (Figure 9). The insider versus outsider dichotomy actually is misleading, and its origins are worth discussing. The linguist Kenneth Pike (1967) coined these terms, mirroring *phonemics* as the sounds of real speech belonging to a particular language group, concurrent with *phonetics* as the range of possible sounds produced by all language groups worldwide. Accordingly, emic referred to the actual expressions of a specific group of people, while etic referred to the potential scope of human behaviours in a general sense.

Following Pike's (1967) original formulation of emic and etic aspects, the individual artefacts of an archaeological site represent the emic expressions of the people who made those objects, but those cultural expressions can be described in analytic etic terms of how human beings behave in a general sense. A site inventory may include certain forms of pottery, stone and shell tools, remains of house structures, and discarded food all representing the past emic actions of the people who had lived at the site. Those individual emic expressions have varied from one site to another, but they all can be identified today within the broader scope of etic possibilities of human behaviours of creating artefacts.

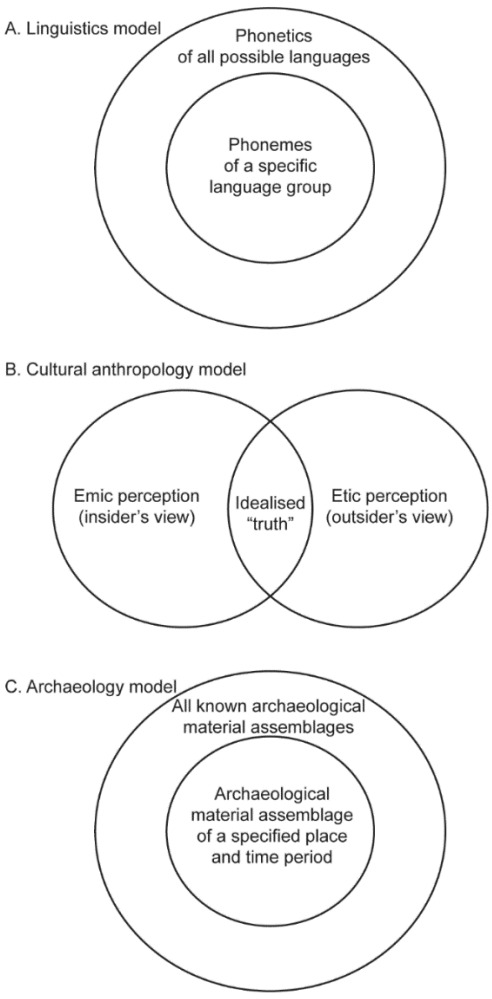

FIGURE 9. EMIC VERSUS EMIC MODELS, AS USED IN LINGUISTICS (A), CULTURAL ANTHROPOLOGY (B), AND ARCHAEOLOGY (C).

Although somewhat different from Pike's (1967) use of emic and etic, archaeologists can study individual artefacts as the emic expressions of a group's way of achieving a general task or goal as an abstract etic construct. If the generic goal was to boil water, then people could achieve such a goal in numerous ways with variable archaeological material signatures in the formats of hearths or other burning features, possible pottery or other containers, and other remnants that survive in archaeological layers. This concept can be applied to other cultural behaviours, such as building a house, making clothing, obtaining food to eat, or finding water to drink. The concept furthermore can be applied at other scales, such as studying a group's technology in terms of its repertoire of artefacts, and similar approaches could be devised for studying a group's economic practice and other necessary cultural functions.

Cultural anthropologists such as Marvin Harris (1976), Ward Goodenough (1970), and many others have explored how people view themselves in emic terms, while they are observed by outside examiners in etic terms. Both viewpoints are valuable, yet both inherently are biased in different ways. The insider and outsider positions should not be misconstrued as separate opposing forces, but more accurately they co-occur and indeed can make use of each other's views. Neither position can be purely objective, but the two together in theory can cross-check each other's subjective bias.

If the past can be accepted as a foreign place, then it can be viewed today only from an outsider's perspective. The "insiders" of the past no longer exist today, so they cannot personally share with us about their lives, except indirectly through the material records that they have generated in archaeological layers, artefacts, food remains, pictographs, and other traces. Most of the past's records at Ritidian, as in the Mariana Islands overall, refer to contexts pre-dating the availability of written documentation, so the individual voices of this ancient past are not immediately evident. Even in the cases of written texts and archives, such as from the A.D. 1500s and later in the Mariana Islands, those records need to be evaluated and interpreted.

As noted, this book offers a visitor's guide to Ritidian's past, organised in chronological order as a narrative of what happened here ever since the time of first human presence about 1500 B.C. if not earlier. This story has been assembled through multiple voices, accounting for the scope of different time periods, as well as for the varied lines of evidence pertaining to each of those time periods. The past does not have a literal "voice" per se, but rather it is given a set of metaphorical voices through the available evidence.

Situating Ritidian in Space and Time

The long chronological record at Ritidian constitutes one of its main attractions for learning about the past, yet this same long-term record poses a challenge of how to represent its ever-changing contexts. The archaeological layers reveal thousands of years of changing natural environment and social setting, and each layer refers just to one segment of a long and complicated narrative. The findings at surface-visible residential housing complex of the late 1600s should not be conflated with subsurface archaeological layers dated a few hundred years older, and they most certainly should not be equated with broken pottery excavated from a deeply buried layer of first island settlement dated more than 3000 years earlier (Figure 10).

When situating the Ritidian site in a larger context, the site itself and the outside world both must be understood as evolving through time. Ritidian's physical position in mapping coordinates has remained fixed, but the conditions of the natural and cultural world most definitely have transformed (Figure 11). As shown in later chapters, the inhabited landscape at Ritidian evolved with changing sea level, coastal ecology, strategies of resource usage, and many other factors, simultaneously with ongoing change in the overall patterns of human settlement and cultural traditions of the Asia-Pacific region.

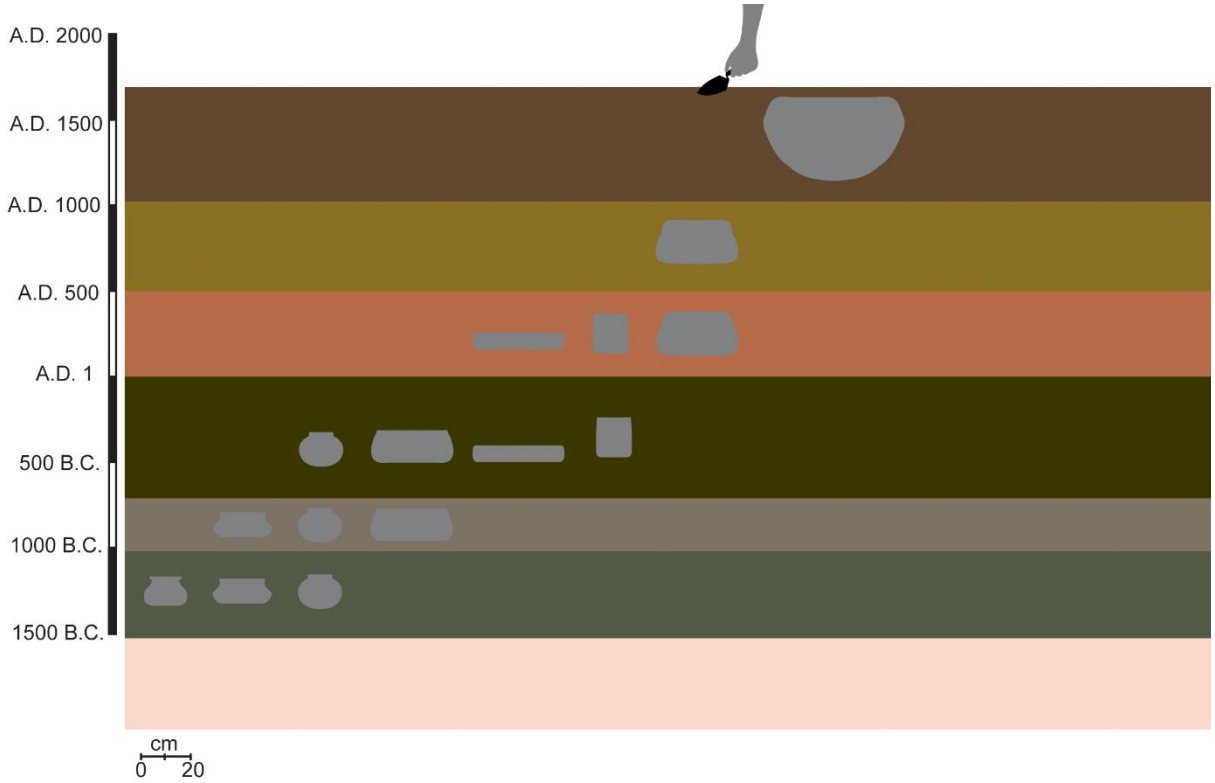

FIGURE 10. SCHEMATIC DIAGRAM OF ARCHAEOLOGICAL LAYERS IN THE MARIANA ISLANDS, PROGRESSIVELY OLDER WITH DEPTH AND EACH CONTAINING DIFFERENT MATERIALS AND REFERRING TO DIFFERENT CONTEXTS.

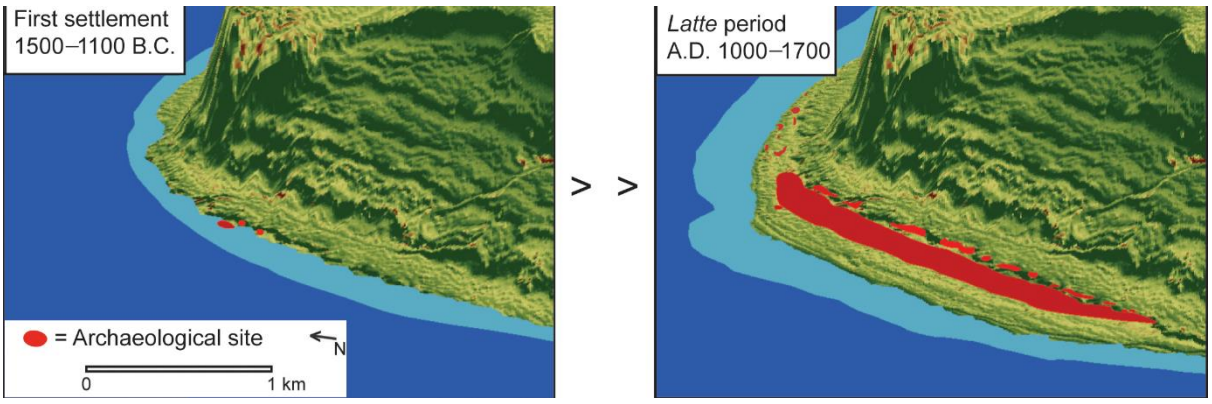

FIGURE 11. EARLIEST SUBSURFACE-DETECTABLE CONDITIONS VERSUS LATEST SURFACE-VISIBLE CONDITIONS AT RITIDIAN.

At any given point or interval in time, the Ritidian Site can be contextualised differently. Ritidian is among the rare sites confirmed as holding evidence of the initial human settlement of the Remote Oceanic region around 1500 B.C., prior to a series of other sea-crossing migrations that eventually resulted in the fully inhabited seascape of Pacific Oceania as known after A.D. 1000. While the overall picture of Asia-Pacific archaeology underwent significant transformations, the records at Ritidian can be articulated with these larger trends and patterns.

The chronological narrative begins with the world's first effective long-distance sea-crossing migration into Remote Oceania about 1500 B.C., at its time setting a record for the longest such journey in the world, exceeding 2000 km. As will be detailed fully in Chapter 6, the distinctively decorated pottery and other artefacts of this earliest period can be traced to origins in Island Southeast Asia (Hung et al. 2011), confirming the picture as suggested through linguistics and genetics studies. The Chamorro language of the Marianas has retained archaic features in its phonology, syntax, and vocabulary that differentiate Chamorro from the Oceanic subgroup evident elsewhere in Remote Oceania (Figure 12), and hence Chamorro can be assigned to origins prior to the existence of the Oceanic group and instead most closely tied to older language communities in Island Southeast Asia (Blust 2000, 2009, 2013; Reid 2002; Zobel 2002). Likewise, DNA studies of modern-day Chamorro people have shown that the maternally inherited mitochondrial DNA (mtDNA) lineages belong to groups originating in Island Southeast Asia and separate from the lineages otherwise gaining prominence elsewhere in the Remote Oceanic islands (Lum and Cann 1998, 2000; Vilar et al. 2013).

After A.D. 1000, by far post-dating numerous other developments across the Asia-Pacific region, the Pacific Oceanic world approached its fullest inhabited extent (see Figure 1), along with the emergence of formalised village structures, land-use patterns, and other cultural expressions linked with the traditions as known ethnohistorically and today (Figure 13). Within this later time range, the records at Ritidian depict the locally specific versions of the larger Pacific-wide patterns, as will be discussed in Chapter 11. These outcomes can be understood best when first knowing about the preceding several centuries of evolving natural and cultural history, as will be presented in the chapters of this book emulating the experience of walking through a chronologically ordered museum exhibit.

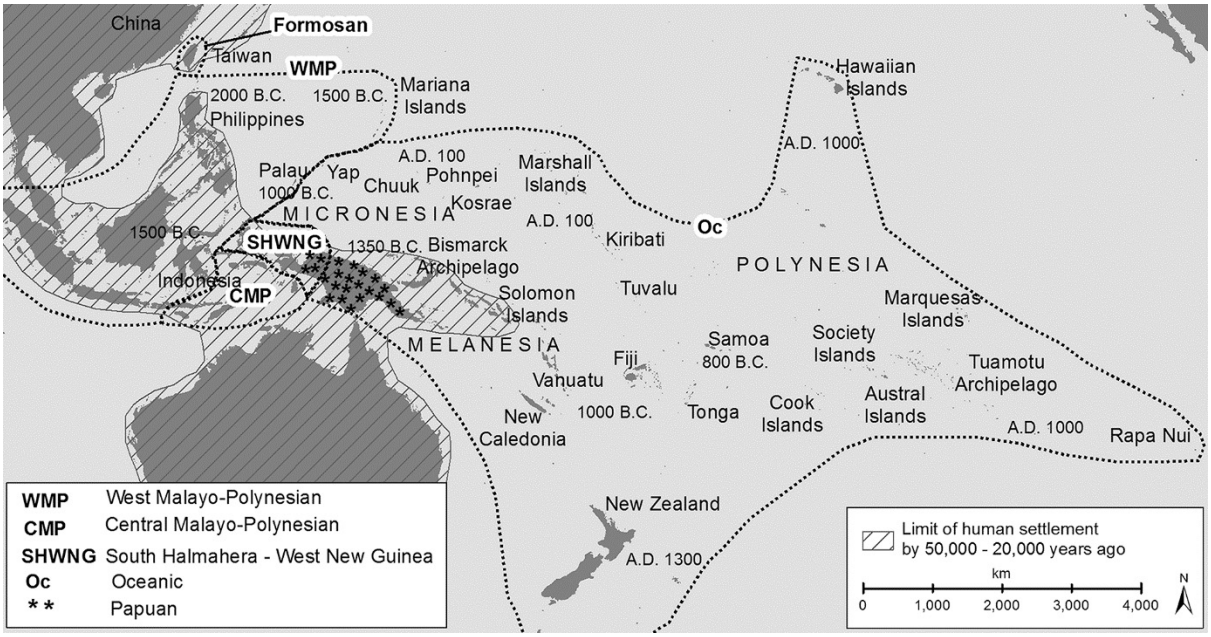

FIGURE 12. MAJOR LANGUAGE GROUPINGS OF PACIFIC OCEANIA, COORDINATED WITH APPROXIMATE ARCHAEOLOGICAL DATING OF FIRST CULTURAL SETTLEMENT IN EACH AREA. THE CHAMORRO LANGUAGE OF THE MARIANA ISLANDS IS CLASSIFIED AS PART OF "WEST MALAYO-POLYNESIAN".

FIGURE 13. EXAMPLE OF *LATTE* RUINS AT THE EAST SIDE OF RITIDIAN, JUNE 2015, VIEW TO SOUTHEAST. THE PARTICULAR OCCURRENCE HERE WAS RECORDED AS PART OF FEATURE B OF SITE CLUSTER 05 IN THE EAST *LATTE* VILLAGE COMPLEX, VISIBLE ALONG A GUIDED-ACCESS HIKING TRAIL. SCALE BARS ARE IN 20-CM INCREMENTS.

Structure of the Presentation

Ritidian's profound landscape heritage is befitting of a living museum, further effective when coordinated with the long sequences of continually changing artefact assemblages, ecological settings, and inhabited environments. Accordingly, this book aims to support the combined experience of visiting the landscape and viewing a curated exhibit. The pages of this book can serve as a guide to explore more than might meet the eye at first.

Following the present introduction (Chapter1), the next chapters will consider Ritidian as it exists today, how the landscape has transformed through time, and how its heritage values continue to evolve. Chapters 2 through 5 consider the different ways of opening windows into the past, through observations and experience of the natural environment, cultural and historical setting, and archaeological findings. Chapters 6 through 11 collectively unpack more than three millennia of archaeological records, environmental history, and other lines of evidence in chronological order, from the moments of first human presence all the way through the time of Spanish missionary and military encounters. The concluding Chapter 12 captures a view of history-making in process by the people whose hearts are attached to Ritidian or Litekyan today.

Chapter 2

Natural Setting

The natural setting at Ritidian inter-connects habitats of densely forested limestone plateau, expansive coastal plain, and vibrant coral reef that all have transformed substantially through time. The ecosystem has evolved through many changing circumstances of its geology, sea level, and other factors that have influenced each other. This natural history provides an essential context for appreciating the traditions that have developed here.

Geology and Landforms

The Marianas Archipelago originated entirely in an Oceanic setting, forming over the ocean floor unattached to any continental land mass, more than 40 million years ago (Cloud et al. 1956; Tracey et al. 1964). Two of the world's major tectonic plates collided, resulting in a long north-south trough of the Marianas Trench, including the deepest spot in the world's seabed at 10.9 km at Challenger Deep. From this trench, magma periodically erupted and gradually formed enough upward-building mass to create the beginnings of islands near or above sea level.

Figure 14. Limestone plateau of northern Guam, view to north, September 2006. Ritidian Point is the farthest viewable point.

The core volcanic land masses of the Mariana Islands were in place between 5 million and 3 million years ago, distributed in two great arcs from south to north (see Figure 2). The southern-arc islands were the oldest, where coral reefs grew in large horizontal masses around the edges of volcanic formations, slowly uplifted as limestone terrain of the islands of Guam through Saipan. While southern Guam retains its older volcanic hilly terrain, northern Guam is comprised of an extensive limestone plateau, including the Ritidian area. By comparison, the northern-arc islands were younger, forming a series of small volcanic cones north of Saipan, where volcanic activity still continues today.

The terrain of Ritidian consists of the edge of Guam's extremely old northern limestone plateau, fringed by considerably more recent accumulations of coastal sediments (Figure 14). The limestone plateau originally had been a living coral reef, growing in broad terraces that uplifted above the ocean very slowly, at a rate of less than 1 mm per year. The slow uplift, compounded with change in sea level itself, eventually created a series of terraces with origins between 5 million and 100,000 years ago (Tabarosi 2006). The older terraces now are uplifted at the highest elevations of the plateau, and the youngest are closer to sea level. Around the northeast side of Ritidian and continuing around the north tip of Guam, the lowest limestone terrace is approximately 100,000 years old.

Around the perimeter of the uplifted limestone terrain, newer coastal landforms have developed over the last few thousands of years, greatly influenced by their positions relative to sea level. Of the coastal landforms seen today at Ritidian, the geological origins can be traced within the last 5000 years, shaped in a number of stages. In order to make sense of how these landforms developed, the sea-level history must be outlined.

Sea Level and Coastal Zones

Coastal zones of Ritidian, as well as worldwide, owe much of their present-day characteristics to the fluctuating circumstances of sea level. After the last major Ice Age of the Pleistocene Epoch, warmer global temperatures melted giant sections of polar ice sheets, thereby releasing massive amounts of water into the world's oceans. At a grand scale, sea level began to rise dramatically about 10,000 B.C., heralding the beginning of the Holocene Epoch, followed by a series of smaller-scale episodes of higher or lower levels throughout the Holocene (Figure 15). These variable stages of changing sea level directly affected the shapes of coastlines, the positions of freshwater lenses and seeps floating above sea level, and the kinds of shellfish and other resources in the nearshore zones.

Most relevant for the scope of a culturally inhabited landscape at Ritidian, the sea level at 3000 through 1100 B.C. stood about 1.8 m higher than today (Dickinson 2000, 2001; see also Kayanne et al. 1993). At that time, a shallow-water lagoon existed all around the edges of the much older limestone terrain, and a coral reef grew along the outer border of the lagoon. Distinctive portions of the ancient coral reef are visible in a few places today, now stranded at 1.8 m above the present-day sea level, while the modern coral reef is growing at the current sea level (Figure 16). Other portions of the ancient coral reef and of the ancient lagoon floor have been discovered through deep excavations, where they have been covered by layers of more recent sediments (Carson 2011). As will be discussed in Chapter 6, the floor of the ancient shallow-water lagoon is indicated by a buried bed of *Halimeda* sp. algal bioclasts that lived in a broad "meadow" at Ritidian, directly dated within the time range of the former highstand of sea level (Carson and Peterson 2012).

Beginning about 1100 B.C., sea level began a period of drawdown, slowly approaching its present level by A.D. 1000. Minor fluctuations have continued, so far measurable within less than 1 m. Despite these minor fluctuations, today's coral reefs and lagoon ecosystems have been more or less stable for the last 1000 years, replacing older habitats that had existed during prior conditions of different sea level. The period of drawdown at first was rapid after 1100 B.C., but it slowed about A.D. 1–200, followed by the final stage of drawdown until about A.D. 1000. Sea level now is rising again, in a period of global warming.

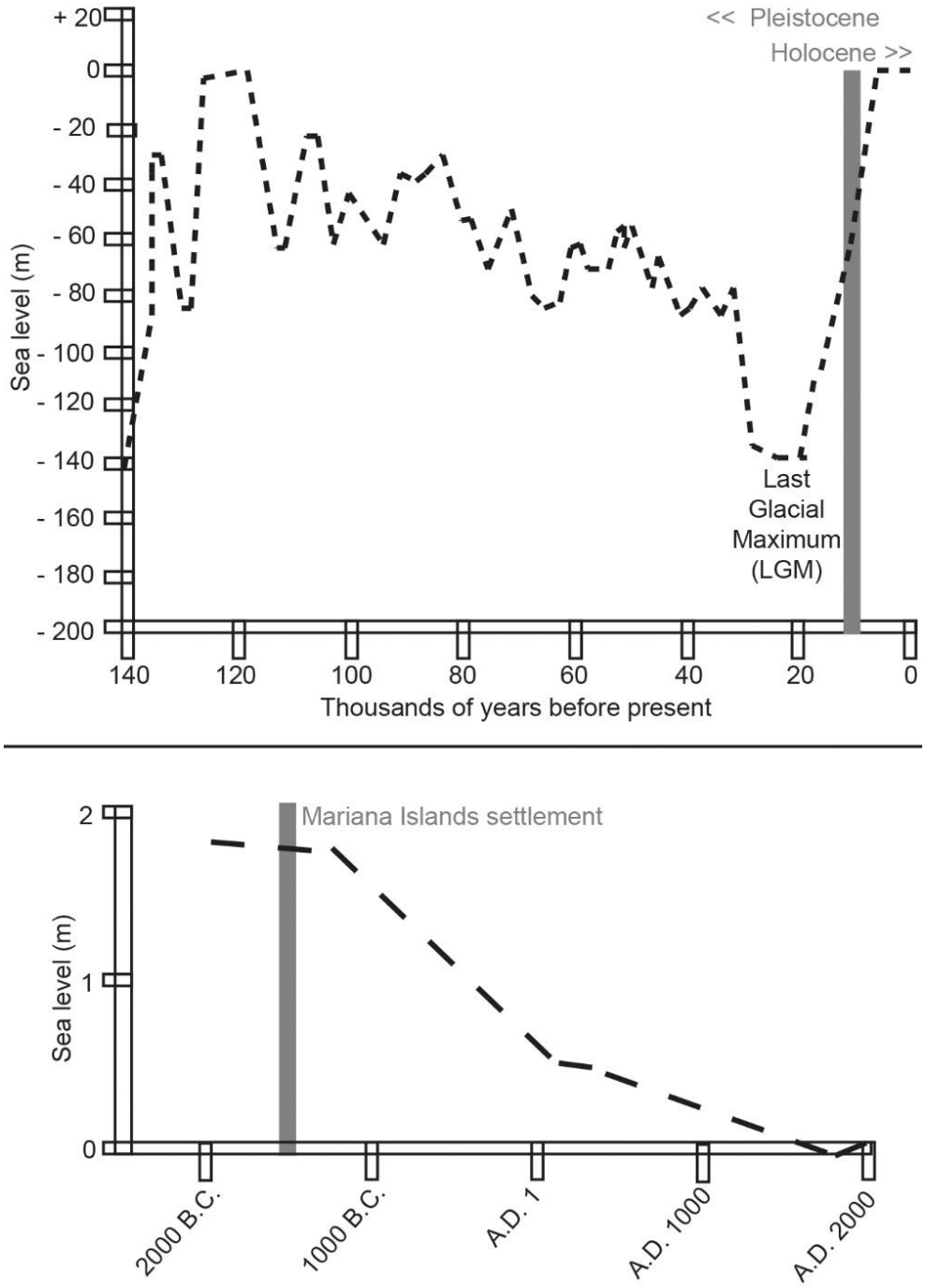

Figure 15. Sea-level history relevant to earliest Marianas settlement and environmental context.

Importantly, this outline of sea-level history occurred worldwide, and it was independent of any tectonic raising or lowering of land masses (Mitrovica and Peltier 1991). As a worldwide occurrence, the same highstand occurred everywhere at approximately 3000 through 1100 B.C., followed by the same sea-level drawdown (Grossman et al. 1998). The precise timing and the exact sea level varied slightly from one place to another, due to the shifting volume of water in the oceans at a global scale. The net change in sea level versus the adjoining land in any specific location of course varied, due to localised tectonic movements, sedimentation, erosion, and other factors.

Water Sources

Guam's northern limestone plateau contains an impressively vast aquifer, with a capacity to produce more than 227,000,000 litres of water per day (Figure 17). Prior to the drilling of moderns wells descending into the aquifer, however, hand-dug wells had supported agricultural fields in Ritidian's coastal plain during the 1800s. Even earlier, before the coastal plain had formed geologically, the inhabitants of this area since 1500 B.C. collected rainwater and ceiling-drip in the area's many caves, accessed portions of the aquifer in cave pools, and tapped into natural freshwater seeps at the shorelines.

Through time, people needed to adjust with new ways of accessing water. Even a slight change in base sea level can affect the position of ground water sources. When the sea level lowered after 1100 B.C., the floating lens of fresh water accordingly lowered with it. As a result, pools of water inside caves became less accessible, and seeps at the shorelines shifted to new locations. Meanwhile, new layers of sediments accumulated over the coastal zones, covering the spots where coastal seeps once had existed, and continually the seeps followed the expanding shorelines, always flowing outward just above the position of the mean tide level (Figure 18).

FIGURE 16. ANCIENT AND MODERN ALGAL RIDGES ADJACENT WITH ONE ANOTHER AT THE EAST END OF RITIDIAN, EXPOSED AFTER TYPHOON DOLPHIN IN MAY 2015. A REMNANT OF THE MID-HOLOCENE ALGAL RIDGE IS IN THE FOREGROUND, AS COMPARED WITH THE MODERN-DAY LIVING ALGAL RIDGE WHERE THE WAVES ARE BREAKING AT THE EDGE OF THE CORAL REEF.

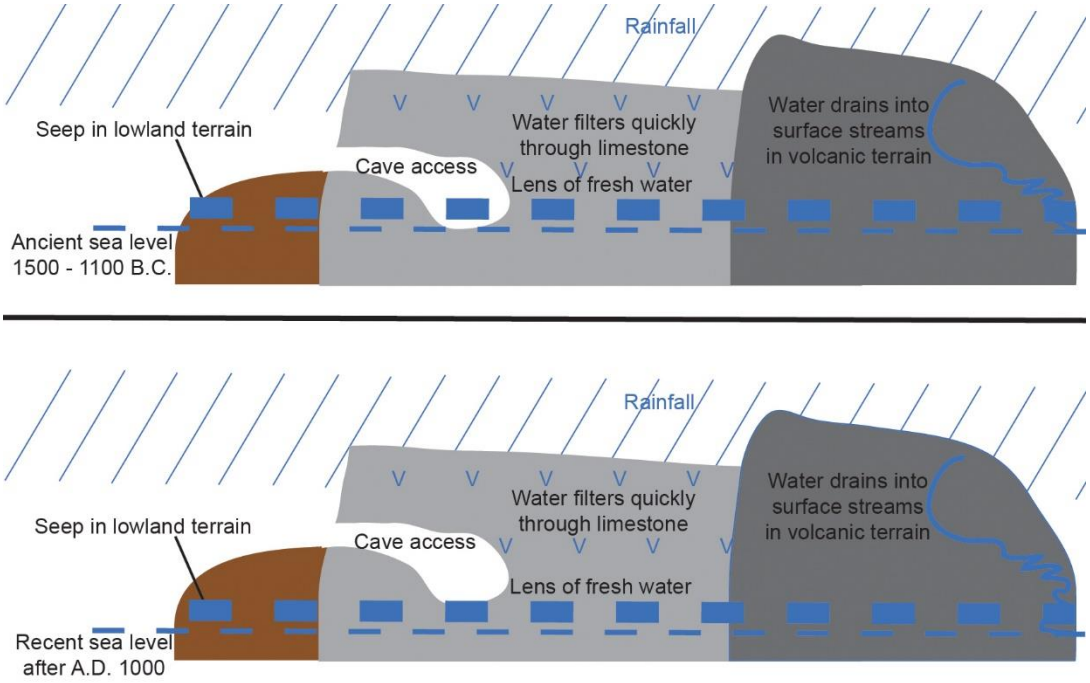

FIGURE 17. SCHEMATIC DIAGRAM OF WATER ACCESS AT RITIDIAN, COMPARING EARLY VERSUS LATE TIME PERIODS.

FIGURE 18. COLLECTING WATER AT A COASTAL SEEP, AT THE SHORELINE NEAR *LATTE* HABITATION OF THE A.D. 1600S AT THE EAST END OF RITIDIAN. THE AUTHOR IS SHOWN HERE IN THIS JUNE 2015 PHOTOGRAPH BY HIRO KURASHINA.

Plant and Animal Communities

Given the fact that the Mariana Islands formed geologically in a remote part of the Pacific Ocean, the only plants and animals here must have arrived from elsewhere. Fish, shellfish, sea turtles, and other marine life naturally found the most opportunities to reach these shores, while only limited numbers of land-dwelling plants and animals ever lived here. For those birds, bats, lizards, trees, shrubs, and other wildlife successfully established in the Marianas, many of their descendants evolved with highly specific adaptations as isolated populations in the remote island setting.

Ritidian is known for its healthy habitats of lush forests and coral reef, in large part due to the deliberately conserved ecosystem in Guam National Wildlife Refuge, yet it cannot be considered "pristine" in the strictest sense. Wherever people have lived, anywhere in the world, they have altered the natural ecosystems through introduced plants and animals, compounded with depopulation or even outright extinction of native species. Different from other places, however, the Marianas environmental record shows a low level of human-caused transformations at the time of initial cultural presence at 1500 B.C. and sustained for the next several centuries, becoming more serious after A.D. 1000, and then increasingly profound ever since Magellan's arrival in 1521.

Compared to other parts of Guam, Ritidian bears far less amounts of foreign-introduced plants and animals (Figure 19), but nonetheless the invasive species include modern and historical introductions of *tantangtangan* trees, *limondechina* thorny bushes, and tough vines of false rattan. Most infamously since the middle 1900s, the overseas import of the brown tree snake has been responsible for massive decline of native birds throughout Guam. Feral pigs, deer, and cats roam the forests of Ritidian, all introduced during the Spanish imperial period, while additional Spanish introductions of water buffalo (*carabao*), cattle, horses, and other animals are found in other parts of Guam with even more profound effects on the island ecosystem.

FIGURE 19. FOREST ALONG HIKING TRAIL IN PUBLIC ACCESS AREA, MARCH 2016.

Chapter 3

Cultural Traditions

Chamorro culture today involves several traditions that have developed over successive generations, ever since the time of the oldest known sites such as at Ritidian dating at least as early as 1500 B.C. Modern Chamorro culture cannot be expected to retain perfect continuity with the contexts of more than three millennia ago, and in fact much has changed within the range of clearer historical memory of the last few centuries or even just the last few decades. The Chamorro language, remembered traditions, and ways of viewing history all have undergone degrees of change, yet they persist as definitively Chamorro in identity.

The naming of Ritidian or Litekyan may be viewed as a starting point for learning about this place. The suffix *an* indicates a "geographic place" of something, not only in Chamorro but also in all Austronesian languages of Island Southeast Asia and Taiwan. In this case, the suffix *an* modifies a root word or perhaps a compound of *Ritid* or *Ritidi*, but officially the Chamorro language does not include a sound of "r." Moreover, certain of the consonants and especially the vowels were written inconsistently by Spanish and other foreign-language speakers who recorded Chamorro words more than 300 years ago. Prior to that time, the Chamorro language was not written, and many aspects of the language never were intended to be fixed in writing.

When using standard Chamorro spelling today, the word Ritidian has been interpreted as Litekyan. In this case, the root word *litek* means "to stir," and the component of *yan* is a version of the ancestral Austronesian *an* denoting a "place." Given the dangerous churning waters off the shore of this place today, the name can be recognised as suitable.

Generally speaking, Chamorro place names carry literal description of a place, figurative meaning of cultural values, and occasionally historical references to past events. Accordingly, the literal interpretation of a "stirring place" offers only a beginning for learning more about the traditions associated with this place. While the different intended meanings may not be recoverable today, at the very least they can be acknowledged as having existed.

Among the unwritten cultural history of the Chamorro people, one of the most consistently remembered traditions refers to the "child's leap" from northern Guam across the channel to the island of Rota. This tradition has been interpreted as a way of remembering the event of a young man moving from Ritidian across to Rota. Opinions vary about the motivation for this cross-channel journey, possibly involving conflicts with family members or a personal ambition for power and authority, consistent with a number of other Chamorro traditions referring to similar kinds of conflicts leading to legendary feats of strength, catastrophic battles, and movements of people from one place to another.

The place name of Ritidian or Litekyan may be applied overall for a large part of northern Guam, generally in the area bordered by other places known as Orunao on the west and Jinapsan on the east. A number of other names may have been known at one time or another for several specific locales, such as the many caves, places of collecting water, villages, neighbourhoods within those villages, attended gardens, patches of forest, canoe launching points, fishing areas, and natural landmarks (Figures 20 through 22). All of those specific names may not be obvious today, but they can be appreciated as integral components of a vibrant community.

FIGURE 20. COASTAL AREA AT EASTERN SIDE OF RITIDIAN, LOOKING EAST, JUNE 2015.

FIGURE 21. VIEW LANDWARD (SOUTHEAST) TOWARD LIMESTONE CLIFF AND PLATEAU, JUNE 2017.

FIGURE 22. SHORELINE IN PUBLIC ACCESS AREA, FAVOURED BY LOCAL FISHERMEN. VIEW IS TO THE NORTHWEST, MAY 2016.

During the late 1600s, when written and unwritten history overlapped in the region, Ritidian was among the many villages abandoned through the *reducción* campaign, also known as the period of Spanish-Chamorro wars. The residents at Ritidian or Litekyan were involved in a series of conflicts with Jesuit missionaries and Spanish militia. The unwritten Chamorro traditions clearly refer to the same events as recorded in the written history that will be considered in Chapter 4. By all accounts, violent confrontations occurred at Ritidian, as well as at many other places, ultimately resulting in radical reduction of the Chamorro population and forced re-location of survivors into a few Spanish-controlled villages.

The traditional village of the late 1600s at Ritidian survives in the ruins of houses, broken pottery, and other materials on the surface today, as seen not only here but also throughout the Mariana Islands. The remnants of houses are known as *latte* (Laguana et al. 2012; Thompson 1940), composed of paired sets of stone pillars (*haligi*) topped by capital stones (*tasa*) (Figure 23). The wooden and thatch superstructures have long since disintegrated, and even the most durable stone pieces have been subjected to more than 300 years of weathering and disturbance.

Today, *latte* represent Chamorro identity and heritage. *Latte* are depicted pervasively in modern art and architecture. This particular design in stone is unique to the Mariana Islands, not known anywhere else in the world, thus adding to the value as a distinctive cultural symbol.

Latte at Ritidian and elsewhere were used as living houses, and their ruins today are recognised as inhabited by ancestral spirits. In this sense, *latte* constitute tangible links with the Chamorro past and specifically with the ancestors who lived during a critical transformative period of the 1600s. In many cases, *latte* can be associated with place names, local histories, and other information.

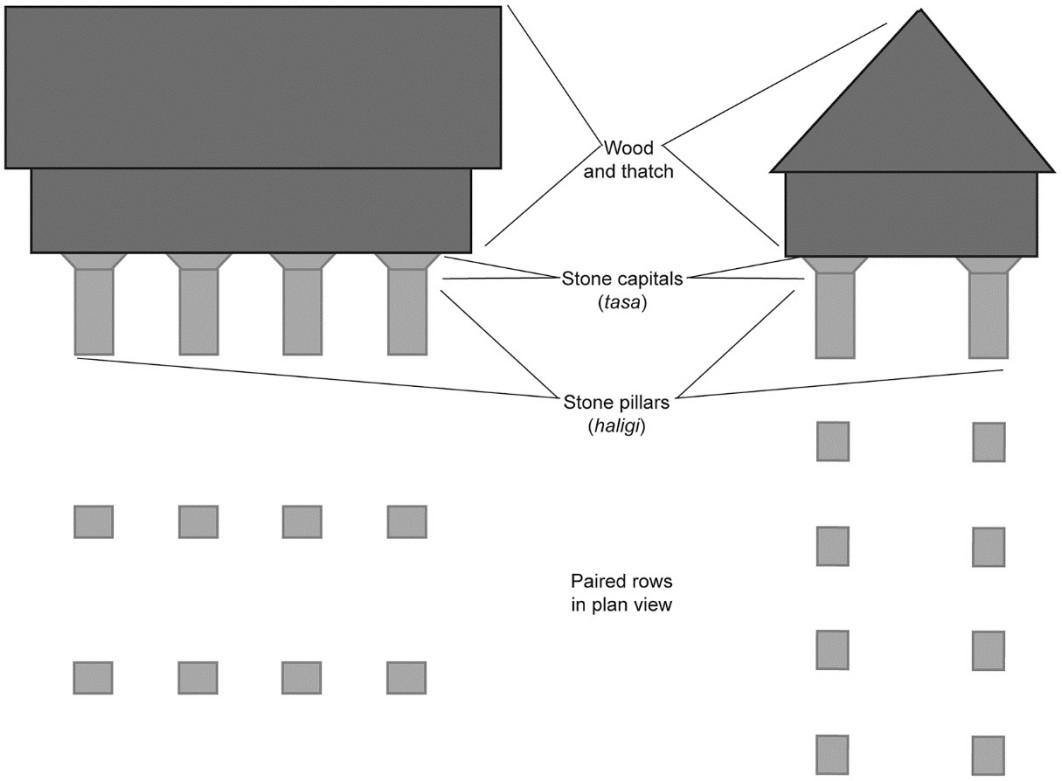

Figure 23. Schematic diagram of *latte* and components, shown in side views and plan views.

At Ritidian and other sites where *latte* are found today, they provide a snapshot of the last time when a village had supported a living community. Many of these sites contain deeper archaeological layers, extending into more ancient periods, but their accessible surfaces generally refer to the last decades of the 1600s. These sites most powerfully symbolise a key turning point in Chamorro cultural history, understood as much more than the decayed ruins of a bygone era.

The remnants of a *latte* village at Ritidian can be appreciated through studies of Chamorro traditions, written histories, language, archaeology, and other perspectives. While most of this information refers to the 1600s, the forms and styles of broken pottery and other archaeological materials can be grouped into a generalised "*latte* period," dated in a broad range of A.D. 1000 through 1700 (Carson 2012a). For instance, the distinctive type of thickened-rim pottery seen on the surfaces of *latte* sites of the late 1600s also can be found in buried deposits as old as A.D. 1000. Surely, Chamorro culture and society experienced a number of changing circumstances throughout these several centuries, yet the overall cultural period has been understood primarily through the abundant and diverse information related to the 1600s.

Knowledge of the *latte* period could be extended as early as A.D. 1000, but people had been living in the Mariana Islands at least since 1500 B.C. if not earlier. Of course all time periods have contributed to Chamorro cultural heritage and identity, but much more is known about the *latte* period than about the older centuries. Compared to the richly documented and widespread record of the *latte* period, the deeper past has been sparse and vague.

By default, the ancient centuries prior to the *latte* period have been regarded collectively as a "pre-*latte* period" prior to A.D. 1000, although in fact several different periods may be distinguished as illustrated in this book. The immediate "pre-*latte*" years just prior to A.D. 1000, for instance around 900–1000, may

be viewed as the proximate context of the emergence of the *latte* period, but they should not be confused with much older periods. Similarly, most historians would regard the "pre-World War II" context as probably not any older than 1900, and the most directly relevant years would have been primarily during the 1930s. The "pre-*latte*" circumstances of A.D. 900–1000 surely differed from the case of A.D. 400–500. Considerably more difference may be expected when referring to more distant eras of 500 B.C. or even farther back to 1500 B.C.

Compared to the ability to reach from the present into the past to learn so much about the *latte* period, the accessibility of older time periods has been problematic. Sites from those time periods are not visible on the surface today, and instead they are known entirely through archaeological excavations of deeply buried layers. Those deep layers are unrelated to the surface-visible *latte* villages, and people had inhabited substantially different environments in the more distant past. Buried layers cannot be observed during site tours and visits, so they are difficult to incorporate into modern experience. Additionally, the bulk of broken pottery and pieces of discarded food debris may not appear attractive in a museum exhibit. Compounded with these challenges, archaeologists have been slow to obtain information from these older centuries, but significant research now has been productive at Ritidian and other sites.

Chapter 4

Written History

Written history overlapped with the end of the traditional *latte* village contexts throughout the Mariana Islands, adding verifiable details in some ways yet raising new questions in other ways. Archival documents at first were sparse during the 1500s and most of the 1600s, then increasingly detailed after the Jesuit missionary efforts began in earnest in 1668. After Ferdinand Magellan's arrival in 1521 and Legazpi's official claim of the Marianas for the Spanish Crown in 1565, the Mariana Islands were regarded as peripheral to Spanish interests of the trans-Pacific galleon trade between the Philippines and the Americas.

Spanish interests and record-keeping grew with the start of intensive Jesuit mission programs in 1668, coupled with military support and conquest. As one of the densely populated areas at that time, Ritidian was among the places targeted by missionaries to convert and control the Chamorro people. These encounters often involved conflicts between the Jesuit and Chamorro groups, and eventually the Spanish militia seized command through force of arms.

The numbers of deaths due to the Spanish-Chamorro wars are unknown, but the surviving people were moved into a few villages under strict Spanish control. By 1700, villages such as at Ritidian were abandoned as part of the *reducción* program, yet they endured as reminders of the past and as symbols of Chamorro cultural history and heritage. These events at Ritidian may be regarded as representative of what happened throughout the Mariana Islands, as the *reducción* campaign had been undertaken at a massive scale affecting every village in every island.

At Ritidian, the Jesuit missionary records testify to an outpost during the 1670s through 1680s, including the building, destruction, and re-building of churches and other structures throughout years of strained relations with the local Chamorro groups. The tension centred around the foreign concepts of Christianity and attendant notions of how the Jesuits idealised that the Chamorro people should conduct their lives, at odds with indigenous Chamorro religion, social order, and lifestyle. The written documents from the late 1600s offer the most direct information about this tumultuous time, although many aspects are open to interpretation.

1) In August 1672, a group of Christian missionaries visited a village called "Retian," but no further details are provided (Lévesque 1995:143).

2) The village of "Retiyan" is mentioned without elaboration in 1674 (Lévesque 1995:221).

3) In the Jesuit annual report for 1674 to 1675 (Lévesque 1995:198–299), Alonso Lopez noted the construction of a church at "Ritidyan," dedicated to Francis Xavier.

4) In the same annual report for 1674 to 1675 (Lévesque 1995:303), Lopez noted: "About 400 attending mass at Ritidian church of San Xavier, as compared to 500 at San Ignacio in Agana, 300 at Santa Rosa in Tupungan, 700 at San José in Upi, and more than 500 at San Miguel in Tarague." These numbers suggest that Ritidian supported a population ranking among the larger villages of the 1670s.

5) Again in the same annual report (Lévesque 1995:303), Lopez noted: "The Father in charge of San Xavier de Ritidian was so well disposed that he undertook to build a college for children (dedicated to the glorious Archangel St. Gabriel) where twice a day 22 children meet."

6) In a document dated 1676 (Lévesque 1995:357), "Rittian" is mentioned as the location of the "residence of St. Francis Xavier" as well as "a house or college dedicated to the glorious St. Sabina where the girls of that residence were collected for their education."

7) The same 1676 document (Lévesque 1995:357–358) describes the death of Brother Pedro Díaz at "the residence of San [Francisco] Xavier of Rittian." According to this account, Brother Díaz was killed after an incident wherein a group of young men invaded the girls' college at night. The next day, Brother Díaz confronted the group, and a rapidly escalating conflict ended in his death.

8) At some point in 1680 or perhaps 1681, the Jesuits merged the church at Ritidian with another at Jinapsan or perhaps Tarague. This new merged church was known as "San Miguel de Ritidian" (Lévesque 1995:547).

9) In 1682 and 1683, Father Peter Coomans wrote letters referring to events of 1681, when an irate mob burned and destroyed the mission of San Miguel de Ritidian (Lévesque 1995). These events reportedly were due to conflicts between the missionary Father Gerard Bouwens and the local Chamorro populations, possibly on two separate occasions.

10) In 1684, another letter by Father Coomans referred to the death of the missionary Father Angelis at San Miguel de Ritidian (Lévesque 1995).

Some of the violence at Ritidian was chronicled in the first successfully published history of the Marianas in 1700, explaining the conflicts as a disagreement about the Chamorro practice of the "bachelor's house" or *guma uritao*. The *guma uritao* was a house (*guma*) where young unmarried men (*uritao*) learned about their sexuality with a designated young unmarried woman assigned to the house. The Jesuits were described as having regarded the *guma uritao* as scandalous and contradictory to Christian ideals, therefore deserving to be destroyed.

Regarding the Jesuit disagreement with the *guma uritao* tradition at Ritidian, the relevant text was written within living memory of the events of the late 1600s, and subsequently it has been translated or paraphrased countless times over more than 300 years. It originally was printed in 1700 with credit to Charles le Gobien as the author (le Gobien 1700). A modern English translation by Alexandre Coelle de la Rosa (2016), however, attributed the authorship to Castilian Spanish documents by Luis de Morales in conjunction with the French version by Charles le Gobien. This most recent English version is reiterated here (translation in Coelle de la Rosa 2016:195):

> Brother Pedro Díaz, a religious man of proven virtue, was in charge of these schools. His zeal made him want to destroy a house of corruption where ten to twelve urritaos lived with one woman in such iniquity that they scandalized the Christians. To do it, he resolved to convert the woman, which he accomplished. She therefore left the urritaos and retreated into the seminary of Ritidian to practice piety and Christian virtues. Angered by the decision of the woman that was the object of their passion, the urritaos resolved to capture her, and with this purpose, three of the most intrepid ones entered the place where the young ladies slept, and caused a great disorder. Brother Díaz was dismayed when he learned about this, and animated by great zeal, he went to see these young men and scolded them for what they had done. These libertines, angry that a foreigner would dare reproach them their vices and violence, attacked Brother Díaz and a companion that was with him, called Ildefonso de Léon, and animating each other to take vengeance, they smashed their heads, killing them both and mistreating their corpses. They did not stop there, and as if they were possessed by the devil, they ran to the church and to the missionaries' house, where they killed Nicolás de Espinosa, set fire to the building, destroyed the two schools, and stole the sacred ornaments and anything that they could find.

Simultaneous with the Jesuit missionary efforts, military conquest spread through Guam and the Mariana Islands during the final decades of the 1600s, when the *reducción* program resulted in devastating de-population of traditional villages and re-location of survivors into a few designated areas. During this time, Ritidian and many other villages were taken by force. According to Fritz (1904:31; translation in Fritz 1984:9), Quiroga (former Spanish governor of Guam) in 1680 "established six parish villages, besides Hagatnia: Pago, Juapsan, Juarahan, Merizo, Humatag and Agat. He destroyed all other settlements and forced the natives to settle around the churches." Resistance against Quiroga's campaign was punished severely. The campaign was more or less complete by 1683 for Guam, yet it was re-established in 1694 through 1698 to conclude Quiroga's efforts in other islands.

Today, virtually no physical trace of the Jesuit outpost is visible on the surface at Ritidian (Figure 24), although the stonework foundation and crumbling walls of a "block house" were described by Hans Hornbostel during the 1920s. According to Hornbostel's (1925) notes, the stonework was constructed with *haligi* and *tasa* taken from nearby *latte* structures, symbolising the power of the missionaries to overthrow the older Chamorro traditions (Figure 25). The construction was situated close to the beach, within the overall footprint of the large *latte* village in the western side of Ritidian, at a spot near the opening in the coral reef for convenience of access and option of a quick departure whenever the missionaries would need to escape from danger. The stonework ruins were mentioned by archaeologists who visited during the 1940s and 1950s (Osborne 1947a; Reed 1952), with variable interpretations as a Jesuit missionary outpost, church, school, or *casa real* (royal house). By the 1960s, the ruins had been destroyed through bulldozing, and now scattered disturbed pieces of house rubble and other debris have survived in archaeological layers beneath the ground (Jaladoni 2014).

FIGURE 24. EXPOSING THE NOW-BURIED OCCUPATION SURFACE IN THE AREA OF THE FORMER JESUIT MISSIONARY OUTPOST OF THE LATE A.D. 1600S. THE AUTHOR IS CLEANING THE ANCIENT SURFACE WITH CONCENTRATIONS OF BROKEN POTTERY AND ASH, IN THIS APRIL 2009 PHOTOGRAPH BY JOHN A. PETERSON. SCALE BARS ARE IN 20-CM INCREMENTS.

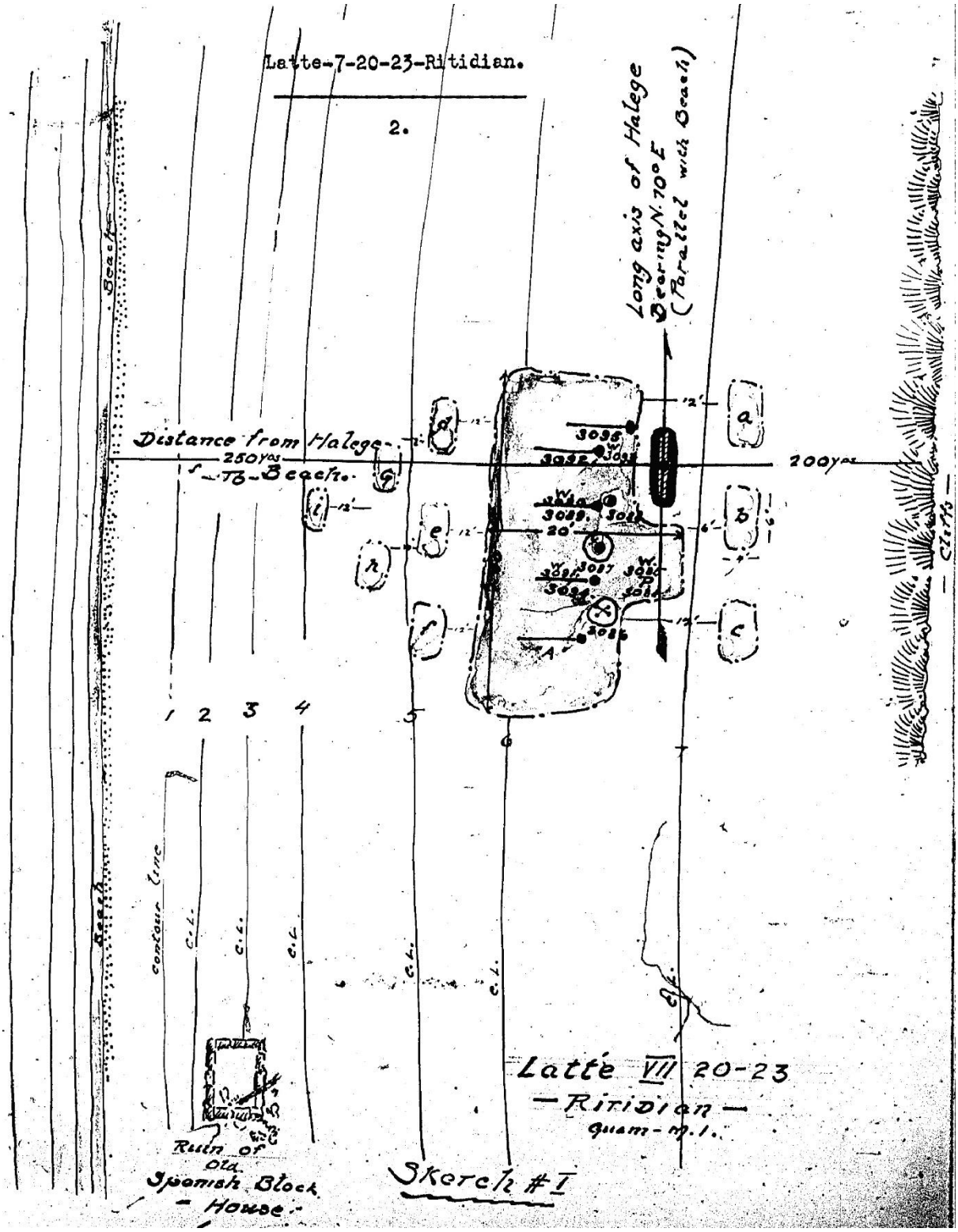

FIGURE 25. MAP OF *LATTE* AND "SPANISH BLOCK HOUSE" AT RITIDIAN, PREPARED BY HANS HORNBOSTEL (1925).

During the Jesuit missionary presence at Ritidian, the "block house" near the beach was within the view of a large cave in the adjacent limestone cliff, associated with older Chamorro traditions. In the 1920s, Hans Hornbostel (1925) wrote: "As this cave is said to have contained skulls which were removed years ago by the Spaniards, it was thought worth while to investigate thoroughly in order to determine whether the ancients used the cave in which they deposited human skulls for other purposes." Hornbostel's excavations indeed found the disturbed remains of Chamorro burials inside the cave (Figures 26 and 27). Ancestral skulls are recognised as having been important in mortuary rituals and religious ceremonies prior to the Spanish missionary influence in the region, so very likely the tradition of removal "years ago by the Spaniards" refers to the efforts of Jesuit missionaries to eradicate and overthrow older Chamorro religious practice.

After the removal of Chamorro people from the *latte* villages, Ritidian and several other places were considered as Spanish Crown Land. More than 100 years later, during the 1800s, Ritidian was converted into an agricultural development (Madrid 2014), in particular taking advantage of the soft sedimentary layers in the western side of Ritidian. This area contains numerous large crater-shaped wells, sometimes with stone lining (Figure 28). The well-digging had displaced and destroyed many of the *latte* structures of the older village.

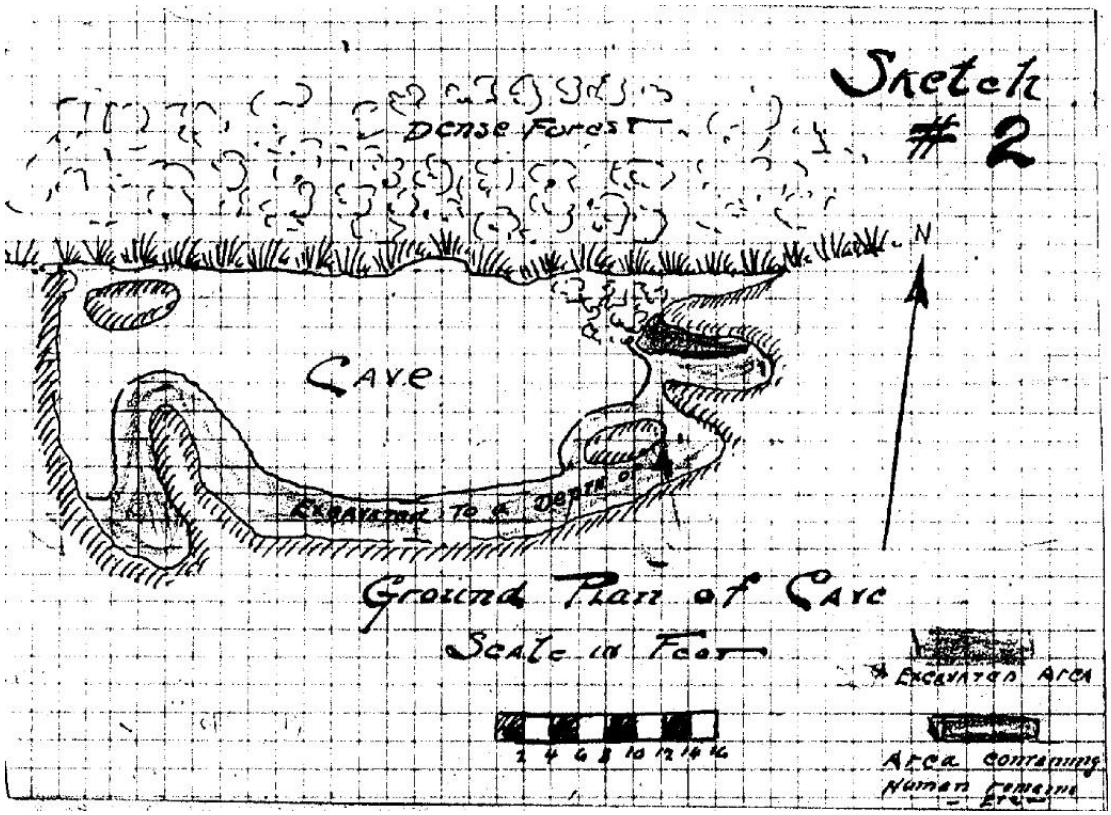

FIGURE 26. MAP OF CAVE EXCAVATION AT RITIDIAN, PREPARED BY HANS HORNBOSTEL (1925). THIS CAVE TODAY IS KNOWN AS RITIDIAN VIEW CAVE.

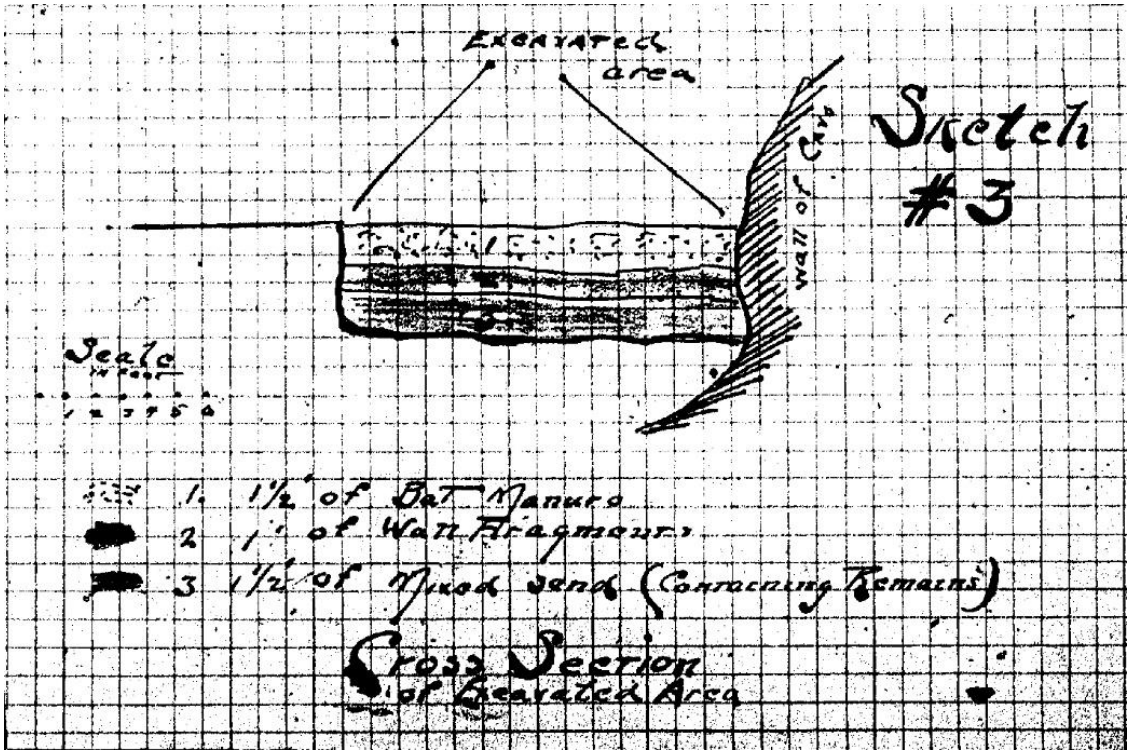

FIGURE 27. CAVE EXCAVATION PROFILE AT RITIDIAN, PREPARED BY HANS HORNBOSTEL (1925).

FIGURE 28. EXAMPLE OF STONE-LINED INTERIOR WITHIN LARGE CRATER-LIKE WELL, ALONG PUBLIC ACCESS TRAIL, JULY 2012.

During the time of the Spanish agricultural development of the 1800s, Ritidian was for the most part isolated from the primary population centres of Guam. In this setting, forest growth was more healthy and dense than in the lands immediately around the heavily populated villages. Even with the intensive agricultural development, large areas of old-growth forest persisted at Ritidian that otherwise were rare in Guam at that time. In the year 1819, de Freycinet (2003:248) described Ritidian as one of two places in Guam (the other was noted as Orote) with "the finest building timber" in the form of trees that he identified as "*agau*, *daok*, *djoga*, *dugdug*, *gago*, *hadju-lago*, *kamatchile*, *nonak*, *ufa*, *unik*, *putting*, *rima*, and *talissai*."

Under U.S. rule from 1898 through 1941, areas such as Ritidian continued to be isolated at a distance from the major villages of Guam. These kinds of peripheral lands were prized by new emerging business entities for coconut plantations and other enterprises. At the same time, new laws and regulations allowed for families officially to own land parcels at Ritidian, in theory honouring older land titles and agreements from the 1800s along with newer developments.

During the Japanese occupation of Guam in 1941 through 1944, no World War II military engagements are known to have occurred specifically at Ritidian. Nevertheless, at least a few Japanese soldiers probably were in the area. From time to time, pieces of Japanese rifles and hand grenades have been discovered in the forest.

After the re-establishment of U.S. rule in Guam, Ritidian was a low priority during efforts to build Guam's post-war infrastructure, but this location was regarded as ideal for monitoring the surrounding ocean and air. The U.S. Naval Facilities of Ritidian Point eventually were commissioned in 1968, following unclearly documented and now disputed agreements with the different land-owning families. After the closure of the Naval Facilities, the area was converted into the Ritidian Unit of Guam National Wildlife Refuge in 1993, although the ongoing concerns of land-owning families and their descendants have not yet been resolved.

Chapter 5

De-coding the Archaeological Records

Archaeological layers at Ritidian represent every period of Chamorro cultural history, from the initial human settlement in the islands all the way through the present day. One portion of this record is immediately visible and accessible on the surface, in the forms of *latte* house ruins, broken pottery, and other objects dating to the last time when people inhabited fully functional *latte* villages during the late 1600s. Other pieces of evidence have been recovered through controlled excavations, documenting the fragments of artefacts contained within ancient layers that are hidden from view today, known only through archaeological explorations.

The surface-accessible sites of the *latte* period are by far the best documented elements of the Marianas archaeological record, not only at Ritidian but also throughout the archipelago. This record adds visibly and tangibly to the most familiar cultural traditions and historical documents, in total supporting a lively picture of Chamorro contexts at approximately A.D. 1000 through 1700. In terms of the archaeological evidence, this period is attested not only in the ruins of *latte* but also in abundant broken pottery and other artefacts, remains of *lusong* grinding mortars, caves bearing pictographs and other signs of ancient cultural practices, and archaeological layers extending beneath the surface.

The subsurface archaeological record is by definition invisible today, except through excavations that penetrate deep enough to recover ancient buried layers. With a program of controlled excavations, Ritidian has been instrumental in defining the full chronological sequence of cultural periods and landscape transformations of the Marianas (Carson 2016). Some of the layers are directly related to the *latte*-associated remains on the surface today, where some centuries of sediments have accumulated during and after the time of *latte* occupation. Many other layers, however, are deeply buried and often in places unrelated to surface-detectable *latte* structures, as will be clarified in later chapters.

Traditional Villages

Based on region-wide surface-guided surveys, Ritidian has been known to contain the remains of *latte* sets (Figure 29) as reported first by Hans Hornbostel (1925) and later reiterated by Douglas Osborne (1947a), Erik Reed (1952), and Fred Reinman (1977). According to Hornbostel's (1925) records, the *latte* village at Ritidian covered several hundreds of square metres, and at least one large cave contained evidence of specialised cultural use. The later survey reporting essentially duplicated the same approximate outline of the *latte* ruins at Ritidian, without specific detailed maps or excavations.

As noted by Hornbostel (1925), Ritidian was one of the many places in Guam bearing evidence of a former *latte* settlement, perhaps involving more than one distinguishable village within the area known as Ritidian. Precise outlines of individual villages are difficult to ascertain, given that the entire northern tip of Guam, including Ritidian and adjacent areas, was depicted as containing more or less continuous *latte*-related archaeological materials. Although portions of the Ritidian area have been disturbed through land-alterations over the decades since Hornbostel's observations of the 1920s, many *latte* still are visible in ruins.

At Ritidian, Hornbostel (1925) recorded three prominent archaeological entities among the larger *latte* village occupation. First, near the shoreline, the remains of a Spanish "block house" were noted, likely related to the events of the late 1600s just prior to the abandonment of the traditional village. Second, a large set of *latte* remains showed a particularly robust construction, and excavations verified sets of human burials within a dense habitation deposit. Third, a cave in the upper limestone terrace was shown to contain

a deeply buried layer with human skeletal remains, broken pottery, and other materials typical of the *latte* period.

Shortly after World War II, Douglas Obsorne (1947a, 1947b) surveyed archaeological sites of Guam, aiming for an island-wide synthesis and update, including Ritidian as just one minor component in a much larger undertaking. This work entailed surface reconnaissance of much of the island. Limited subsurface testing was undertaken in a few selected locations, but no excavation was reported at Ritidian. Of relevance to Ritidian, Osborne (1947a:47) noted:

> From Oruno around the whole northern to northeastern coast on the island there is a continual archaeological area. It has been generally disturbed by recent copra plantations but remnants of sufficient size from archaeologic examination remain. At Ritidian are several small latte groups in a poor state of preservation. They are generally so covered by the prolific limonchina that no more than location could be done. Here too is the Casa Real ruin of the Jesuit mission which was established there in the early years of evangelization.

Later efforts to compile standard site recording for Guam largely followed the pre-existing baseline data of surface-visible *latte* ruins, for example as reported in the Ritidian area. Surface-guided surveys by Erik Reed (1952) and again by Fred Reinman (n.d., 1968, 1974, 1977) concentrated on documenting *latte* sites. The efforts at Ritidian involved visual observation without detailed mapping or excavation, although more efforts were devoted to selections of representative sites in other parts of Guam. With this level of information, Ritidian consistently was described as containing: a) substantial broken pottery on the surface; b) disturbed *latte* elements over a widespread area; and c) possible disturbed remains of the Spanish church or other structure no longer in evidence.

According to the standardised site records for Guam (Reinman 1974, 1977), the Ritidian area coincides roughly with Sites 66-08-0012 and -0013 (see Figure 8). The sites appear to be defined as two large areas where artefacts are visible on the surface, almost certainly relating to the traditional village settlement just prior to abandonment in the late 1600s. Within these two generalised site areas, several specific portions may be discerned as containing variable density, type, and age of archaeological materials.

Much of the eastern portion of Ritidian corresponds roughly with Fred Reinman's 1965–66 description of the area of "Ritidian Point to Pajon Point" in his unpublished report to the U.S. National Science Foundation, quoted here in its entirety (Reinman n.d.: 8–9):

> From Ritidian Point to the central portion of Tarague Beach the coast swings around Ritidian Point and runs nearly in a northwest/southeast direction. On this easterly side of Ritidian construction has removed most of any evidence of occupation for approximately the first 1000 meters. Beyond this area the occupation remains again become fairly heavy. From a point about half way between Ritidian Point and Pajon Point a heavy occupation area exists from the 10 meter contour line all the way back to the cliffs which begin about 250 meters from the beach. Eight sets of latte still survive in this area nearly all of which are 8 stone sets. Most of these are located between 25 and 100 meters back from the beach; two, however, were found only about 75 meters from the cliffs. Several of the latte structures located here also had low stone walls on the down hill (seaward) side of the late as well as a smaller, 4 stone structure adjacent to the larger structure. The uprights of the main latte are relatively flat in cross section with a truncated triangular outline. Pottery, broken tools, and other parts of the now badly broken or destroyed latte are also to be found throughout the area. Coconut, pandanus, and papaya are the principal trees in the area.

Intensive survey since 2005 has resulted in detailed mapping and test excavations of *latte* remains, including two large former village areas in the western and eastern portions of Ritidian. In the western portion, the *latte* mostly had been disturbed or destroyed by land-altering developments since the 1800s,

yet scattered portions have survived intact (Carson 2012b). In the eastern portion, an extensive village complex consists of the remains of several intact *latte* sets and others in variable stages of decay (Carson et al. 2015).

The detailed findings of the *latte* villages will be presented in Chapter 11. In brief, however, this period of approximately A.D. 1000 through 1700 witnessed a widespread and intensive cultural use of the landscape at Ritidian, as had occurred throughout the Marianas Archipelago at that time. Two large villages can be defined at parts of Ritidian, apparently co-existing and furthermore related with ritual activities at several nearby caves.

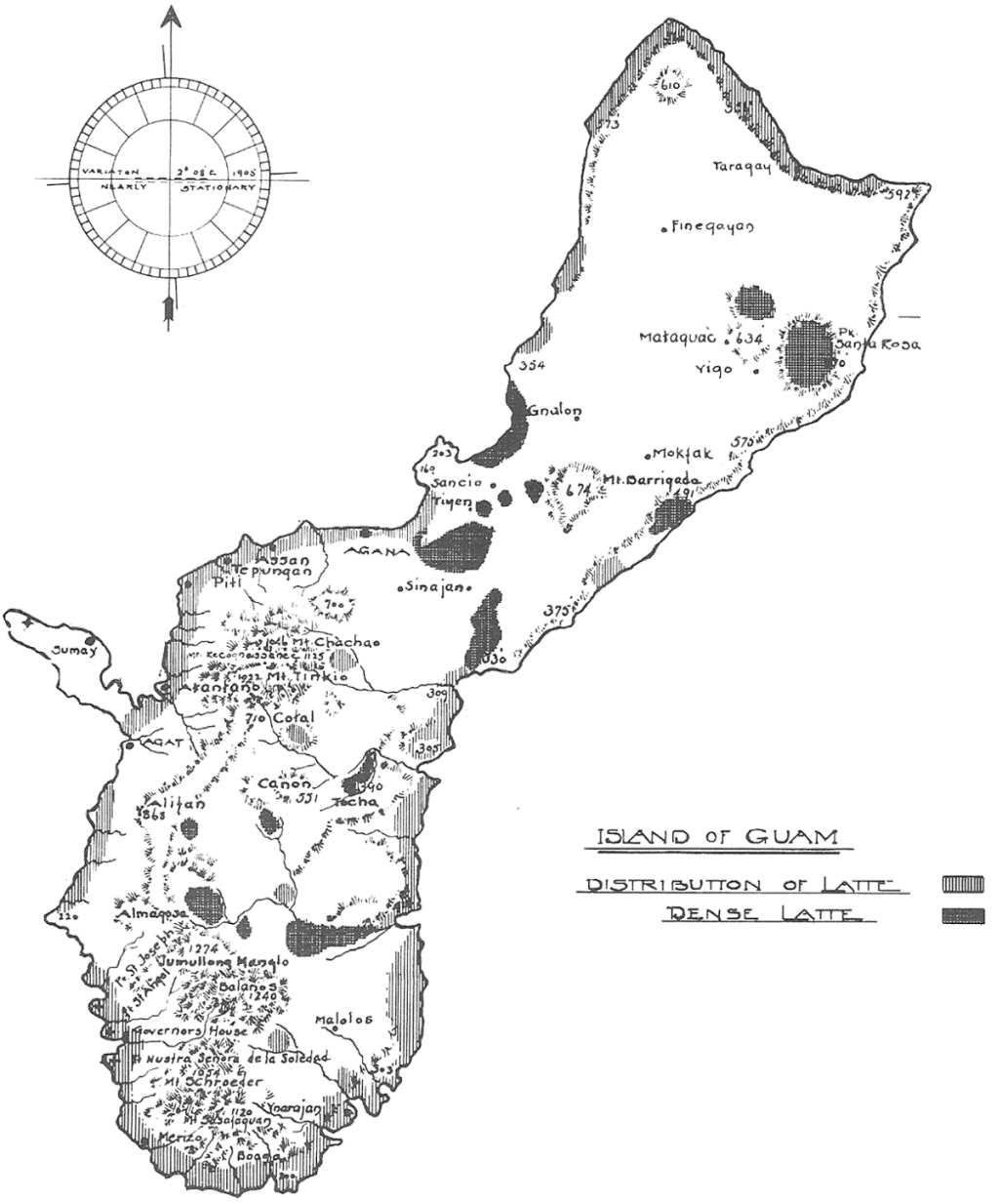

FIGURE 29. DISTRIBUTION OF *LATTE* OF GUAM, PREPARED BY ERIK REED (1952) AND FOLLOWING HANS HORNBOSTEL (1925). AT THE NORTH END OF GUAM, RITIDIAN IS SITUATED WITHIN A LARGE EXPANSE OF *LATTE* ALONG THE COAST.

Caves

Some of the most intriguing signs of the ancient past have survived in the many caves at Ritidian (Figures 30 through 32), where coloured pictographs, rare forms of artefacts, and unusual food debris all reflect specialised venues, significantly different from the daily life in houses and villages outside the caves. For as long as people were living in the islands since at least 1500 B.C., the caves were essential for ceremonial events, involving the creation of pictographs, offerings of ornamental objects, and collection of water in some cases. The details varied from one cave to another, as well as through time, yet the caves persisted as extraordinary places.

Worldwide research has shown that human beings never actually resided permanently inside the dark zones of caves (Bergsvik and Skeates 2012; Brady and Prufer 2005; Clottes 2003; Moyes 2012). Quite simply, human beings are not adapted to live in total darkness and other unusual qualities of deep caves (Montello and Moyes 2012). People worldwide did, however, use caves for periodic shelter and refuge, especially in light and twilight zones more suitable for human life. More importantly, though, people used caves as venues for specialised rituals and ceremonies, as evidently occurred at Ritidian.

At the edge of Guam's northern limestone plateau, the cliff face at Ritidian is riddled with caves and cavities (Figures 33 and 34), classified as solution caves and flank margin caves (Tabarosi 2006). Solution caves formed where the limestone was dissolved by slightly acidic rainwater filtering downward and thus creating cavities. Flank margin caves were created at the outer edges of limestone formations, especially cliff faces, at the interface of the island's internal aquifer overlying a base of saltwater. In all of these cases, the cavity dissolving had occurred many millennia prior to human presence in the region, noting that the upper limestone plateau had formed about 5 million years ago.

FIGURE 30. ENTRY CHAMBER OF STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), AUGUST 2016. SCALES BARS ARE IN 20-CM INCREMENTS.

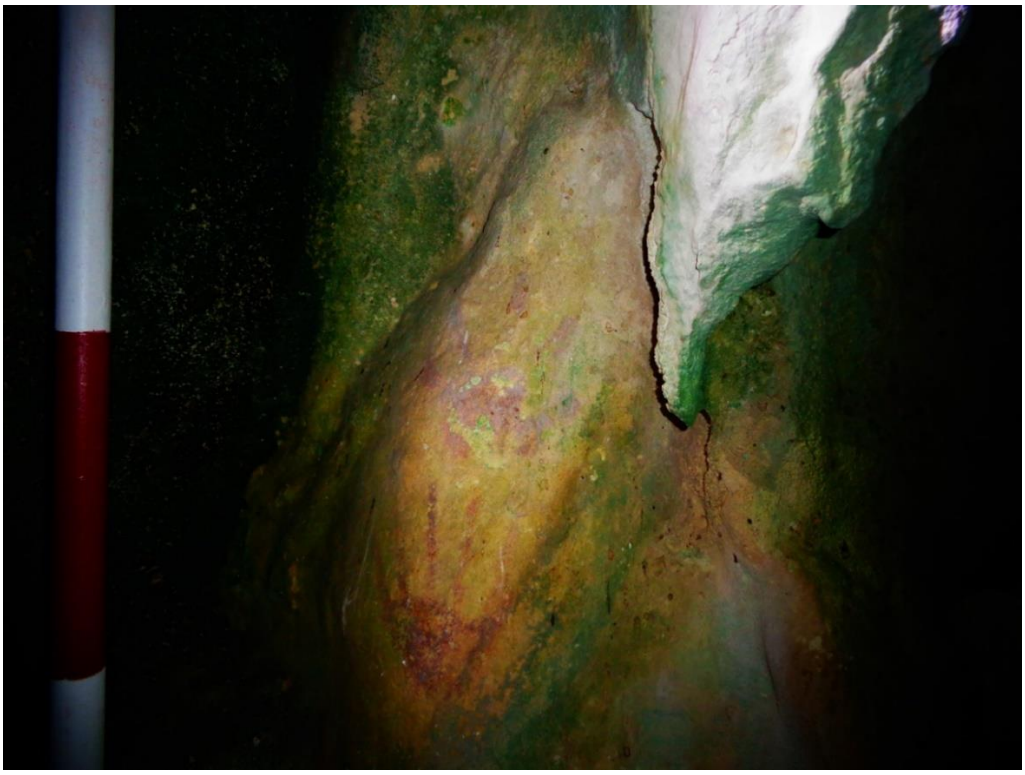

FIGURE 31. PICTOGRAPH PANEL IN RITIDIAN GATE CAVE, JUNE 2017. PANEL INCLUDES RED-PIGMENT COMPONENTS OF A HANDPRINT AND AN X-RAY HAND. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 32. INTERIOR OF FIRST CAVE ("RITIDIAN BEACH CAVE"), SHOWING INCIPIENT WATER POOL AT BEGINNING OF HEAVY RAINING EPISODE, MARCH 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

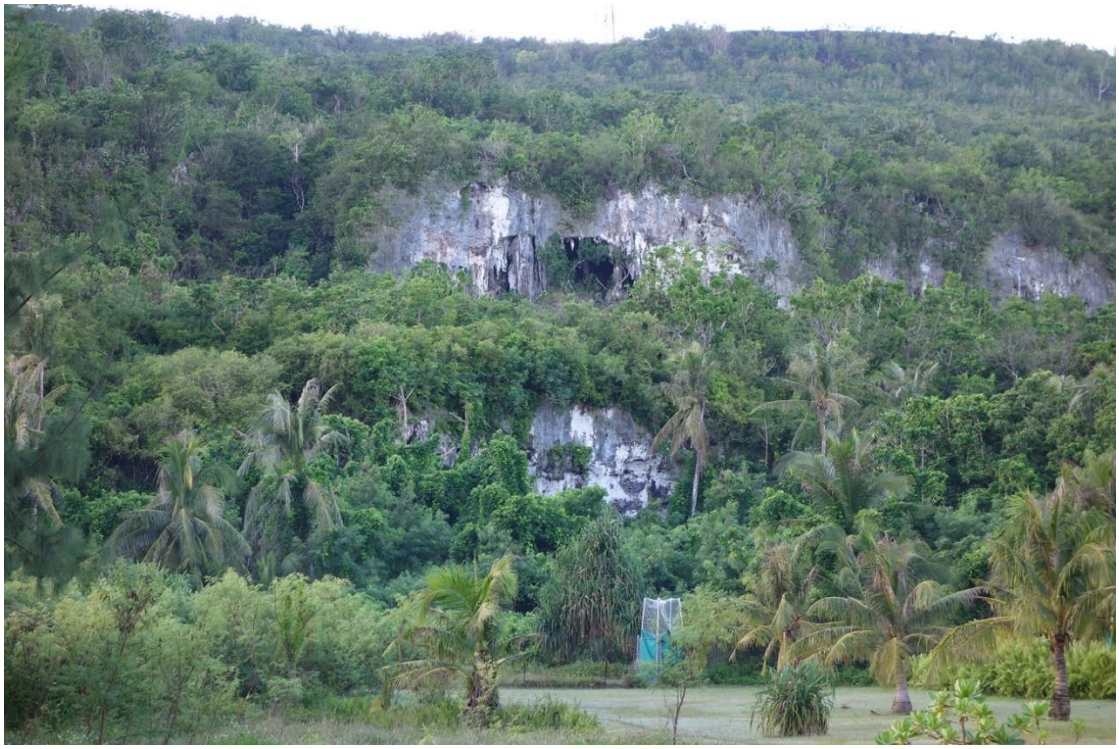

FIGURE 33. LIMESTONE CLIFF AT RITIDIAN, SHOWING RITIDIAN VIEW CAVE IN MIDDLE TERRACE, SEPTEMBER 2015.

FIGURE 34. EXPLORING CAVES AND CAVITIES IN THE CLIFF FACE OF THE MIDDLE LIMESTONE TERRACE, JUNE 2017, WITH JOEY FLORES (BACK LEFT) AND BRIAN LEON GUERRERO (FRONT CENTRE).

Of the several dozens of caves at Ritidian, so far nine caves have been confirmed as containing ancient archaeological evidence (Carson 2017a) (Figure 35). While all nine of those caves have shown signs of cultural use concurrently with the nearby *latte* villages about A.D. 1000 through 1700, a few instances of older cultural activities have been identified. Excavations have found buried layers as old as 1500 B.C. at two caves and as old as 1100 B.C. at one other cave.

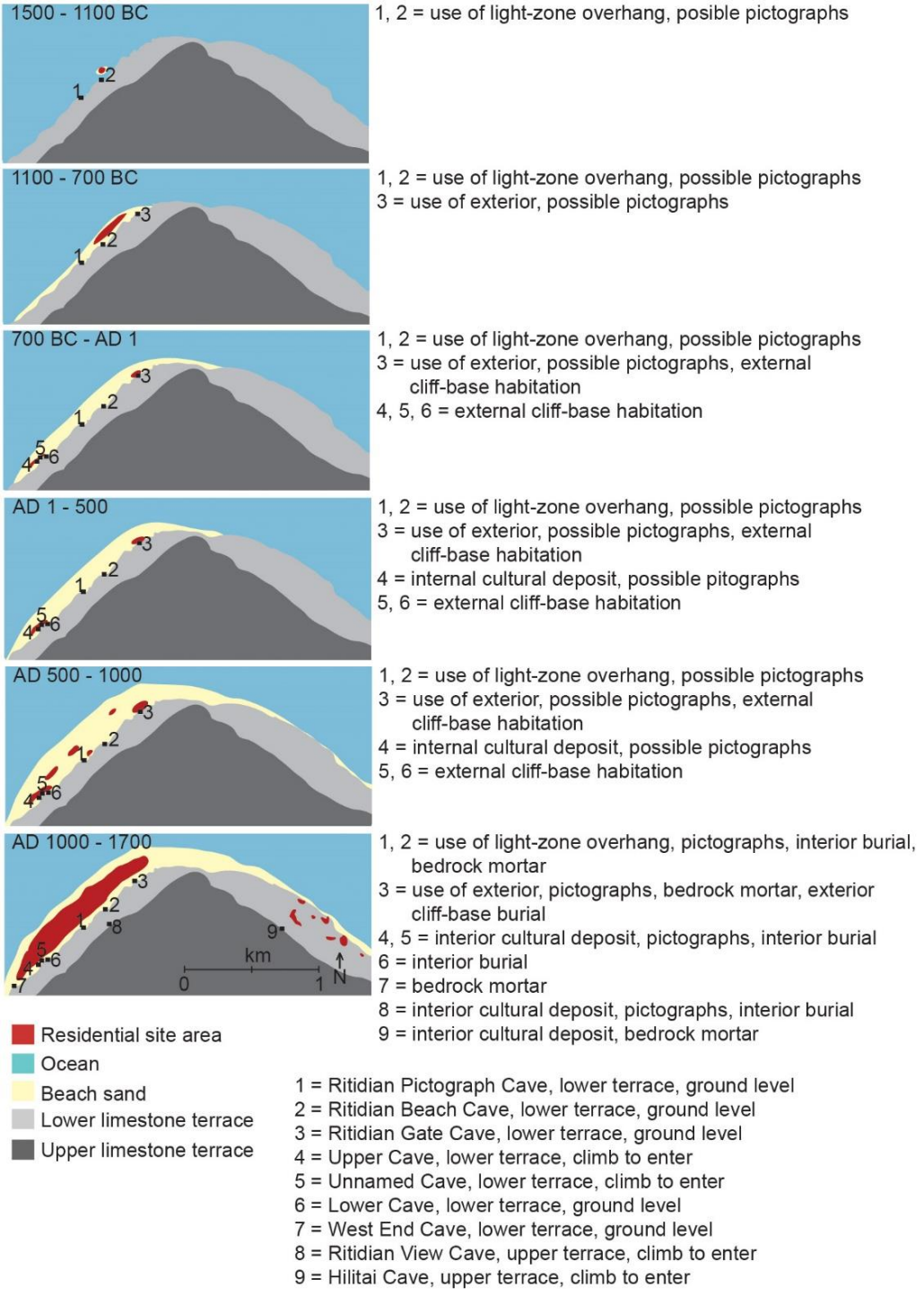

FIGURE 35. CHRONOLOGY OF CULTURAL USE OF CAVES, CONCURRENT WITH OPEN HABITATION SITES.

Archaeological evidence at the caves entails sets of pictographs, *lusong* grinding mortars, and buried cultural layers. The pictographs are noticed in varied colours and motifs, often faded and requiring close scrutiny to discern their forms in full (Figure 36). The *lusong* grinding mortars always are in the external light zones of overhang areas, evidently used for the preparation or processing of pigments, foods, or other materials before or after entering the cave interiors (Figure 37). The subsurface archaeological layers contain traces of the artefacts and foods that had been discarded at the caves (Figure 38).

Human burial features are evident at some but not all of the caves, clearly differentiated from the burials at houses that became most popular during the *latte* period. Nearly all of these interments occurred within the range of A.D. 1000 to 1700, in layers with thickened-rim pottery and other materials typical of the *latte* period, further corroborated by radiocarbon dating. The burial features mostly entailed single pits for each individual, placed in extended position on the back, facing upward, although often the head and occasionally other bones had been removed through later intrusive pits. A few of the burial features were made as deep and narrow pits, containing mixtures of disarticulated human bones with animal bones, shellfish remains, and dense concentrations of burned rocks and charcoal.

The oldest known burials so far at Ritidian were observed at the Ritidian Beach Cave (also known as "First Cave"), in archaeological layers of approximately 700–100 B.C. One format, found at the external overhang area of the cave, involved burial of individuals in extended position on their backs, later accessed for removal of the heads and other bones, leaving the lower portions intact inside the original burial pits (Figure 39). Another format, found in the cave interior, involved secondary re-deposition of disarticulated bones in pits, thereby suggesting that the secondary pits had followed after other mortuary rites (Figure 40).

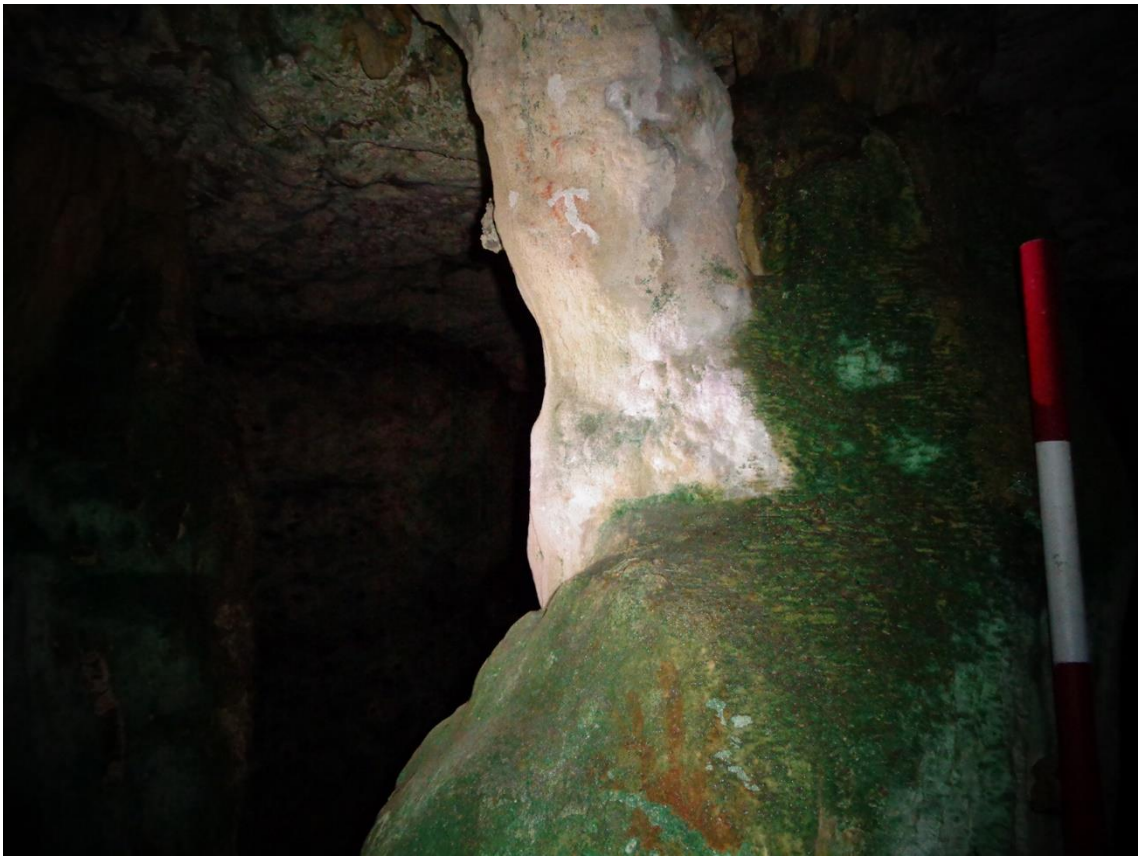

FIGURE 36. WHITE OVERLAYING RED PICTOGRAPHS IN THE STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 37. *LUSONG* GRINDING BASIN IN LIMESTONE SHELF, OUTSIDE FIRST CAVE ("RITIDIAN BEACH CAVE"), JUNE 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 38. EXCAVATION IN PROGRESS AT THE OVERHANG EXTERIOR OF FIRST CAVE ("RITIDIAN BEACH CAVE"), MAY 2017. PHOTOGRAPH BY HSIAO-CHUN HUNG.

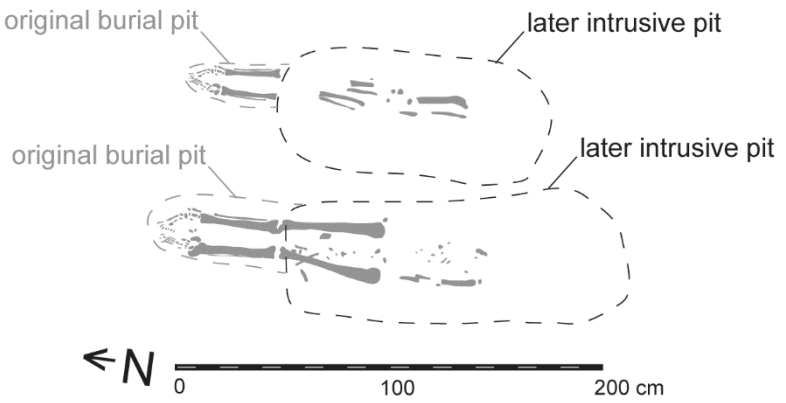

FIGURE 39. FIRST CAVE EXTERIOR BURIALS, DOCUMENTED IN SITU.

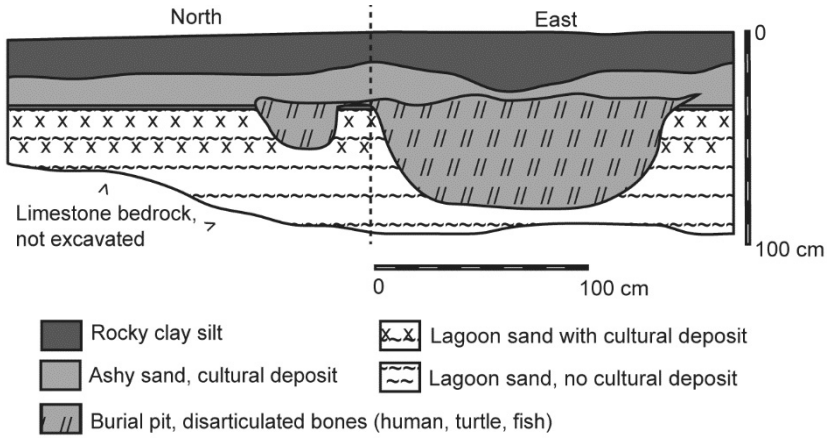

FIGURE 40. FIRST CAVE INTERIOR SECONDARY BURIAL PIT, CONTAINING DISARTICULATED HUMAN, TURTLE, AND FISH BONES AMONG ASH AND MARINE SHELLS.

During the archaeological investigations, burial features were observed and then left preserved in their places. Given the preference for in-place preservation, observations were limited to the basic knowledge of burial format and position, associated datable layers, and the most obvious visible characteristics. Detailed examination was not performed toward assessing bone trauma, health indicators, or other factors that would have required removal and intrusive analysis of the burial remains.

The burial features reaffirm the spiritual and religious significance of the caves, evidently most prominently after A.D. 1000 yet with much older origins of these traditions. Some of the pictographs conceivably depicted the burial acts and rituals, adding to the special-use contexts. Ritual activities probably entailed more than the mortuary practices, although the exact details are difficult to comprehend at this time far removed from the ancient events and their original contexts.

Some of the Ritidian caves are known by various names, but many are unnamed at present. Traditional Chamorro names are not currently remembered, although new research may yet identify relevant place names. The common naming today for the most part follows an island-wide geological survey (Tabarosi 2006), augmented by the names of convenience that have gained local popularity during guided cave tours with the U.S. Fish and Wildlife Service.

Perhaps the most famous of the Ritidian Caves is known as the "Star Cave," where pictographs have been interpreted as elements of a star chart, linked with traditions of star-guided sea-crossing navigation. This interpretation gained popularity since the 1990s, revolving around a panel of thumbprint dots that could represent positions of stars in a 13-month calendar (Figure 41). Other interpretations of course are possible, and curiously none of the rows, columns, or clusters of dots in the Star Cave were made in sets of 13 fitting with the traditional 13-month calendar. The numerous and diverse pictographs prompted the geological survey naming of the "Ritidian Pictograph Cave," and indeed this cave contains more pictographs than any other cave in the area.

FIGURE 41. PANELS OF RED TO DULL REDDISH BROWN THUMBPRINTS AND FINGERPRINTS IN THE BACK CHAMBER OF THE STAR CAVE ("RITIDIAN BEACH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

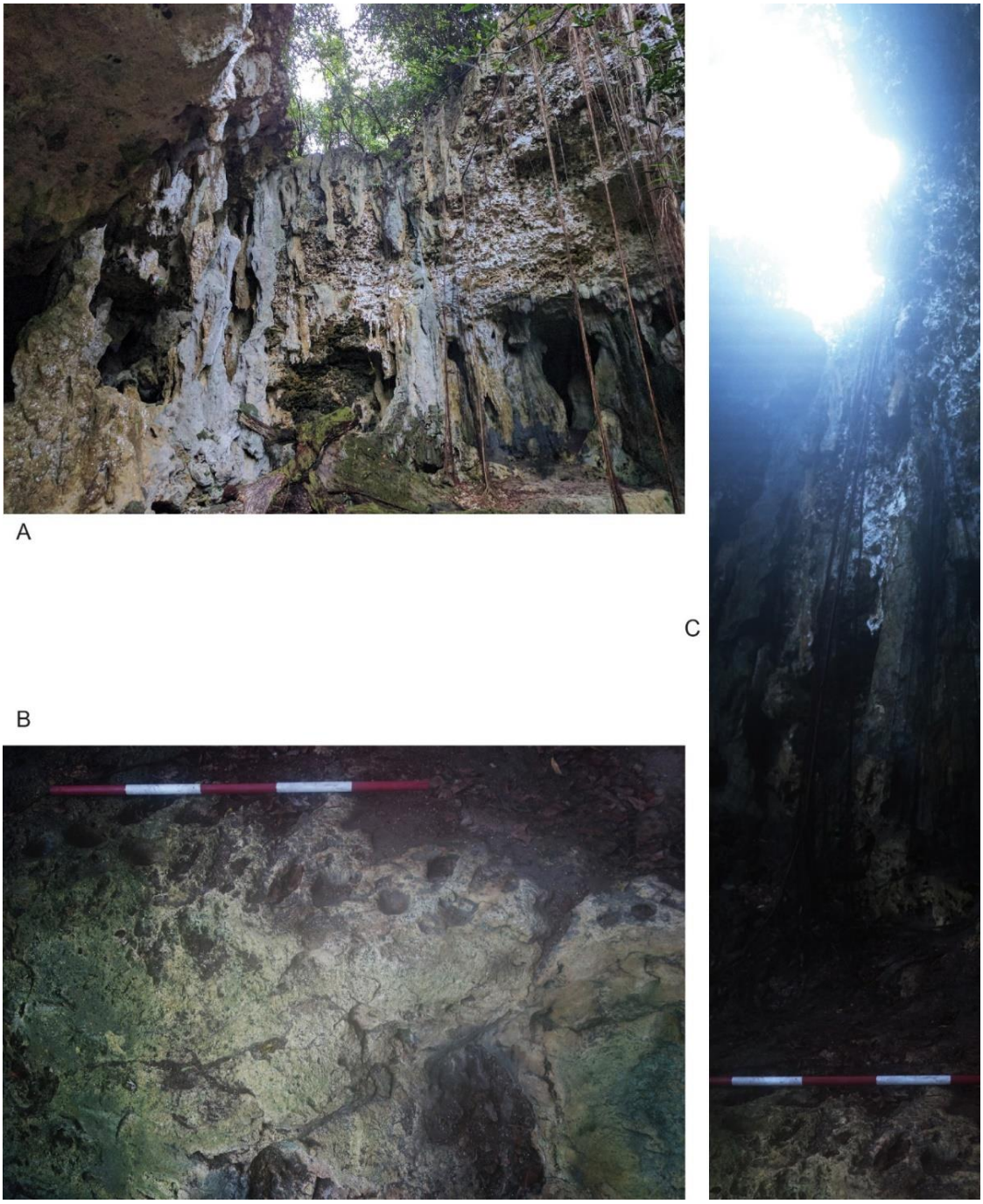

FIGURE 42. VIEWING THE SKY OUTSIDE THE STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"). A = VIEW OF COLLAPSED CEILING, JUNE 2017. B = PERMANENT *LUSONG* GRINDING BASINS IN LIMESTONE SHELF, NOVEMBER 2015. C = VIEW FROM THE PERMANENT *LUSONG* UPWARD TO THE SUNRISE POSITION, NOVEMBER 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

If the panel of thumbprint dots indeed refers to astronomical sightings or recording, then the horizontal and vertical lines most likely reflect the eastern horizon and the rising of the sun, moon, or stars above the horizon. The horizontal line appears curiously unusual, with a downward dip at the right-hand side, possibly depicting the shape of the east-facing external cave opening when viewed from the permanently marked position of a set of *lusong* grinding mortars (Figure 42). The three vertical lines possibly depict the different positions of the rising sun, moon, or stars at different times of the year, for instance at the

summer and winter solstices (the outer left and right extremes) and the spring and autumn equinoxes (both coinciding in the middle vertical line). All of this speculation must be regarded as tentative and so far untestable, and furthermore no explanation yet has been forthcoming for the two clusters of fingerprints adjacent to the apparent chart panel (see Figure 41).

While the "Star Cave" or "Pictograph Cave" has been the major highlight of guided tours by the U.S. Fish and Wildlife Service, several other caves contribute to the cave experience at Ritidian. The first cave on the tour was recorded as "Ritidian Beach Cave," but it also is known as the "First Cave," coincidentally where one of the most ancient archaeological layers has been verified about 1500 B.C. Other caves along the guided trail were not named during the geological survey, although various colloquial names have been proposed.

Outside the guided cave tour trail, the caves with archaeological evidence include the View Cave, where Hans Hornbostel had excavated in the 1920s, as well as several others, such as Ritidian Gate Cave, Lower Cave, Upper Cave, Unnamed Cave, West End Cave, and Hilitai Cave. Excavations so far have been limited in size, but they have been sufficient to document the time range and general scope of past cultural activities at each cave. Given the sensitivities both for cultural and safety reasons, the caves are strictly protected, and the guided tours provide controlled access only to a few selected areas.

Although the caves have been well protected within the last few decades, the results of vandalism are visible in Lower Cave (Figure 43). The vandalised elements include spray-painted personal names, vernacular phrases, local high school insignias, imaginary animals, and calendar dates of the 1970s. During the 1970s, a road provided vehicle access within some footsteps of the cave, but it more recently has been closed and blocked by a boundary fence. Notably, no further vandalism has been observed since the 1990s under the management of the U.S. Fish and Wildlife Service.

The findings from dated archaeological layers will be disclosed in chronological order in Chapters 6 through 11, but the pictographs in the caves are difficult to situate in specific time periods. At present, the pigments of the pictographs have not been dated directly. Instead, they are being preserved in place without removal of samples.

FIGURE 43. MODERN VANDALISM IN LOWER CAVE, SHOWN IN JULY 2012.

An approximate chronology of the Ritidian pictographs so far has been based on the dating of associated archaeological layers and on observations of super-imposed motifs in some cases (Carson 2017). Four different formats can be discerned in terms of the motifs and pigments (Figure 44).

1) Black-pigment contorted human figures and geometric shapes appear to be the oldest images (Figures 45 and 46). They are found in small numbers and only at Ritidian Beach Cave (also known as "First Cave") and Pictograph Cave (also known as "Star Cave). These two caves happen to be the only caves bearing evidence as old as 1500 B.C., hence the potential old age of the black-pigment images. These particular images are restricted to dark and high-reaching portions of the caves, differentiated from the other pictographs drawn in more visible and accessible locations.

2) Dull reddish brown geometric patterns of compound elements are of unknown age, but they occur solely at Pictograph Cave and therefore potentially extending as old as 1500 B.C. As noted, a set of thumbprint dots could represent a counting system or a way of referring to the sun, moon, or stars rising above the eastern horizon (see Figure 41). Other shapes are difficult to interpret at this time, although one image resembles a crab (Figures 47 through 50).

3) Bright red pictographs definitely are among the older elements, found so far in two caves. They are overlain by white-pigment human figures in Pictograph Cave (Figure 51; see also Figure 36), where associated archaeological layers are as old as 1500 B.C. They are the only images in Ritidian Gate Cave (see Figure 31), where the archaeological deposits have been dated as old as 1100 B.C. The bright red images include mostly handprints, occasional x-ray hands, and two unique occurrences of an asterisk and a circle (Figures 52 through 57). In the Pictograph Cave, most of the handprints were placed within horizontal reach of a person standing at ground level, but a few were placed on the ceiling.

4) White-pigment human figures are the youngest images, apparently post-dating A.D. 1000 (Figures 58 and 59) They all were drawn at head-level or arm's reach on the cave walls. They are the only images in Lower Cave, Upper Cave, and View Cave, where the predominant cultural deposits post-date A.D. 1000. These images possibly portray mortuary rituals, ghosts, or ancestors.

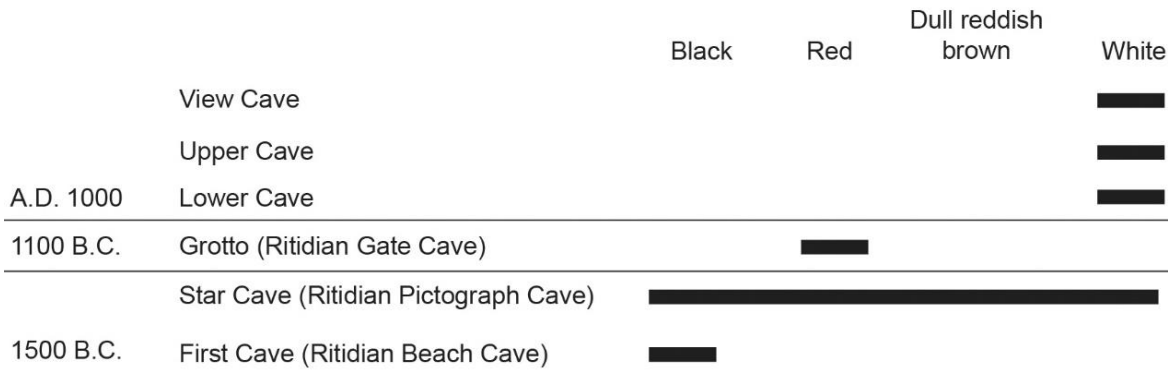

FIGURE 44. TENTATIVE CHRONOLOGY OF ROCK ART AT RITIDIAN.

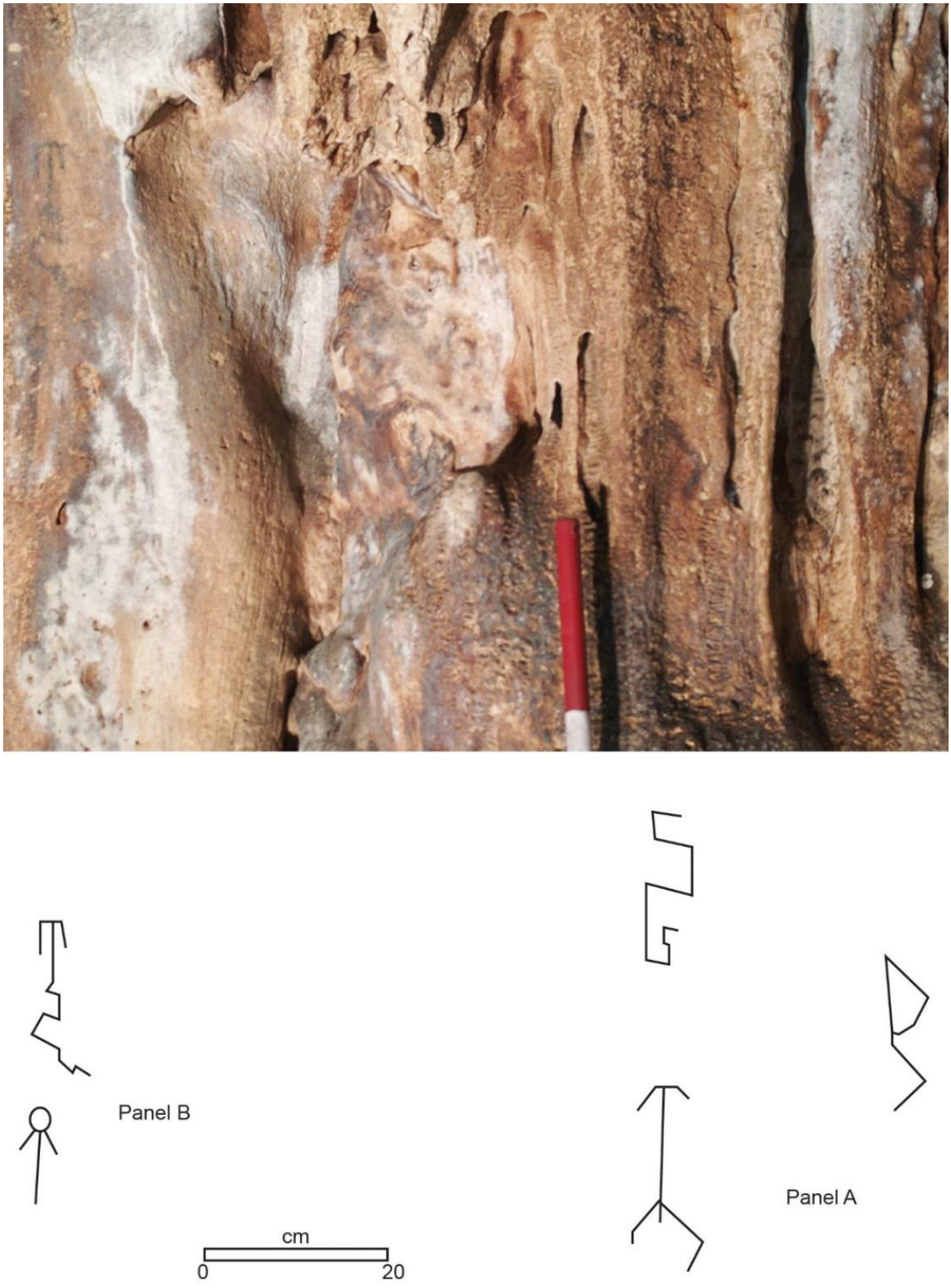

FIGURE 45. BLACK IMAGE PANELS IN FIRST CAVE ("RITIDIAN BEACH CAVE"), AUGUST 2016. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 46. BLACK IMAGE PANEL IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 47. TWO ADJACENT DULL REDDISH BROWN PANELS IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 48. DULL REDDISH BROWN PANEL NEAR FLOOR IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 49. DULL REDDISH BROWN PANEL OF ENIGMATIC GEOMETRIC SHAPE IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 50. CRAB SHAPE PICTOGRAPH IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 51. WHITE PIGMENT PARTIALLY COVERING FADED RED HANDPRINTS IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 52. X-RAY HAND IMAGE, PARTIALLY SCRATCHED, IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 53. REPRESENTATION OF APPARENT HAND AND FOREARM, WITH ADJACENT GEOMETRIC SHAPES, IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 54. HANDPRINT AND CIRCLE IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 55. HANDPRINT ON CEILING IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 56. SIX-POINTED ASTERISK IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 57. HANDPRINTS ON CENTRAL LIMESTONE PILLAR IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), PARTIALLY OVERLAIN BY LATER-AGED WHITE PICTOGRAPHS, JUNE 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 58. EXAMPLES OF WHITE PICTOGRAPH IMAGES IN STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), JUNE 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 59. EXAMPLES OF HEADLESS WHITE HUMAN FIGURE PICTOGRAPHS IN UPPER CAVE, MARCH 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

In all cases, the archaeological findings at caves differed notably from the materials at daily habitation sites outside the caves. This difference was persistent through all time periods. At the caves, people used extraordinary forms and styles of pottery and other artefacts at the caves, including some types that were either unknown or else extremely rare anywhere else. Also at the caves, people discarded food remains atypical of ordinary residential habitation sites, often disposed in designated pits.

Among the special qualities of caves, water collection must be recognised as a primary characteristic. When people first lived at Ritidian about 1500 B.C., at least a few caves at that time contained pools of fresh water connected with the island's interior aquifer. At that time, the level of fresh water was elevated 1.8 m higher than today, floating over a higher sea level. The freshwater lens thereafter dropped, following the drawdown of sea level after 1100 B.C. Although ground-accessible water lessened after 1100 B.C., ceiling drip continued to supply collectable water in many caves. Meanwhile, freshwater seeps just above sea level continually shifted in accordance with the changing sea level and shapes of coastlines at Ritidian as throughout Guam.

Layers of Cultural History

Within recent years, archaeological excavations at Ritidian have been instrumental in clarifying the chronological sequence of layers of Chamorro cultural history in the Mariana Islands. Several sites throughout the archipelago have contributed to the overall picture of the archaeological chronology, but the Ritidian Site in particular has revealed crucial information spanning the entire sequence (Carson 2016). The oldest archaeological layers here date around 1500 B.C., equal with the first human settlement in the Mariana Islands and in fact in all of the Remote Oceanic region (Carson 2014a; Carson and Kurashina 2012), followed by layers representing every other time period through the present day.

Subsurface exploration is not always considered by archaeologists who focus on surface-visible site ruins, and in fact it has been emphasised only recently in Marianas archaeology. Increasingly over the last decades, archaeologists worldwide intensified their efforts in excavating deep beneath the ground surface, exploring the potential to learn about ancient cultural layers pre-dating the surface-visible ruins and monuments such as the *latte* sites of the Mariana Islands. Among this worldwide trend, Alexander Spoehr (1957) promoted stratigraphic excavations, chronological sequencing, and radiocarbon dating in the Mariana Islands, where he demonstrated a cultural sequence dating at least as early as 1000 B.C. and pre-dating the *latte*-associated materials of A.D. 1000 through 1700. Spoehr worked in the islands of Rota, Tinian, and Saipan with clear implications for investigations in Guam.

Despite the potential of deep and old site layers as proven by Spoehr's (1957) excavations, field research in Guam continued to rely on surface surveys of *latte* and occasional cave investigations for some decades. Sites such as Ritidian therefore were known to hold *latte* ruins, but the possibility was not explored for finding older archaeological layers pre-dating the known *latte* villages. Today, the official site records of the Guam Historic Preservation Office are based almost entirely on the surface surveys as coordinated by Fred Reinman (1974). Indeed, most of the land area of Guam contains sites of the *latte* period, and older site layers are found only in limited places such as at Ritidian.

Deliberate subsurface exploration for ancient layers in Guam gained momentum with research at Tarague (Kurashina et al. 1981) and then at Ritidian (Kurashina 1990). Even with these and other encouraging examples, most archaeological work in Guam has been performed in compliance with land development projects, constrained to the footprints of those developments and not necessarily targeting the specific locales bearing ancient subsurface archaeological layers. By default, the preponderance of archaeological knowledge in Guam and throughout the Mariana Islands refers to the *latte* period or later-dated contexts. For instance, Kurashina (1990) found the *latte*-related layers within the given boundaries of U.S. Government infrastructure work at Ritidian, although adjacent locales were expected to contain much

older deposits. The new body of work here has expanded on the initial findings by Kurashina (1990) in a small permitted footprint area, now with the ability to search throughout the broader landscape of Ritidian as a whole.

Excavation-oriented research at Ritidian has been ongoing since 2005, aimed at coordinating the different layers within a complete chronological sequence. Summary narratives have been developed periodically (Carson 2012b, 2014b, 2017a), and the present synthesis here offers the most updated information as a chronologically ordered guidebook. Within the overall sequence, a number of investigations concentrated on specific time periods, such as the earliest settlement at 1500 B.C. (Carson 2014a, 2017b; Carson and Hung 2015), a detailed survey of the east *latte* village comples (Carso net al. 2015), a study of labour divisions at *latte* households (Bayman et al. 2012a, 2012b), and the Spanish-Chamorro contacts of the late 1600s (Jalandoni 2014).

The current research findings at Ritidian have been achieved through a wide-ranging access to the Ritidian Unit of Guam National Wildlife Refuge. Instead of being confined to the footprint of a given land development project, the research investigations could account for the larger setting. With this broader working space, the excavations first accounted for sample transects of the terrain, then targeted specific locales with the greatest potential to learn about particular time periods.

All of the archaeological layers at Ritidian have produced important information about the past, and in total these layers substantiate a chronologically ordered narrative as presented in the next several chapters. In any pinpointed location throughout Ritidian, excavations have uncovered only one layer or a few layers of limited time periods. No single excavation window yet has recovered distinct layers of every time period all together, but rather the numerous excavations in combination can account for the full parameters at the scale of Ritidian as a whole entity.

The chronological sequence at Ritidian was possible through classic archaeological excavation, involving first a relative ordering of layers and then radiocarbon dating of each of those layers. Within each defined layer, the body of evidence reveals aspects of the natural environment, how people lived in that environment, and what changed from one time period to the next. Specific points of information are outlined in the next chapters.

Chronological Sequence

Archaeological excavations have identified the ancient layers belonging to measured time periods, in total covering a sequence of more than 3500 years of an ever-changing landscape at Ritidian. Within each of those dated layers, enduring physical evidence refers to the different tools and ornaments that people used, the kinds of foods that they ate, and how they lived in relation to their changing environment. Each archaeological layer tells the story of what happened during a particular time period, together forming a cohesive chronological narrative.

The Ritidian chronological sequence has been outlined through a thorough survey, including subsurface test excavations across the entire area (Figure 60). In the particular locations with especially informative layers of specific time periods, additional excavations have enlarged the windows into those periods. Ample evidence now is available for narrating a holistic natural-cultural history of Ritidian, refined with robust radiocarbon dating (Table 1) and matched with a larger regional chronology of pottery and other artefacts (Figures 61 and 62).

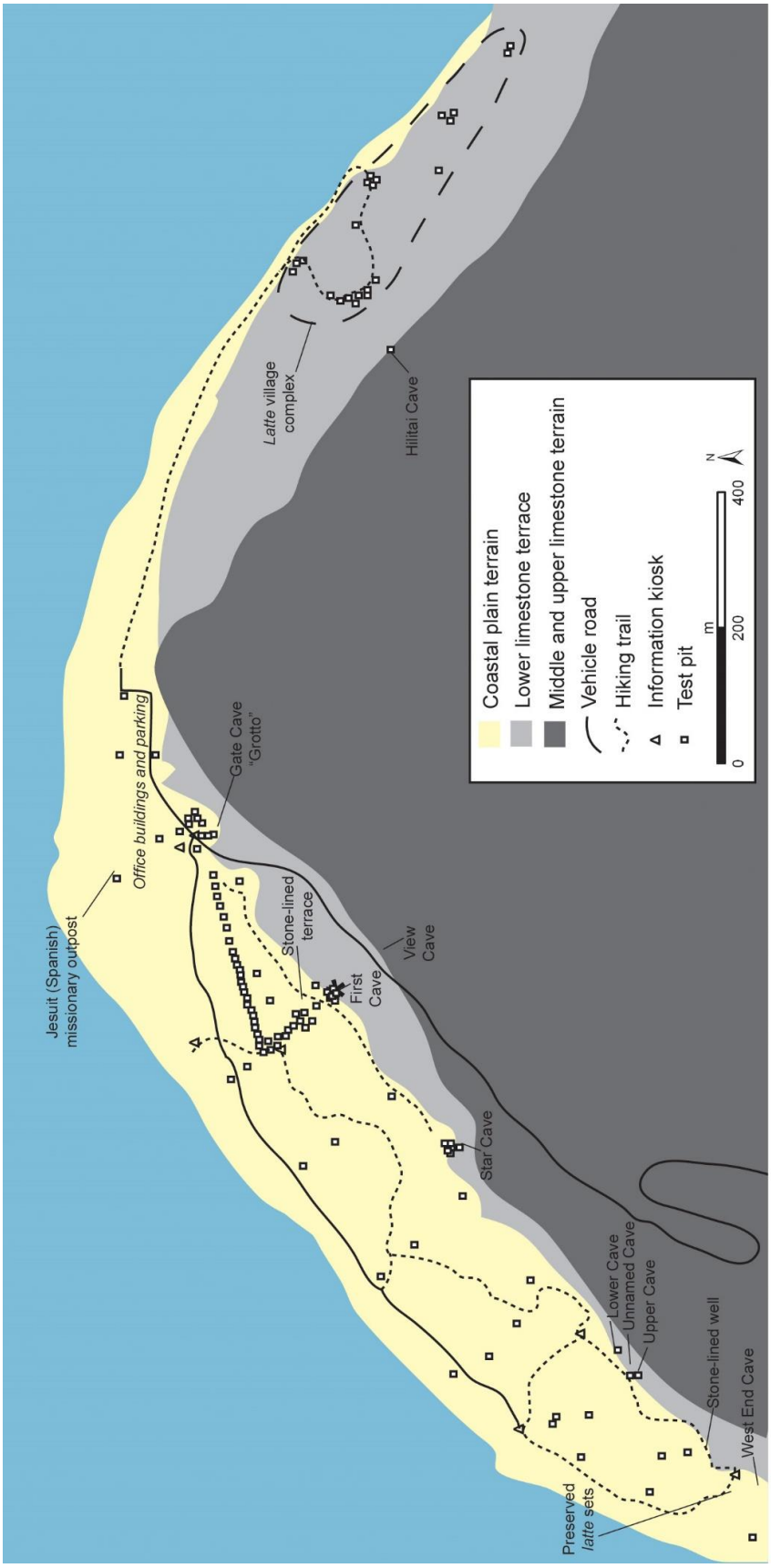

FIGURE 60. DISTRIBUTION OF ARCHAEOLOGICAL TEST PITS ACROSS THE SITE COMPLEX AT RITIDIAN, 2005 THROUGH 2016.

Given the extent of the test excavation surveying, the combined positive and negative evidence can illustrate the ancient scene of any given time period. For instance, at 1500 B.C., a higher sea level and different coastal ecology resulted in very small footprints of possible archaeological deposits in just a few spots, while much of the Ritdian area at that time was underwater or otherwise uninhabitable. Numerous test pits thus have outlined the parameters of the inhabitable versus uninhabitable zones at different measured time intervals. The mapped configurations of archaeological findings of course varied through time, as emphasised here.

Six major time periods are discussed in Chapters 6 through 11. For each definable time period, the pertinent information is provided in a manner similar to a museum exhibit, wherein the raw data can be perceived and appreciated. Possible interpretations are offered with reference to the material basis in the hard data, ideally encouraging further thought and discussion.

As presented here, the individual time periods are not designated by names or phrases, but rather they are discussed in reference to their approximate dated intervals. Future work may yet refine the sequence, but the current state of knowledge can discern the contexts of 1500–1100 B.C., 1100–700 B.C., and so on through the latest archaeologically detectable interval at A.D. 1000–1700. This approach avoids the imposition of modern bias, whether intentional or not, and instead the material evidence can be appreciated in its own terms. Furthermore, this approach strengthens the ability to situate the specific archaeological findings within their original contexts, as well as to trace chronological change.

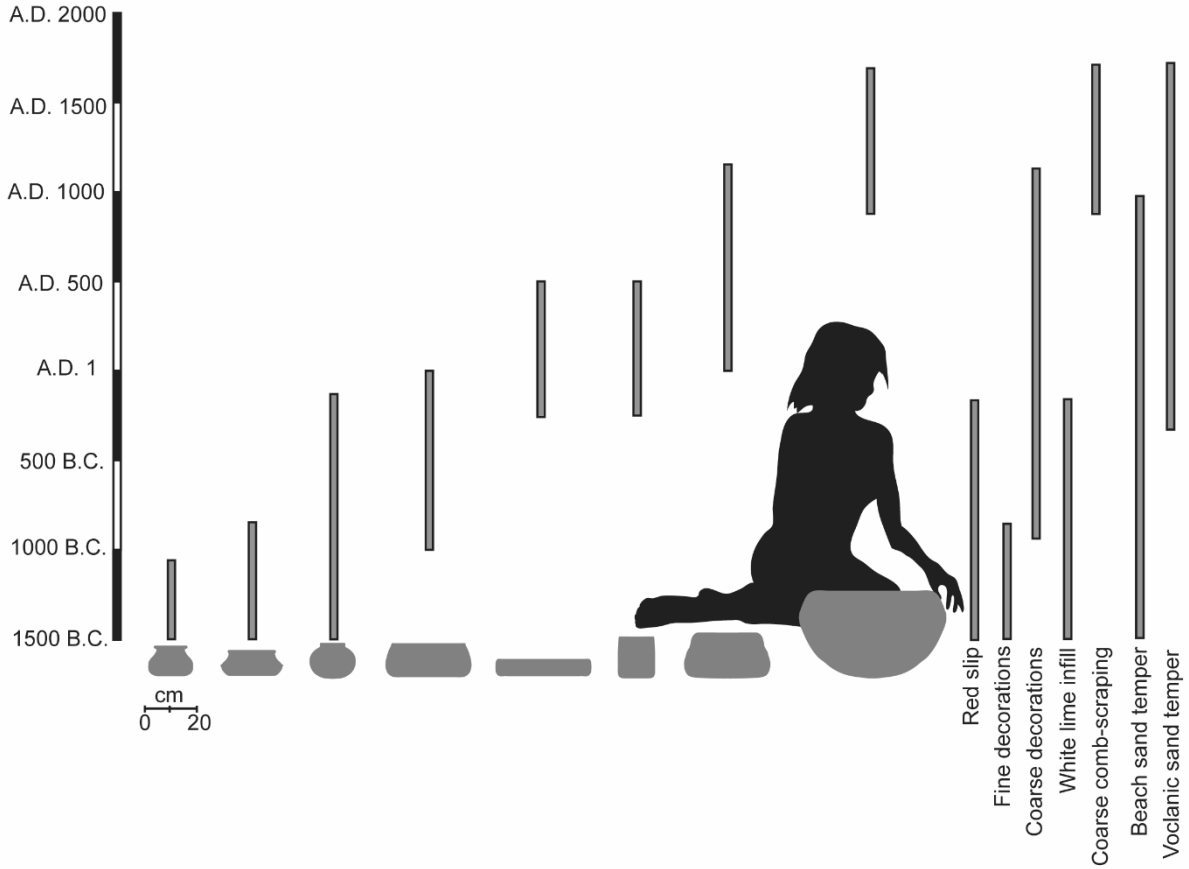

FIGURE 61. CHRONOLOGY OF MAJOR POTTERY CATEGORIES AND CHARACTERISTICS.

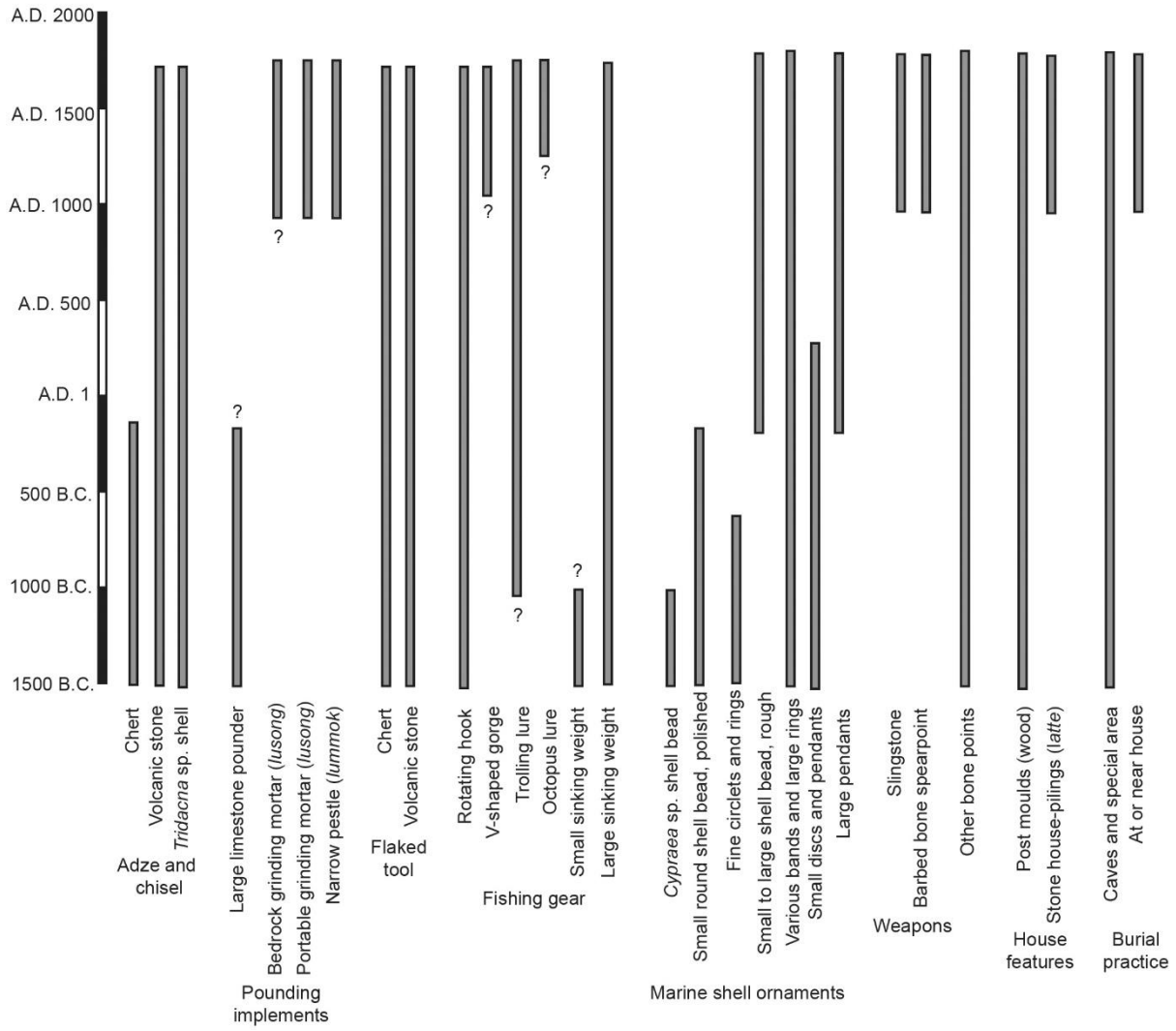

FIGURE 62. CHRONOLOGY OF MAJOR CATEGORIES OF STONE, SHELL, AND BONE ARTEFACTS.

The most abundantly known record of A.D. 1000–1700 corresponds with *latte* sites, post-dating the prior several centuries of older archaeological contexts. In this sense, colloquially named designations of "pre-*latte*" and "*latte*" periods are accurate, but they are imprecise. They are accurate in terms of referring correctly to the presence or absence of *latte*-associated materials, but they are imprecise in terms of lacking important finer distinctions.

In each of the next chapters, the narrative follows a standard format for each time period, beginning with a summary overview and leading into the supporting details and interpretive discussions. Within each time period, the presentation clarifies the site setting of the natural environment and inhabited cultural context, then proceeds with consideration of the range of identified artefacts and other material evidence. Furthermore for each period, the findings from Ritidian are discussed in relation to the Mariana Islands and within the larger Asia-Pacific region.

TABLE 1. RADIOCARBON DATES FROM THE RITIDIAN SITE IN GUAM.

Context	Beta-#	Material	δ13C (‰)	δ18O (‰)	Conventional Age (years BP)	Marine Reservoir Correction (ΔR)*	2-Sigma Calibration (calendar years)**
Fenceline Pit 35							
98–105 cm, beach ridge habitation	239577	Carbonised coconut endocarp fragment	-25.4	-	2810 ± 40	-	1073–1066 B.C. (0.77%); 1057–843 B.C. (94.7%)
98–105 cm, beach ridge habitation, testing for possible ΔR	239576	*Cellana* sp. shell	+3.9	-	5180 ± 40	2041 ± 56	1165–806 B.C. (95.4%)
105–110 cm, beach ridge habitation, testing for possible ΔR	239578	*Anadara* sp. shell	+1.5	-	3140 ± 40	1 ± 56	1165–806 B.C. (95.4%)
110–120 cm, natural tidal surge layer, inferred as following initial sea-level drawdown	303808	*Acropora* sp. branch coral	-1.1	-	3260 ± 30	-49 ± 61	1386–1006 B.C. (95.4%)
250–260 cm, within cultural layer of palaeo-seashore context	253681	*Anadara* sp. shell	-0.7	-	3430 ± 40	-49 ± 61	1595–1222 B.C. (95.4%)
255–260 cm, natural matrix of cultural layer in palaeo-seashore context, equal or pre-dating the cultural material	253682	*Halimeda* sp. algal bioclasts	+5.3	-	3480 ± 40	-49 ± 61	1646–1281 B.C. (95.4%)
262–263 cm, natural component of palaeo-seashore pre-dating cultural presence	303807	*Acropora* sp. branch coral	-3.0	-	3750 ± 30	-49 ± 61	1975–1611 B.C. (95.4%)
260–265 cm, coral reef of mid-Holocene highstand, pre-dating cultural presence	253683	*Heliopora* sp. coral	+4.4	-	4100 ± 50	-49 ± 61	2472–2029 B.C. (95.4%)
First Cave (Ritidian Beach Cave), cave overhang exterior							
Stable backbeach layer	433372	Charcoal	-26.3	-	2470 ± 30	-	768–476 B.C. (92.4%). 464–453 B.C. (1.2%); 445–431 B.C. (1.8 %)

Context	Beta-#	Material	δ13C (‰)	δ18O (‰)	Conventional Age (years BP)	Marine Reservoir Correction (ΔR)*	2-Sigma Calibration (calendar years)**
Pit feature, originating in stable backbench layer, testing for possible ΔR	424685	*Anadara* sp. shell	-1.2	-2.1	2780 ± 30	-56 ± 66	788–420 B.C. (95.4%)
Within cultural layer of palaeo-seashore context	424686	*Anadara* sp. shell	-0.7	-1.6	3400 ± 30	-49 ± 61	1539–1190 B.C. (95.4%)
Within cultural layer of palaeo-seashore context	433371	*Anadara* sp. shell	-1.9	-1.8	3480 ± 30	-49 ± 61	1633–1291 B.C. (95.4%)
Star Cave (Ritidian Pictograph Cave), cave overhang exterior							
Landward coastal plain	418951	Charcoal	-24.0	-	1670 ± 30	-	A.D. 258–285 (6%); A.D. 290–295 (0.4%); A.D. 321–428 (89%)
Landward coastal plain	418952	Charcoal	-25.0	-	1870 ± 30	-	A.D. 73–226 (95.4%)
Upper portion of stable backbeach	418950	*Anadara* sp. shell	-1.9	-1.4	2570 ± 41	-49 ± 61	578–147 B.C. (95.4%)
Lower portion of stable backbeach	355871	*Anadara* sp. shell	-1.8	-	3330 ± 30	-49 ± 61	1456–1096 B.C. (95.4%)
Natural matrix of cultural layer in palaeo-seashore context, equal or pre-dating the cultural material	424684	*Halimeda* sp. algal bioclast	+3.3	-2.0	3850 ± 30	-49 ± 61	2122–1734 B.C. (95.4%)
Natural matrix of cultural layer in palaeo-seashore context, equal or pre-dating the cultural material	355872	*Halimeda* sp. algal bioclast	+4.2	-	3860 ± 30	-49 ± 61	2130–1741 B.C.
Cave overhang exterior, natural matrix of cultural layer in palaeo-seashore context, equal or pre-dating the cultural material	414213	*Halimeda* sp. algal bioclast	+4.0	-	3900 ± 30	-49 ± 61	2190–1786 B.C. (95.4%)
Cave overhang exterior, natural component of palaeo-seashore	383491	*Barbatia* sp. shell	+1.3	-	4300 ± 30	-49 ± 61	2766–2333 B.C. (95.4%)

Context	Beta-#	Material	δ13C (‰)	δ18O (‰)	Conventional Age (years BP)	Marine Reservoir Correction (ΔR)*	2-Sigma Calibration (calendar years)**
pre-dating cultural presence							
Fenceline Pit 34							
150–155 cm, natural matrix of palaeo-seashore, no cultural material	239579	*Halimeda* sp. algal bioclasts	-3.2	-	3500 ± 40	-49 ± 61	1670–1304 B.C. (95.4%)
Grotto (Ritidian Gate Cave) exterior							
Landward coastal plain	263447	Carbonised coconut endocarp fragment	-24.5	-	790 ± 40	-	A.D. 1169–1280 (95.4%)
Stable backbeach	263448	Carbonised coconut endocarp fragment	-24.5	-	2510 ± 40	-	796–509 B.C. (95.4%)
Stable backbeach, testing for possible ΔR	263449	*Anadara* sp. shell	+2.1	-	2810 ± 40	-70 ± 80	867–412 B.C. (95.4%)
Stable backbeach	263450	Carbonised coconut endocarp fragment	-24.0	-	2510 ± 10	-	796–509 B.C. (95.4%)
Stable backbeach, testing for possible ΔR	263451	*Conus* sp. shell bead artefact	+1.5	-	3180 ± 40	300 ± 80	867–412 B.C. (95.4%)
Stable backbeach	414211	Charcoal	-24.6	-	2460 ± 30	-	758–678 B.C. (29.5%); 672–429 B.C. (65.9%)
Tidal surge material within cultural layer, inferred as following initial sea-level drawdown	414212	*Acropora* sp. branch coral	-2.5	-	3140 ± 30	-49 ± 61	1227–852 B.C. (95.4%)
Lower Cave (Vandalised Cave), twilight interior							
15–20 cm, landward coastal plain, ritual use of cave	303815	Charcoal	-27.9	-	290 ± 30	-	A.D. 1492–1602 (64.6%); A.D. 1615–1663 (30.8%)
30–35 cm, landward coastal plain, ritual use of cave	303816	Charcoal	-25.8	-	510 ± 30	-	A.D. 1328–1341 (4.5%); A.D. 1396–1445 (90%)
				-		-	

Context	Beta-#	Material	δ13C (‰)	δ18O (‰)	Conventional Age (years BP)	Marine Reservoir Correction (ΔR)*	2-Sigma Calibration (calendar years)**
45–50 cm, landward coastal plain, ritual use of cave	303817	Charcoal	-24.0		540 ± 30		A.D. 1316–1354 (29.8%); A.D. 1389–1437 (65.6%)
75–80 cm, palaeo-seashore layer, no cultural material	303818	Concentration of organic clay	-22.5	-	5600 ± 40	-	4504–4351 B.C. (95.4%)
75–80 cm, palaeo-seashore layer, no cultural material	303820	*Halimeda* sp. algal bioclasts	+0.1	-	4200 ± 30	-49 ± 61	2581–2194 B.C. (95.4%)
80–82 cm, beachrock of mid-Holocene highstand, pre-dating cultural presence	303819	Beachrock bioclasts	+1.0	-	4640 ± 30	-49 ± 61	3245–3198 B.C. (1.5%); 3193–2838 B.C. (92.9%)
Upper Cave, exterior							
25–28 cm, landward coastal plain	303809	Charcoal	-23.9	-	940 ± 30	-	A.D. 1025–1160 (95.4)
35–40 cm, stable backbeach	303810	Charcoal	-25.2	-	1980 ± 30	-	45 B.C.–A.D. 77 (95.4%)
65–70 cm, palaeo-seashore layer, no cultural material	303811	*Halimeda* sp. algal bioclasts	+2.6	-	4080 ± 30	-49 ± 61	2441–2039 B.C. (95.4%)
Upper Cave, twilight interior							
5–10 cm, ritual use of cave	303812	Organic sediment	-25.3	-	910 ± 40	-	A.D. 1030-1210
30–35 cm, limited use of cave	303813	Organic sediment	-25.0	-	1880 ± 40	-	A.D. 53–236 (95.4%)
30–35 cm, limited use of cave	303814	Organic sediment	-27.4	-	1710 ± 40	-	A.D. 241-411
Emergency Recovery Pit 2							
20–25 cm, upper portion of coastal plain habitation	247659	Carbonised coconut endocarp fragment	-25.0	-	240 ± 40	-	A.D. 1520–1593 (14.8%); A.D. 1619–1685 (40%); A.D. 1732–1808 (31.2%); A.D. 1928–1950 (9.4%)
80 cm, lower portion of coastal plain habitation	247660	Carbonised coconut endocarp fragment	-24.4	-	350 ± 40	-	A.D. 1455–1638 (95.4%)

Context	Beta-#	Material	δ13C (‰)	δ18O (‰)	Conventional Age (years BP)	Marine Reservoir Correction (ΔR)*	2-Sigma Calibration (calendar years)**
East latte village complex							
Site Cluster 02, Feature A, TU-2	414210	Carbonised coconut endocarp fragment	-25.3	-	250 ± 30	-	A.D. 1521–1575 (14.6%); A.D. 1585–1590 (0.5%); A.D. 1626–1679 (55.2%); A.D. 1764–1801 (21.3%); A.D. 1939–1950 (4%)
Site cluster 05, Feature A, TU-2	414214	Carbonised coconut endocarp fragment	-24.7	-	300 ± 30	-	A.D. 1489–1604 (69.6%); A.D. 1611–1654 (25.8%)

* = Marine reservoir (ΔR) correction follows the calculation specifically for *Anadara* sp. shells paired with charcoal specimens at the Ritidian Site in Guam, building on prior reporting (Carson 2010) and new pairing at Ritidian and other sites (Carson and Hung 2017), using the Deltar online software package (Reimer and Reimer 2017).

** = Calibrations were performed by the OxCal program (Bronk Ramsey and Lee 2013), using the INTCAL13 and MARINE13 calibration curves (Reimer et al. 2013).

Chapter 6

Ritidian at 1500–1100 B.C.

The site records from Ritidian offer a rare look into ancient life during the time of initial settlement in the Mariana Islands, furthermore recognised as the first successful human occupation of the Remote Oceanic region (Figure 63). This movement into Remote Oceania marked the first time ever when people of the Asia-Pacific effectively inhabited a new place across the open ocean, outside the sight of land, necessarily voyaging more than 350 km. For many thousands of years previously, people had been living in Island Southeast Asia, Australia, New Guinea, and nearby islands known as "Near Oceania," evidently conquering water crossings of 120 km or perhaps slightly more, since 50,000 years ago in the case of Australia and New Guinea (Hiscock 2008). When people crossed the barrier into Remote Oceania, they opened a new chapter in human history, and they did it with an astonishing remote-distance voyage of more than 2000 km, attested in sites such as Ritidian.

Compared with the other known first-settlement sites of the Marianas, Ritidian has been especially important in two respects. First, the investigations at this site have produced a wealth of information about the cultural activities within a larger natural setting, thus providing so far the best view of human-environment relations during this earliest period. Second, Ritidian has yielded hard evidence of one residential habitation plus two special-use caves dated about 1500 B.C., unlike other sites that so far have yielded primarily residential debris without linking to other aspects of ancient cultural life.

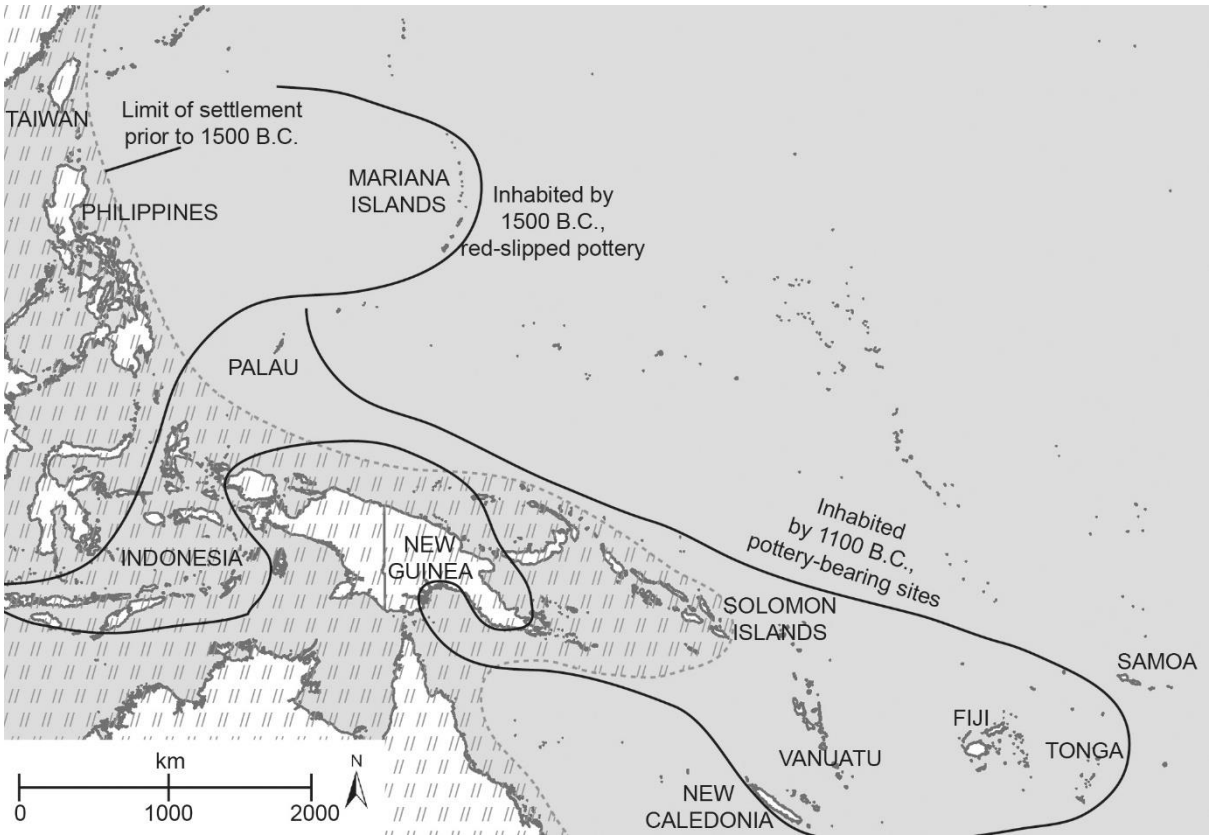

FIGURE 63. INHABITED AREAS OF PACIFIC OCEANIA AT 1500–1100 B.C.

Inhabited Site Context

At 1500 B.C., Ritidian was one of several sites in the Marianas where people lived at ancient shorelines very different from today's conditions, due to a higher sea level affecting the coastal ecosystems (Carson 2014c; Carson and Hung 2015). Worldwide, this period of higher sea level has been understood as the Mid-Holocene Highstand, with slight variations from one place to another around the globe, but it has been especially well documented in the western Pacific (see Figure 15). Around the coastlines of the Marianas, as well as throughout islands as far away as Melanesia and West Polynesia, tidal notches are visible about 1.8 m higher than today's mean tide elevation, and they correspond in many places with emerged coral reefs also about 1.8 m above today's living reefs (see Figure 16), directly dated by radiocarbon as old as 3000 B.C. and as young as 1000 B.C. (Dickinson 2000, 2003; Grossman et al. 1998). The exact measurements and dating naturally can vary in each site-specific instance, but they are well established for the Marianas and notably at the Ritidian Site in Guam (Carson 2011, 2014c).

The higher sea level at Ritidian has been verified at 1.8 m above today's conditions, by the measured elevations of tidal notches and emerged reefs, as well as by the discovery of beds of former lagoon floors and corals at the bottom of archaeological test pits. The dating has been confirmed at least as old as 2200 B.C., based on direct radiocarbon dating of algal bioclasts and ancient corals, and it definitely continued at least through 1500 B.C. when the first archaeological materials were deposited inside the still-growing bed of ancient lagoon bioclasts (Figures 64 and 65). At 1100 B.C., the palaeo-lagoon bed was overcapped by broken branch corals and other tidal-surge debris, reflecting the beginning of sea-level drawdown, when periodic surge deposits started to become stranded on the exposed land higher than the sea level (Figure 66).

FIGURE 64. FINDING *HELIOPORA* SP. CORAL BENEATH BED OF *HALIMEDA* SP. ALGAL BIOCLASTS, AT THE BASE OF FENCELINE PIT 35, NOVEMBER 2008. INSET SHOWS SAMPLE OF THE CORAL, WITH SCALE BARS IN 1-CM INCREMENTS. PHOTOGRAPH OF THE AUTHOR DURING EXCAVATION BY DIEGO CAMACHO.

FIGURE 65. THIN RED-SLIPPED POTTERY INSIDE PALAEO-LAGOON BED LAYER AT STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), DURING EXCAVATION, NOVEMBER 2015. HORIZONTAL SCALE BARS ARE IN 1-CM INCREMENTS.

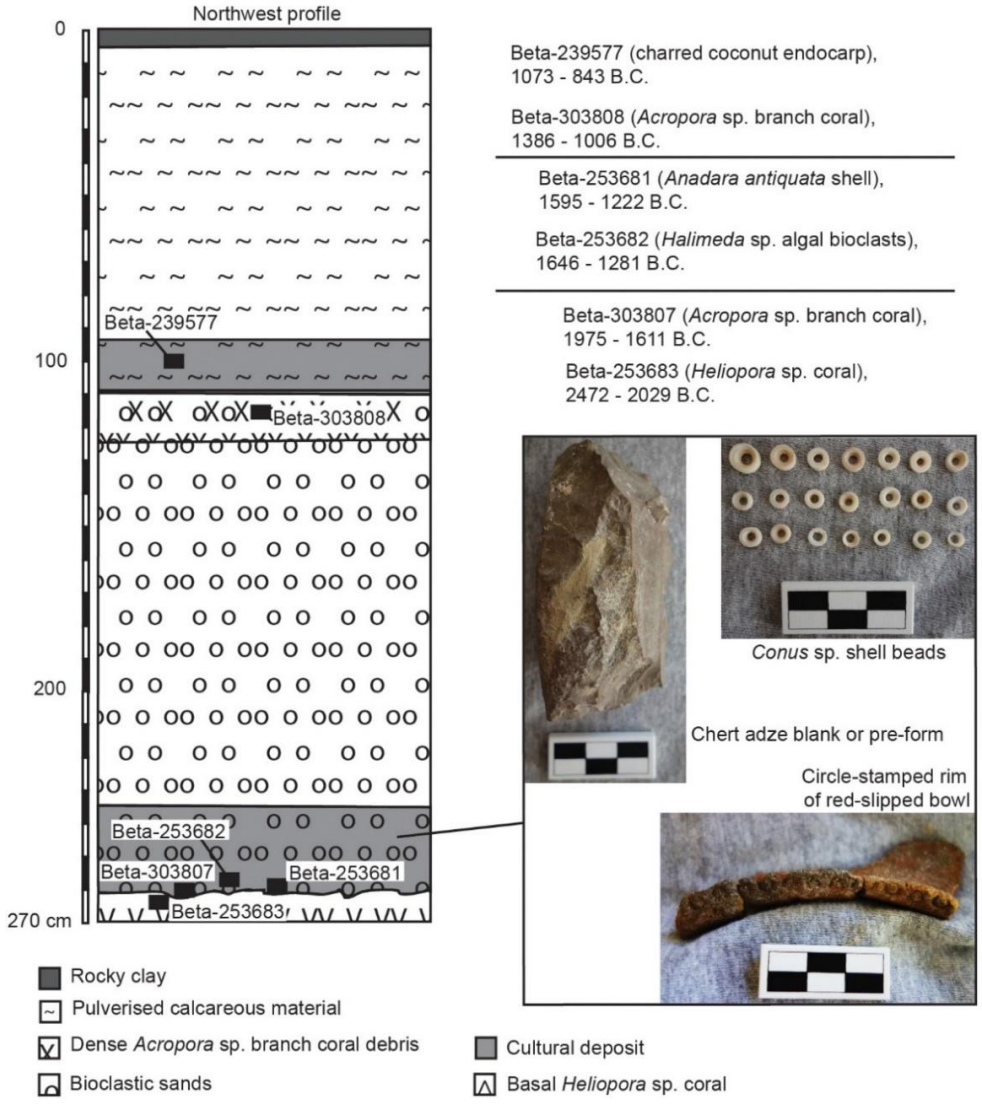

FIGURE 66. PALAEO-SHORE HABITATION PROFILE AND RADIOCARBON DATING, FENCELINE TEST PIT 35. THE ANCIENT PALAEO-SHORE HABITATION WAS REPRESENTED IN THE CULTURAL LAYER AT 235–265 CM DEPTH, OVERLAIN BY LATER-AGED DEPOSITS.

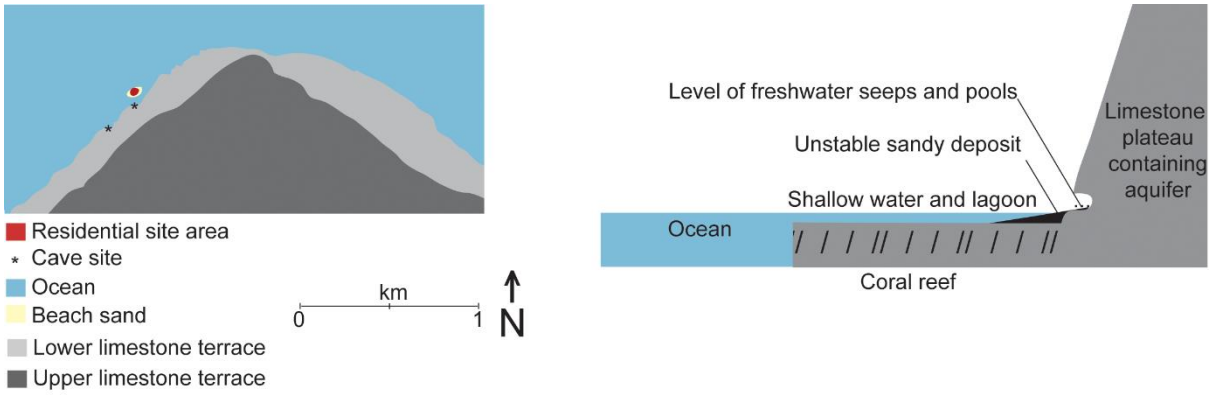

FIGURE 67. RITIDAN LANDSCAPE AT 1500–1100 B.C. LEFT = PLAN MAP. RIGHT = SECTION VIEW.

Excavations have documented an ancient lagoon floor over a broad area of the western side of Ritidian (Figure 67). The palaeo-lagoon floor is evidenced by a thick bed of *Halimeda* sp. algal bioclasts, in some places overlaying slightly older corals. Of the directly dated bioclasts, the oldest dating was 2581–2194 B.C., and the youngest dating was 1670–1305 B.C.

At the time of the palaeo-lagoon along the western side of Ritidian, the eastern side included its own different coral reef, bordering a much older exposed limestone terrace. This particular limestone terrace has been classified as part of the extensive formation of coral that had lived about 100,000 years ago, all around the northern coast of Guam (Tabarosi 2006). During the time of the Mid-Holocene Highstand, the sea level touched at the edge of the pre-existing 100,000-year-old limestone terrace, and a coral reef began to grow in a few places.

During the interval of 1500–1100 B.C., Ritidian offered two adjacent nearshore ecosystems, on the western and eastern sides. The western side consisted of a shallow-water lagoon, with a sandy bottom and a "meadow" of *Halimeda* sp. algae. The eastern side was comprised of a rough limestone terrace, bordered by a separate lagoon and reef, and so far it has not shown any indications of the kind of sandy-bottom lagoon as seen at the western side. The entire area, in both the western and eastern sides, was backed by the steep limestone cliffs as seen today, leading inland to Guam's northern limestone plateau.

When people first settled in the Marianas about 1500 B.C., the sandy-bottom palaeo-lagoon at Ritidian's western side touched at the base of the limestone cliff, and it extended over an area of nearly 800 by 100 m. This kind of habitat accorded with the other known earliest settlement sites of the region, where people could find slow-moving shallow-water zones, with access to *Anadara* sp. clams as a primary component in their diet. By comparison, the eastern portion of Ritidian offered a much different scope of natural resources along the rocky shores of the 100,000-year-old limestone terrace.

While people resided at one small portion of the western palaeo-lagoon setting, they used two nearby caves for ceremonies (Figures 68 and 69). In contrast to the concentrations of general-utility pottery and practical dietary food debris at the residential location, the caves showed evidence of an extraordinary side of ancient life. The caves were places where people used remarkably decorative pottery and shell ornaments, ate unusual kinds of shellfish atypical of regular meals, and created enigmatic pictographs definitely belonging to specialised contexts.

Among the special qualities of the caves, they held fresh water, essential for human survival. For the people living here at 1500 B.C., pools of fresh water were more accessible than today. Northern Guam's limestone plateau famously supports no groundwater in the forms of streams or lakes, yet it contains an impressively massive internal aquifer. Prior to modern well-digging, the aquifer could be accessed only through scattered seeps along coastlines and inside deep caves reaching to the level of interior fresh water pools.

FIGURE 68. INITIAL EXCAVATION IN PROGRESS AT THE OVERHANG EXTERIOR OF FIRST CAVE ("RITIDIAN BEACH CAVE"), NOVEMBER 2015, VIEW TO SOUTHEAST. SCALE BARS ARE IN 20-CM INCREMENTS.

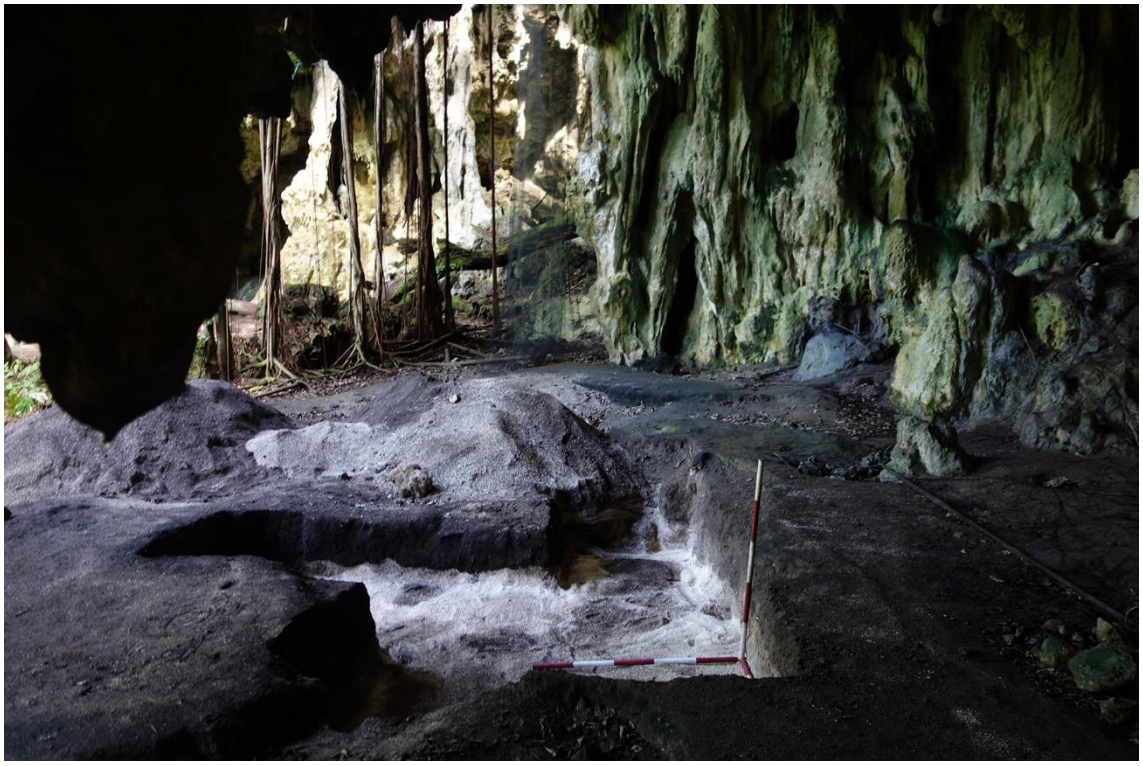

FIGURE 69. EXCAVATION IN PROGRESS AT OVERHANG EXTERIOR OF STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"), SEPTEMBER 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

Due to the formerly higher sea level, the island's internal aquifer and water table had been elevated 1.8 m higher than today's conditions, with direct effects on the positions of freshwater seeps and pools, just above the former sea level. Two of those access points happen to have been situated inside ground-level caves along the limestone cliff face, bordering the palaeo-lagoon at the western side of Ritidian. Additionally, the cave ceilings provided reliably constant dripping of water, filtered through the island's limestone plateau.

Elsewhere along the Ritidian coastline prior to 1100 B.C., the terrain did not include other favourable prospects for freshwater sources. For instance, the limestone terrace in the eastern side of Ritidian did not contain accessible ground-level caves leading to internal water pools, and instead two narrow shaft-like cavities offered the only routes into the island's deep water pools, entirely absent of archaeological traces from any time period. Coastal seeps, flowing just above sea level, are visible today in a few pockets of sandy beach, but those beaches did not exist until close to A.D. 1000.

Material Evidence

As soon as people began living at Ritidian, they started to generate a distinctive horizon of material evidence on the surfaces where they lived, clearly detectable in the stratigraphy of an excavation profile (Figures 70 and 71; see also Figure 66). Broken pottery, shell ornaments, and stone and shell tools appeared all at once in conjunction with other elements of a definite material signature. Pottery fragments and other items were recovered from inside the hardened calcrete or incipient cave flowstone accretions (Figure 72). In the layers of palaeo-lagoon pre-dating the cultural horizon, natural seashells consisted mostly of *Barbatia* sp. bivalves and a few others, but the cultural activity involved a diagnostically different composition of dietary items such as *Anadara* sp., chiton, and sea urchin along with bones of fish, bird, and turtle. Additionally, pieces of burned coral and ash could not have existed without human action.

The initial settlement horizon did not cover the entire area of Ritidian, but rather it has been distinguished in three small spots, all at the edge of the western paleo-lagoon. At 1500–1100 B.C., each of these three spots was situated close with the ancient tidal level. The beds of *Halimeda* sp. algal bioclasts indicated positions either on the shallow-water lagoon floor or within the range of regular tidal surge. The precise settings may have been small patches of unstable sand close to the ancient sea level, possibly exposed periodically between high and low tides. This context accords with the findings at other sites of first settlement in the Mariana Islands, consistently found along the paleo-shorelines and sometimes extending partially into inter-tidal or shallow sub-tidal zones.

Although not yet confirmed at Ritidian, the ancient houses most likely were raised on posts over the water's edge. Traces of post-raised houses have been discovered in exactly these settings about 1500–1100 B.C. at other sites. One such example was exposed through large-format excavations of 92 sq m at House of Taga in Tinian, and another was revealed through an excavation of 16 sq m at Unai Bapot in Saipan (Carson and Hung 2017). By comparison at Ritidian, the small excavation of 2 sq m at the palaeo-lagoon habitation did not clarify patterns of post moulds, and the larger-format excavations at the caves revealed areas of non-housing specialized activity separate from formal residential habitation.

The residential habitation was constrained to an area of less than 20 by 20 m, situated within the much larger area of the palaeo-lagoon. The initial cultural horizon at 2.35–2.6 m depth first was identified through a single 1 by 1 m test pit, later expanded for a total 2 sq m of exposure, penetrating through more than 1 m of cemented sand known as calcrete. Other test pits, at 10-m intervals, found no additional cultural layer at this depth, thus marking its parameters as less than 20 by 20 m in total footprint.

FIGURE 70. ARCHAEOLOGICAL MAP AND EXCAVATIONS WITH RADIOCARBON DATING AT FIRST CAVE ("RITIDIAN BEACH CAVE").

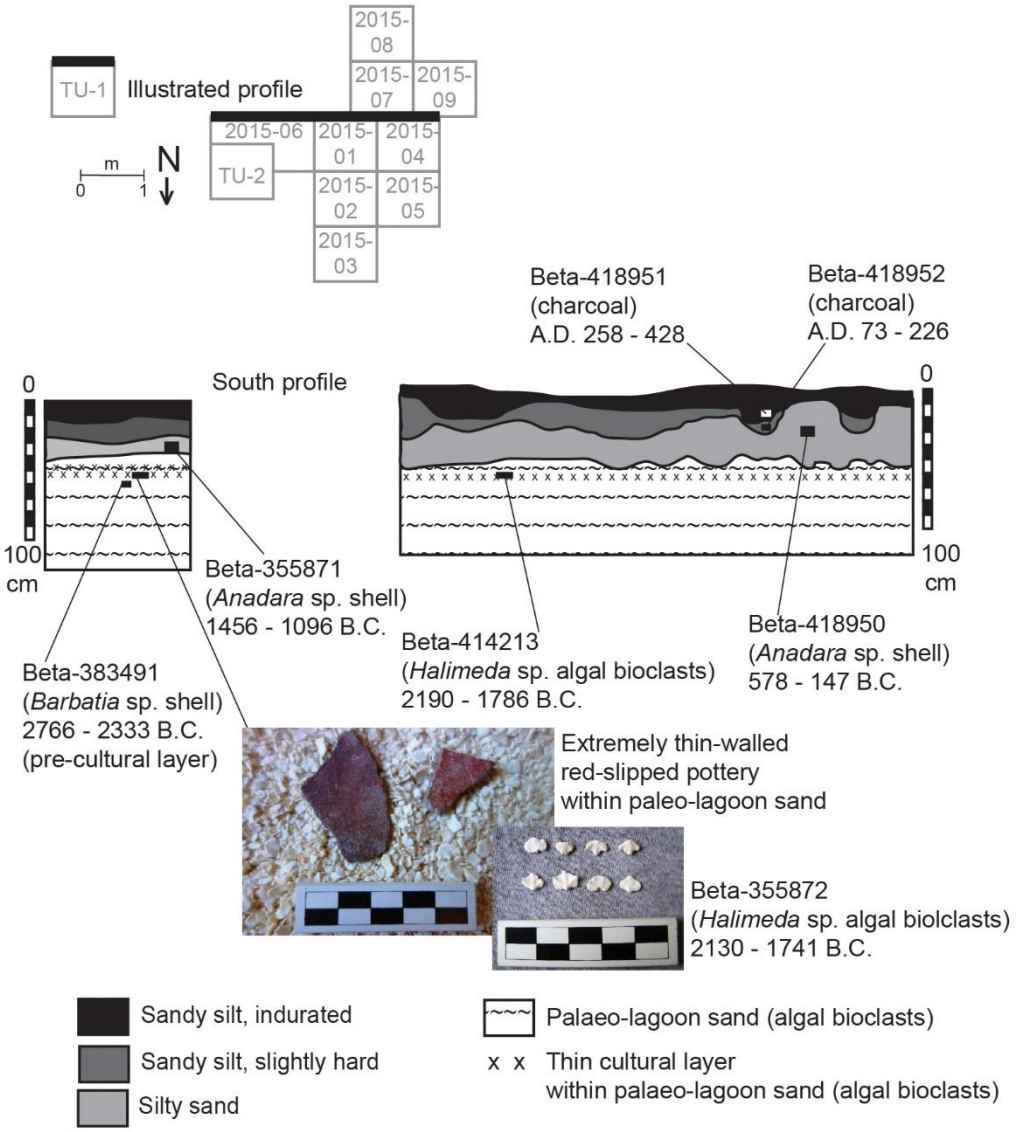

FIGURE 71. ARCHAEOLOGICAL EXCAVATIONS WITH RADIOCARBON DATING AT STAR CAVE ("RITIDIAN PICTOGRAPH CAVE"). INSET IMAGES SHOW SCALE BARS IN 1-CM INCREMENTS. COMPLETE RADIOCARBON DATING RESULTS ARE PROVIDED IN TABLE 1.

FIGURE 72. EXAMPLES OF ENCASED POTTERY FRAGMENTS FROM CONTEXTS OF 1500–1100 B.C. A = THIN RED-SLIPPED POTTERY ENCASED IN CALCRETE OF PALAEO-LAGOON SANDS WITH *HALIMEDA* SP. ALGAL BIOCLASTS, PALAEO-SHORE HABITATION LAYER IN FENCELINE PIT 35. B = DECORATED RED-SLIPPED CARINATED POTTERY ENCASED IN INCIPIENT FLOWSTONE COATING, PALAEO-SHORE CULTURAL LAYER AT OVERHANG EXTERIOR OF FIRST CAVE.

Compared to other habitation sites around 1500 B.C. in the Marianas, the ancient seashore habitation at Ritidian was less dense in its residual artefacts and midden, thus suggesting less intensive occupation than seen at the other sites of the same age. The inhabited area at Ritidian may have been smaller than its contemporaries, but in fact the complete footprint boundaries are not yet known of any of these oldest sites. If the ancient habitation at Ritidian indeed was smaller and less intensively used than others, then it could be interpreted as more similar to a fishing camp and as less fitting of a formalised residential complex. Regardless of its size and intensity of occupation, the ancient habitation area definitely was associated with two nearby ritual caves, thus suggesting a deliberate cultural investment in the place.

Larger excavations were possible at the two early-use caves, including 9.5 sq m at the First Cave and 11.5 sq m at the Star Cave, augmented by a few additional small test pits for fuller exploration. The primary activity areas were in the lighted zones beneath the exterior overhang ceilings, whereas the interior twilight and dark-zone areas contained little or no early-period materials. The deeper cave interiors evidently were kept deliberately clean of artefacts and midden during the earliest periods, perhaps due to the ritual contexts and the circumstances of water collection.

In all three localities of the initial cultural horizon, radiocarbon dating has indicated the first activity close to 1500 B.C., within the context of the palaeo-lagoon setting. Due to the nature of the near-tidal setting prior to 1100 B.C., the best preserved materials for radiocarbon dating were the individual *Halimeda* sp. algal bioclasts of the palaeo-lagoon, as well as discarded dietary shells such as *Anadara* sp. clamshells with reliable carbon. Additionally, dates were obtained for materials in layers both pre-dating and post-dating the initial cultural horizon, effectively constraining the overall potential time spans and cross-confirming the most confident date range probabilities.

Regarding the radiocarbon dating, some materials are considered more reliable than others, in terms of containing carbon of an age directly related to the time frame of archaeological interest, free of factors that might complicate the measurements of the carbon isotopes. For instance, marine organisms absorb their carbon from sources in the ocean that tend to produce different isotope measurements than seen in terrestrial organisms, and therefore items like marine shells can produce different results than seen in samples of burned wood or charcoal. Accordingly for the last few decades, radiocarbon dating laboratories have been refining a global-scale calibration curve for both marine and terrestrial samples, and locally specific fine-tuning corrections are available for most areas of the world (Reimer et al. 2013). Furthermore, the dating results can be calibrated into their percentages of probabilities at the two-sigma statistical range (95.4% confidence) and converted into calendar years B.C./A.D. of standard reference (Bronk Ramsey and Lee 2013).

In particular at Ritidian, specimens of *Anadara* sp. shells from different layers were paired with pieces of coconut nutshells and other wood charcoal, showing little variance from the standard marine carbon of the world's ocean surface, measured locally with a minor correction factor of -49±61 radiocarbon years. This refined correction factor, known as a Delta-R (or ΔR) correction, was obtained for three different paired samples of *Anadara* sp. shells with wood charcoal at Ritidian (Carson 2010, 2017a, 2017b), another at House of Taga in Tinian (Carson and Kurashina 2012), and one more instance at Unai Bapot in Saipan (Carson and Hung 2017). Meanwhile, an updated software package, called Deltar, has been developed for calculating ΔR values (Reimer and Reimer 2017), using the most current calibration datasets (Reimer et al. 2013).

Given the new corroborating dating evidence, the ΔR correction factor now has been refined as -49±61, and it may be regarded as applicable for *Anadara* sp. shells and other specimens such as the *Halimeda* sp. algal bioclasts belonging to the same kinds of shallow-water settings. The key point was to select materials of organisms that had lived in the same or similar habitats as the *Anadara* sp. clams, in near-equilibrium with the carbon of the ancient sea surface. Meanwhile, other shellfish specimens exhibited unreliable results, such as when *Conus* spp., *Cypraea* spp., sea urchins, chitons, and other taxa roamed over different

habitats and thereby ingested carbon of variable ages with unpredictable effects on the dating results (Carson 2010).

The radiocarbon dating may be understood as referring to ranges of probability, extending over some decades or centuries. The most precisely dated context was at the residential habitation area, cross-confirmed definitely within the parameters of 1595–1281 B.C., further constrained by knowing that it must have pre-dated a stratigraphically later-aged deposit of 1386–1006 B.C. The next best dated case was at the exterior overhang of the First Cave, dated at least as early as 1539–1291 B.C. but probably not much earlier. The least clear instance was at the exterior overhang of the Star Cave, not dated directly but rather constrained by other results, post-dating 2122–1734 B.C. while pre-dating 1456–1096 B.C.

The initial cultural horizon at Ritidian began around 1500 B.C., and then the associated natural environmental setting, forms and styles of artefacts, and types of food remains continued as a unified assemblage through approximately 1100 B.C. This 400-year-long period may yet be subdivided or modified according to new evidence, but so far it has been consistent at Ritidian and other sites bearing the ancient layers of first Marianas settlement. Of course many aspects of life and landscape had varied during this discerned 400-year-long period, and it must be recognised as a generalised entity just like every other component in the chronological narrative.

Within the specifically dated first-settlement layer at each of the three localities as described here, the collections of broken pottery and other materials can be grouped within a range of 1500 through 1100 B.C. (Figures 73 through 75). The dating results apply most directly to the contents of those layers and not necessarily to anything else. The separation of different time periods is essential for making clear and factual statements about what happened during any particular measured time range, as well as for making sense of the chronological order of changing contexts as outlined in this book.

Unlike the materials found within datable layers, the pictographs in caves do not allow conclusive dating at this time. Currently, the images are being preserved in place, so they have not been subjected to direct dating. Until a technique can be developed for non-destructive analysis, the dating can be estimated only vaguely and tentatively.

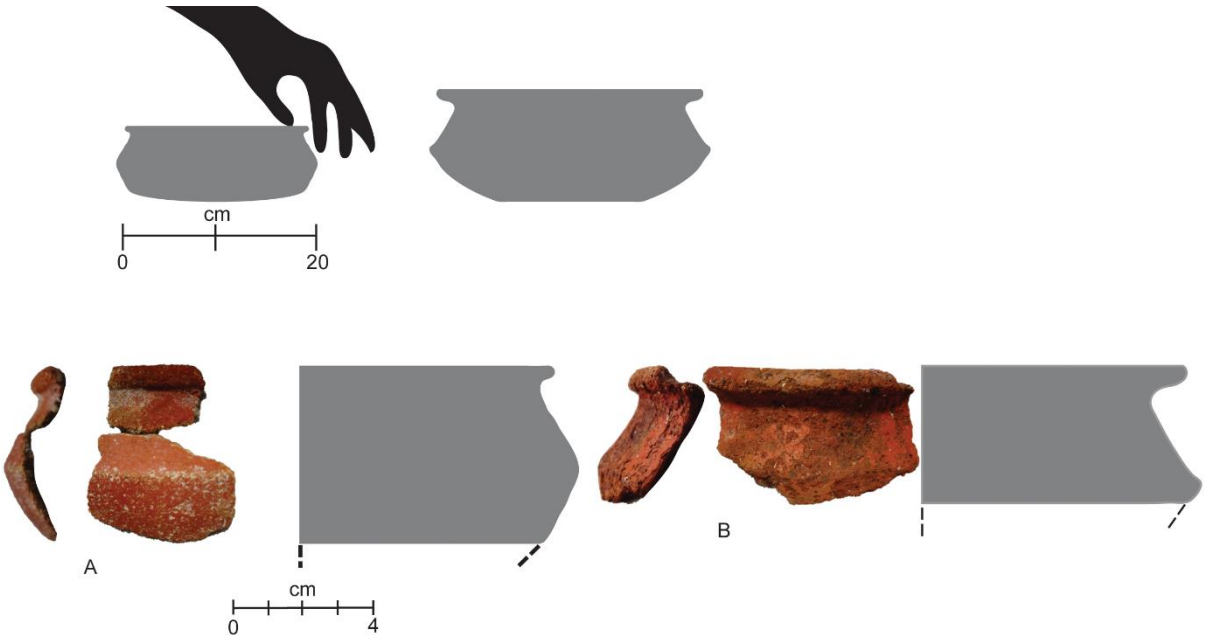

FIGURE 73. POTTERY TYPICAL OF 1500–1100 B.C., FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE, PART 1 OF 3.

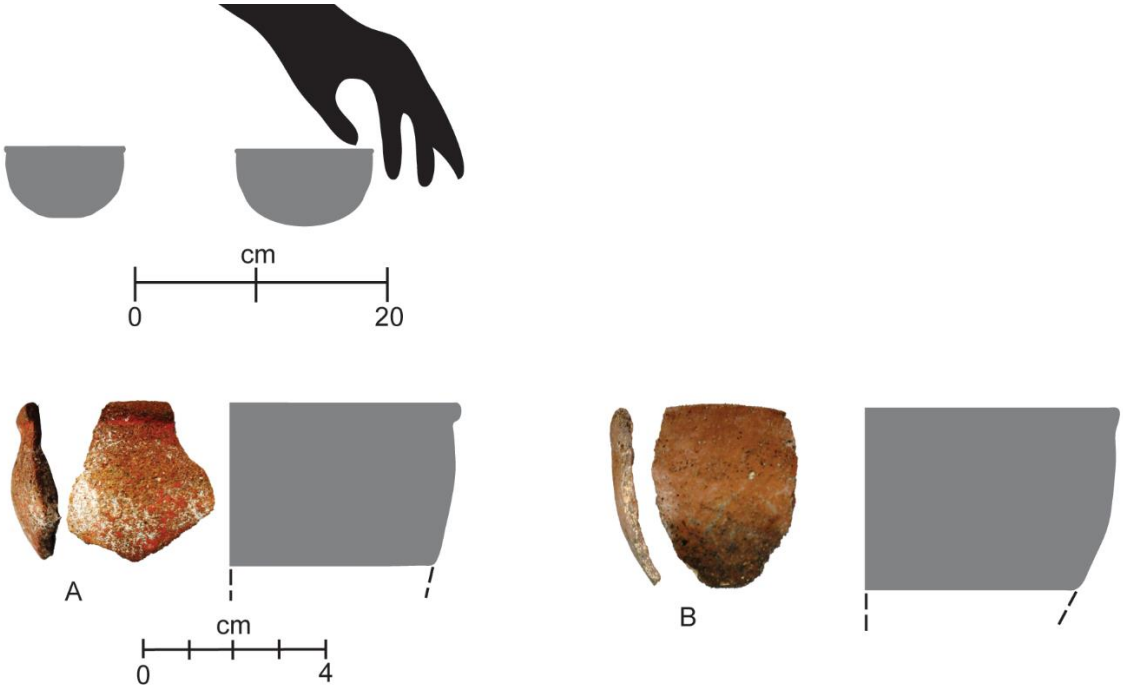

FIGURE 74. POTTERY TYPICAL OF 1500–1100 B.C., FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE, PART 2 OF 3.

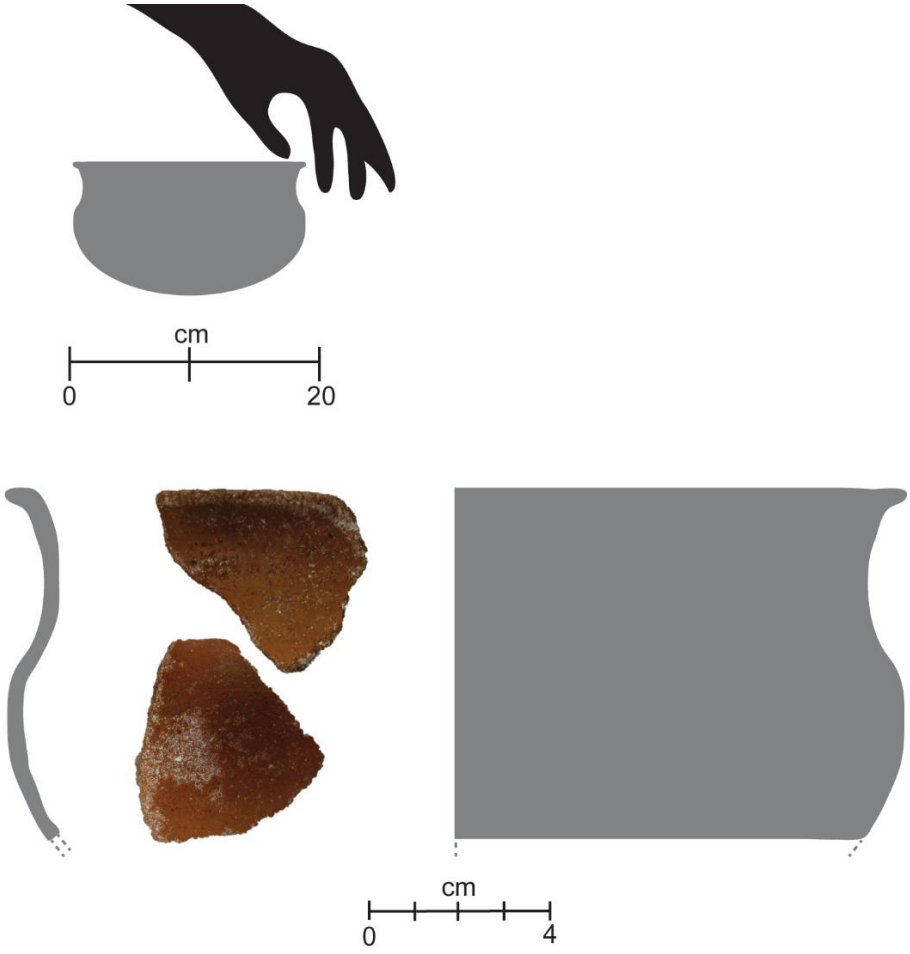

FIGURE 75. POTTERY TYPICAL OF 1500–1100 B.C., FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE, PART 3 OF 3.

Within the given parameters of how the pictographs may or may not be datable at this time, two points are most relevant. First, some of the images are super-imposed, namely involving white-pigment human figures overlaying red-pigment handprints, obviating that the white components must be the most recent. Second, the archaeological deposits at caves can provide a possible time range of how old the images may have been, and then by extension the images one by one can be assigned to different parts of the total potential time range.

Regarding the two caves bearing first-settlement archaeological layers, they both contain black-pigment pictographs that potentially could be assigned to the range of 1500–1100 B.C. (see Figure 44). These are the only pictographs at the First Cave, and only one such image is seen among the numerous different panels at the Star Cave (see Figures 45 and 46). Other of the images at the Star Cave possibly could have been drawn during this early period, but the current evidence does not allow a conclusive association for the dull reddish brown and bright red pictographs. In one other cave, known as Gate Cave, bright red images could be as old as 1100–700 B.C., so perhaps this age range can apply to the similar images at the Star Cave. No other cave contains pictographs of the dull reddish brown pigments, so this association at the Star Cave must be regarded as unique for now, possibly linked with the other unique characteristics of this cave.

In any case, the caves can be understood as different from the setting of the ordinary daily residential habitation. Whatever people did in these two caves, the contexts were set apart from regular life in the outside world. Pictographs epitomise these kinds of specialised venues, not only in the Mariana Islands but also in a worldwide perspective. In order to discuss the uniqueness of the caves, first the ordinary daily setting must be outlined as the standard point of reference.

The archaeological layer of 1500–1100 B.C. at the ancient habitation area can be understood as referring primarily to the results of daily activities at a household setting. The artefacts included mostly items of general utility and practicality, while the food refuse included the most popular daily dietary items. Daily residential life of course entailed at least some measure of non-utilitarian aspects, but the primary focus was on meeting daily technical and economic needs of the household.

Indeed, the initial habitation layer contained mostly fragments of pottery, broken almost entirely from plain bowls of small size, about 20 cm in diameter. One bowl's rim had been decorated by a line of circles (Figure 76), but lavish designs notably were absent here. The pottery may have been mostly utilitarian, yet it still involved fine workmanship and artistic expression, as seen in the use of red slip and in the creation of remarkably thin vessel walls at 1 mm or even less in some parts (Figure 77). A few simple *Conus* sp. shell beads certainly reflected a degree of personal artistic expression or context different from daily practicality, yet the degree of impact was much less than seen at the nearby First Cave assemblage as will be discussed. A single stone tool was recovered from this locality, and it was an unfinished adze of general utility, importantly not yet finished in its "blank" or "pre-form" stage of manufacture (Figure 78).

The food remains at the first habitation layer were dominated by shellfish, with only small amounts of fish bones and extremely few turtle bones. Other animals and plants must have been eaten during this time, but the only surviving evidence at the shoreline-oriented habitation referred to the immediately available nearshore resource foods. Among the shellfish remains, the largest dietary contributor by far was the *Anadara* sp. clam, followed by small amounts of chiton, sea urchin, and limpets as well as some input from others such as *Turbo* sp. and *Trochus* sp. gastropods. This overall composition of food midden at Ritidian closely mirrored the findings at other habitation sites of this earliest period, and by comparison the findings at the two nearby caves can be appreciated as significantly different.

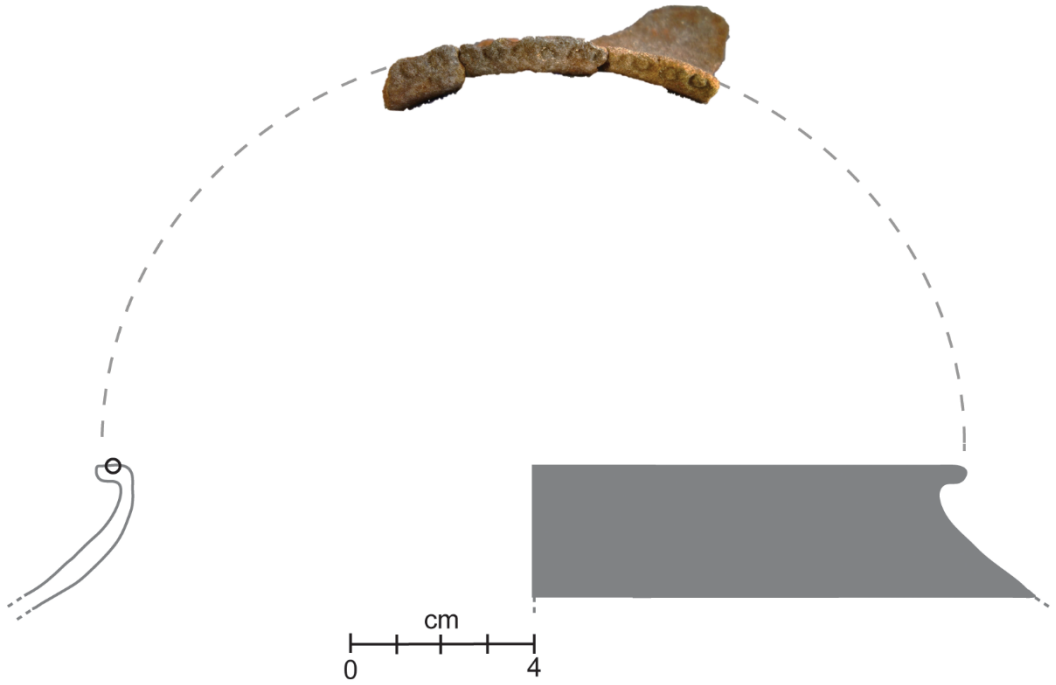

FIGURE 76. FRAGMENTS OF RED-SLIPPED EARTHENWARE BOWL, WITH CIRCLE-STAMPED RIM, EXCAVATED FROM PALAEO-SHORE HABITATION LAYER, 240–250 CM DEPTH, FENCELINE PIT 35.

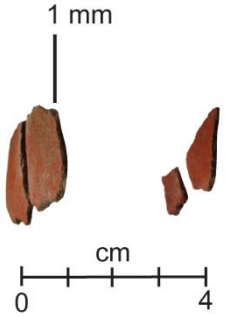

FIGURE 77. EXAMPLES OF EXCEPTIONALLY THIN-WALLED RED-SLIPPED POTTERY FROM CONTEXTS OF 1500–1100 B.C. LEFT = EXCAVATED FROM PALAEO-SHORE HABITATION LAYER, FENCELINE PIT 35. RIGHT = EXCAVATED FROM PALAEO-LAGOON CULTURAL LAYER, STAR CAVE.

FIGURE 78. CHERT ADZE PREFORM, EXCAVATED FROM PALAEO-SHORE HABITATION LAYER, FENCELINE PIT 35.

The two caves shared qualities of being different from the habitation area, but furthermore they were different from one another. The First Cave contained numerous finely made objects and apparent specialty-food items, while the Star Cave contained most utilitarian yet decidedly unusual artefacts and food remains. The relationship with the daily habitation site should be considered, among other factors. The First Cave was situated less than 100 m from the residential habitation, and it showed signs of more steady and repeated use throughout the accumulation of a thick layer over the span of some centuries. The Star Cave was an additional 300 m farther to the southwest along the limestone cliff face, and the initial cultural horizon there was constrained within a single occurrence of less than 10 cm thickness.

Earliest pottery at the First Cave may be categorised within the scope of the red-slipped bowls that were most popular at 1500–1100 B.C., but some aspects were unusual. Most striking at the First Cave, at least 20 bowls were decorated, wherein they displayed variable expressions of paddle-impressed surfaces, punctate impressions, hand-drawn circles, and exquisite decorations of finely dentate-stamped, circle-stamped, and thinly incised designs highlighted by white slaked-lime infill (Figures 79 through 93). Other rarities included a pottery handle (one of very few ever discovered at all in the Marianas) and a foot ring base (so far the only one of its kind) (Figures 94 and 95).

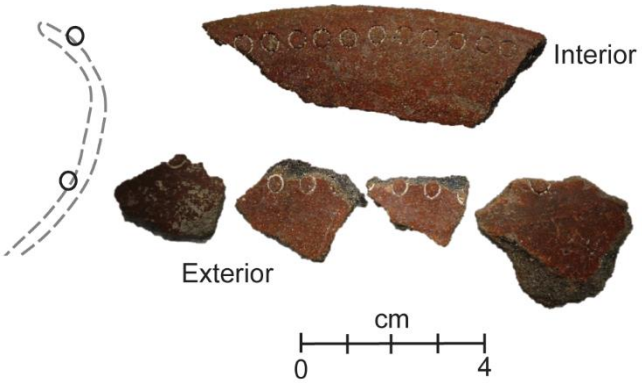

FIGURE 79. DECORATED POTTERY OF 1500–1100 B.C., SHOWING CIRCLE-STAMPED ROWS WITH WHITE LIME INFILLING, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

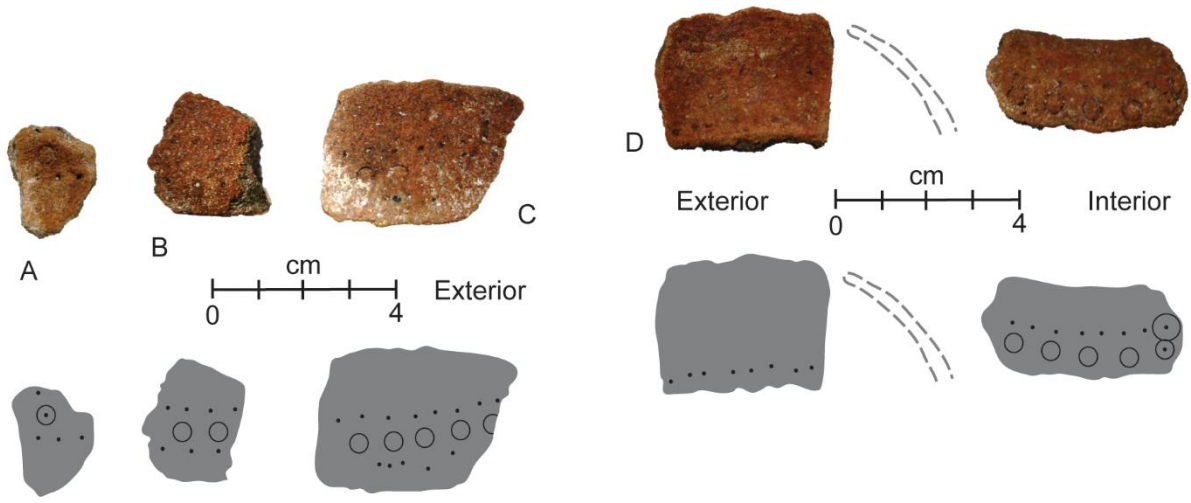

FIGURE 80. DECORATED POTTERY OF 1500–1100 B.C., SHOWING CIRCLE-STAMPED AND POINT-IMPRESSED ROWS, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. ITEMS A THROUGH D DID NOT RE-FIT WITH EACH OTHER, BUT THEY MAY HAVE BEEN BROKEN FROM THE SAME POT, NOTING THEIR CONSISTENT CHARACTERISTICS OF CLAY PASTE, THICKNESS, AND SIZE OF CIRCLES AND DOTS.

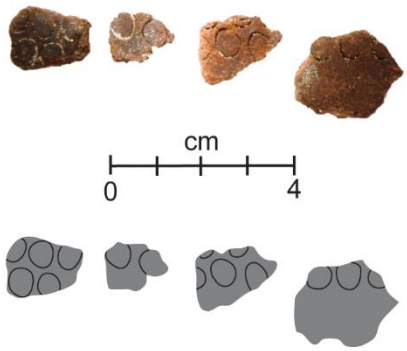

FIGURE 81. DECORATED POTTERY OF 1500–1100 B.C., SHOWING HAND-DRAWN CIRCLES WITH TRACE REMNANT OF WHITE LIME INFILLING, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. THESE FOUR PIECES DID NOT RE-FIT WITH EACH OTHER, BUT THEY MAY HAVE BEEN BROKEN FROM THE SAME POT.

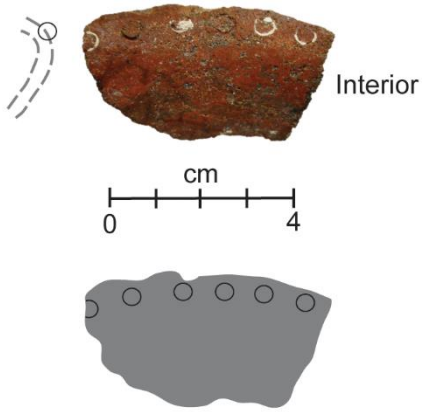

FIGURE 82. DECORATED POTTERY OF 1500–1100 B.C., SHOWING CIRCLE-STAMPED RIM WITH WHITE LIME INFILLING, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

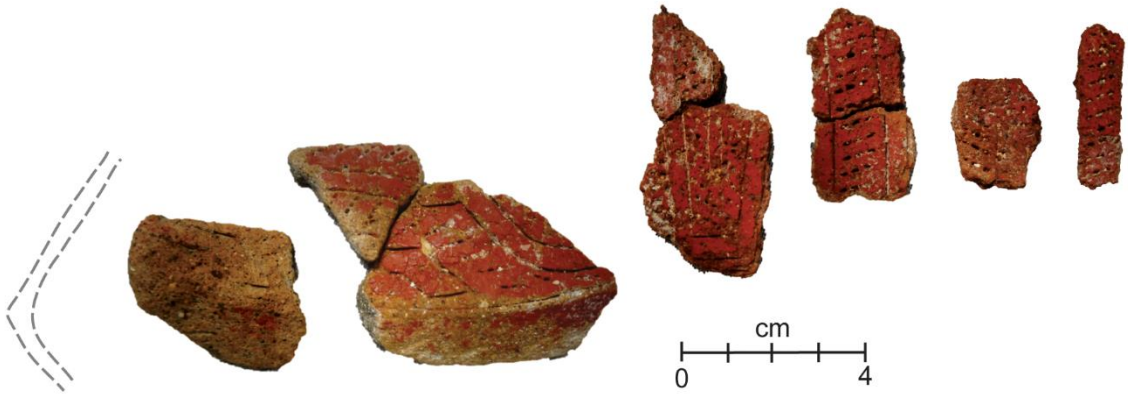

FIGURE 83. DECORATED POTTERY OF 1500–1100 B.C., SHOWING DENTATE-STAMPED ZONE-FILLING PATTERNS WITH TRACE REMNANT OF WHITE LIME INFILLING, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. A FEW OF THE PIECES RE-FIT WITH EACH OTHER AS SHOWN HERE, SUGGESTING A TOTAL OF ONE OR POSSIBLY TWO ORIGINAL POTS.

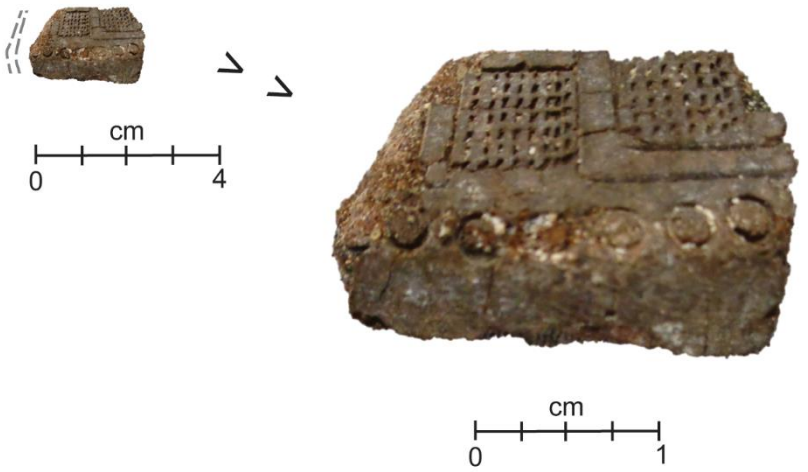

FIGURE 84. DECORATED POTTERY OF 1500–1100 B.C., SHOWING DENTATE-STAMPED ZONE-FILLING PATTERNS AND CIRCLE-STAMPED ROW, WITH TRACE REMNANT OF WHITE LIME INFILLING, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

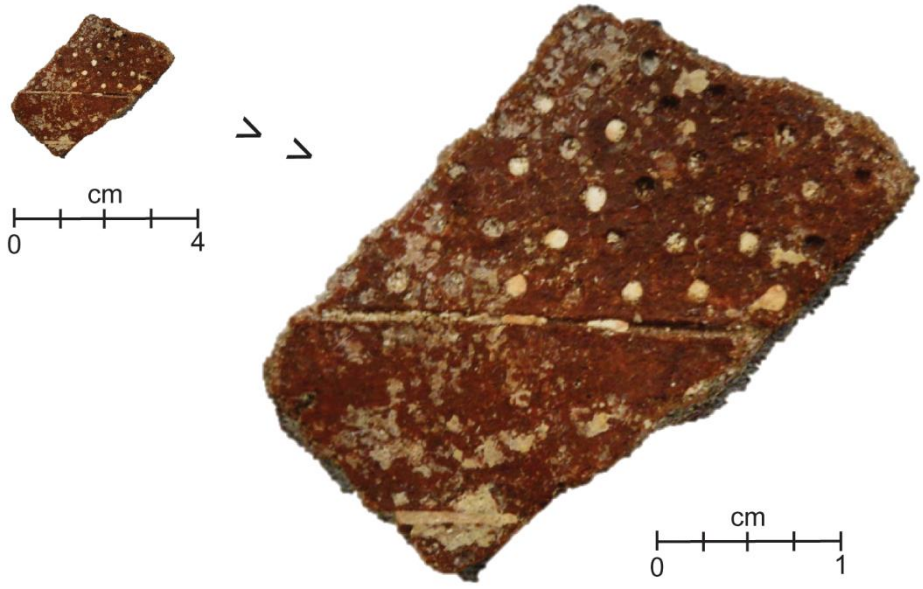

FIGURE 85. DECORATED POTTERY OF 1500–1100 B.C., SHOWING POINT-IMPRESSED ZONE-FILLING AND FINE LINE INCISION, WITH WHITE LIME INFILLING, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

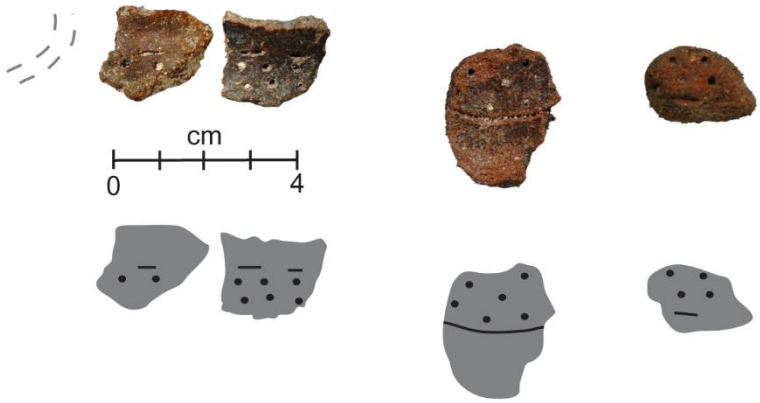

FIGURE 86. DECORATED POTTERY OF 1500–1100 B.C., SHOWING POINT-IMPRESSED ZONE-FILLING AND LINE INCISION, WITH WHITE LIME INFILLING, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. THE TWO PIECES AT THE LEFT PROBABLY WERE BROKEN FROM A SINGLE ORIGINAL POT, WHILE THE TWO PIECES AT THE RIGHT PROBABLY WERE BROKEN FROM A DIFFERENT POT.

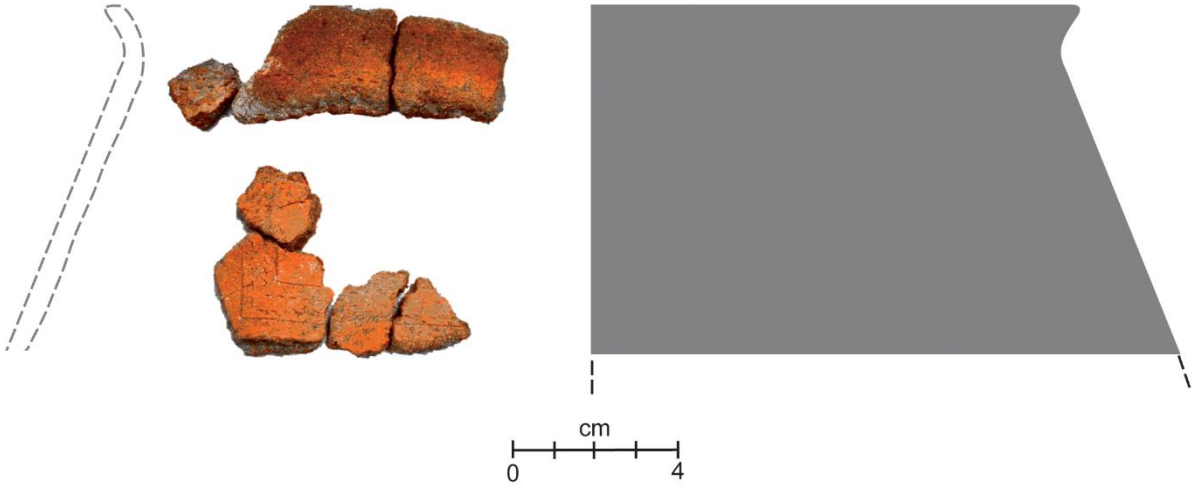

FIGURE 87. DECORATED POTTERY OF 1500–1100 B.C., SHOWING DASHED-LINE ZONE-FILLING AND LINE INCISION, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

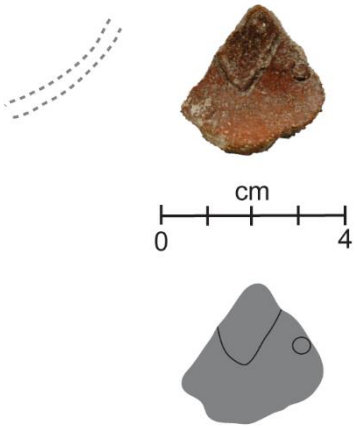

FIGURE 88. DECORATED POTTERY OF 1500–1100 B.C., SHOWING CIRCLE-STAMPED DESIGN WITH LINE INCISION, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

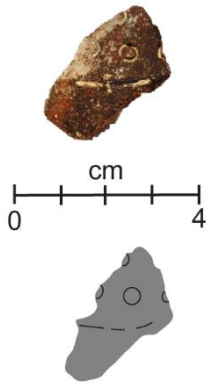

FIGURE 89. DECORATED POTTERY OF 1500–1100 B.C., SHOWING CIRCLE-STAMPED ROWS AND DASHED-LINE INCISION, WITH WHITE LIME INFILLING, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

FIGURE 90. DECORATED POTTERY OF 1500–1100 B.C., SHOWING LINE INCISION WITH WHITE LIME INFILLING, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

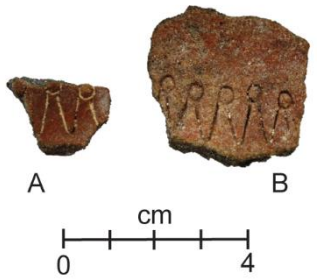

FIGURE 91. DECORATED POTTERY OF 1500–1100 B.C., SHOWING CIRCLE-STAMPED ROWS AND ANGLED-LINE INCISION, WITH WHITE LIME INFILLING IN ONE PIECE, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. ITEMS A AND B WERE BROKEN FROM TWO DIFFERENT POTS, SEEN IN THEIR DIFFERENT CLAY PASTE COMPOSITION, THICKNESS, AND MATERIAL OF RED SLIP. ITEM A RETAINED MORE RED SLIP AND WHITE LIME INFILLING, AS COMPARED TO THE FADED QUALITY OF ITEM B.

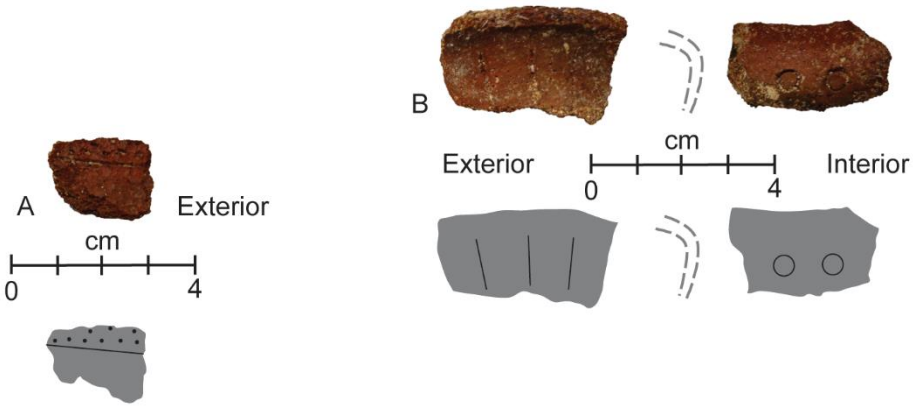

FIGURE 92. DECORATED POTTERY OF 1500–1100 B.C., FROM PALAEO-LAGOON CULTURAL LAYER AT THE INTERIOR OF FIRST CAVE. ITEM A SHOWS POINT-IMPRESSED ZONE-FILLING AND FINE LINE INCISION, WITH WHITE LIME INFILLING. ITEM B SHOWS CIRCLE-STAMPED INTERIOR AND VERTICAL LINE-INCISED EXTERIOR, WITH TRACE REMNANT OF WHITE LIME INFILLING.

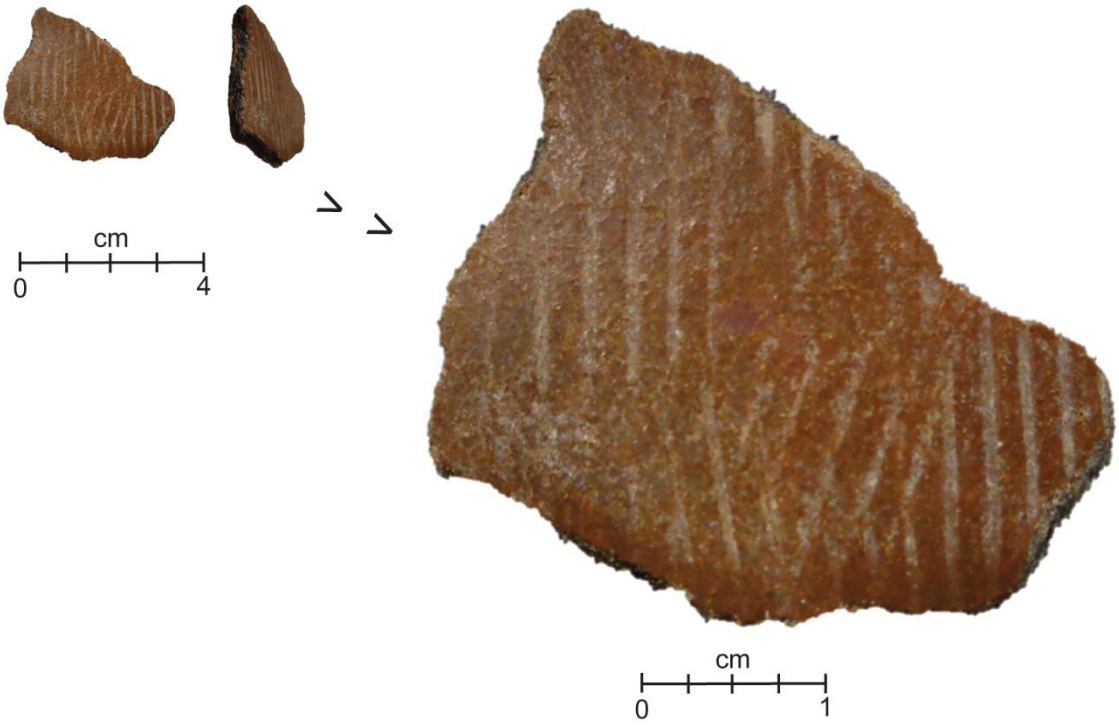

FIGURE 93. EXAMPLE OF PADDLE-IMPRESSED POTTERY OF 1500–1100 B.C., MADE BY CARVED PADDLE, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

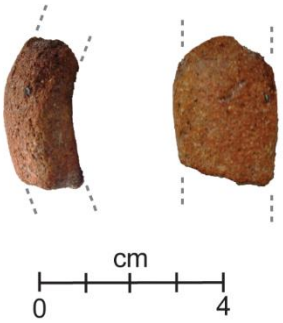

FIGURE 94. FRAGMENT OF POTTERY HANDLE OF 1500–1100 B.C., SHOWN IN TWO VIEWS, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. DUE TO THE BROKEN ENDS, THE ORIGINAL ATTACHMENT TO AN ANCIENT POT IS NOT OBSERVABLE AT THIS TIME.

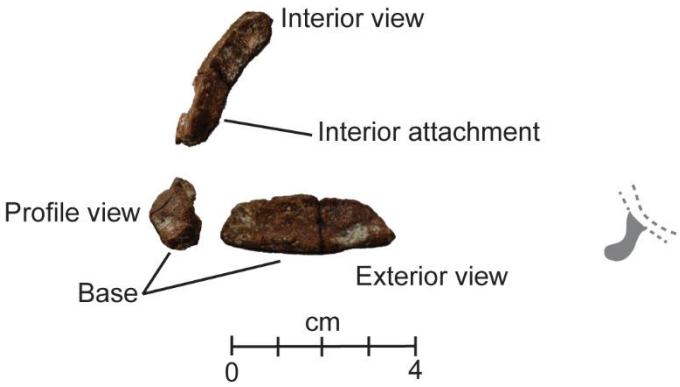

FIGURE 95. FRAGMENT OF POTTERY FOOT RING OF 1500–1100 B.C., SHOWN IN MULTIPLE VIEWS, FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. THE INTERIOR ATTACHMENT ORIGINALLY WAS MOULDED BY FINGERTIPS TO FIT AGAINST THE BASE OF A POT, BUT IT HAD BEEN BROKEN WITHOUT A CLEAR CORRESPONDING PORTION OF THE ATTACHED POT.

Several other artefacts of the first-settlement layer at the First Cave were made with attention to their artistic qualities well beyond their basic practical needs. Many of the items were unique to this one instance, and others were rare overall in the Marianas yet found in unexpectedly noticeable numbers at the First Cave. Diverse ornaments were found in astonishing density, far more than so far seen in any other site, and they consisted of finely cut and polished shell beads, discs, bands, circlets, rings, and pendants (Figures 96 and 97). One tiny adze was made of thoroughly polished white crystalline stone (Figure 98), most probably from the flowstone of a cave. Among the rarest items were a piece of a carved bone harpoon point (Figure 99), a colourful shell made into a possible coconut grater (Figure 100), a thin tabular shell pendant (Figure 101), and a pendant made of a dolphin's tooth (Figure 102).

The ornaments of 1500–1100 B.C. for the most part ceased in production thereafter, similar to the loss of the finely decorated pottery traditions. The most definite oldest items were beads made of cut and polished *Cypraea* sp. shells (Figures 103 through 105), whereas the other ornaments may have continued slightly longer in low frequency. For instance, the small round beads of *Conus* spp. and possibly other shells (Figures 106 and 107) clearly continued in lesser numbers through approximately 500 B.C. Various circlets, discs, and bands were made in later periods, but the most finely made discs were constrained primarily to the centuries prior to 1100 B.C.

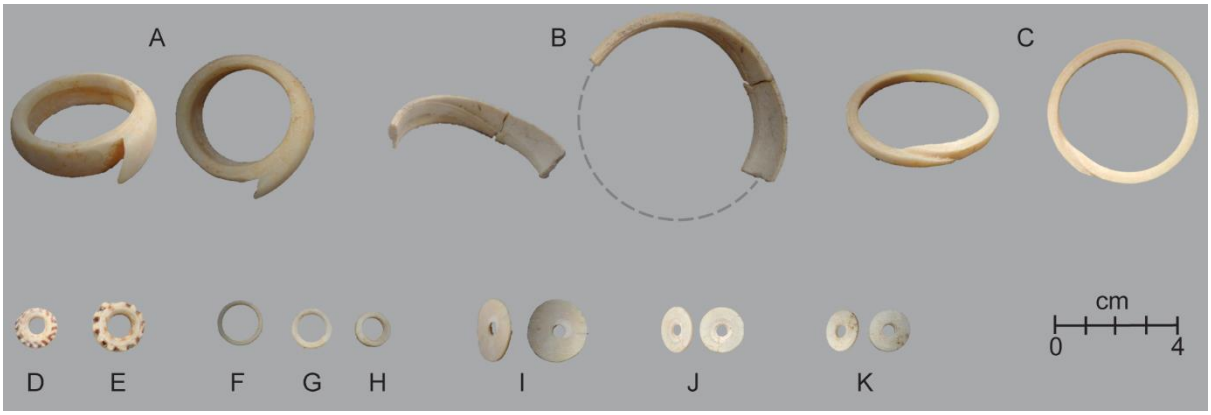

FIGURE 96. EXAMPLES OF SHELL ORNAMENT CATEGORIES OF 1500–1100 B.C., FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. A AND B = TWO BANDS, SHOWN IN TWO VIEWS EACH. C = CIRCLET, SHOWN IN TWO VIEWS. D AND E = TWO THICK AND COLOURFUL SHELL DISCS. F, G, AND H = RINGS. I, J, AND K = THREE THIN DISCS, SHOWN IN TWO VIEWS EACH.

FIGURE 97. SHELL IN PROCESS OF MANUFACTURE BY CUTTING, SHOWN IN TWO VIEWS, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE.

FIGURE 98. SMALL ADZE OR CHISEL, BROKEN AT BACK END, MADE OF POLISHED CAVE FLOWSTONE, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE.

FIGURE 99. BROKEN PIECE OF CARVED HARPOON POINT, MADE OF PROBABLE HUMAN BONE, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE.

FIGURE 100. OBJECT OF *CYPRAEA TIGRIS* SHELL, POSSIBLY AN ORNATE COCONUT GRATER, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE.

FIGURE 101. TABULAR PENDANT, SHOWN IN THREE VIEWS, WITH WELL WORN SUSPENSION HOLE, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE.

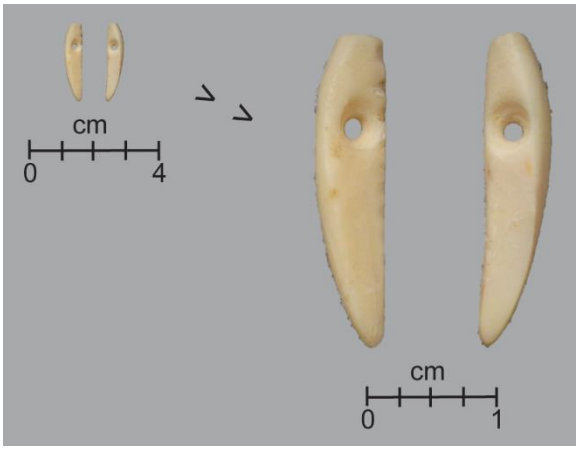

FIGURE 102. PENDANT OF CUT, DRILLED, AND SERRATED MARINE MAMMAL TOOTH, PROBABLY OF A DOLPHIN, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE.

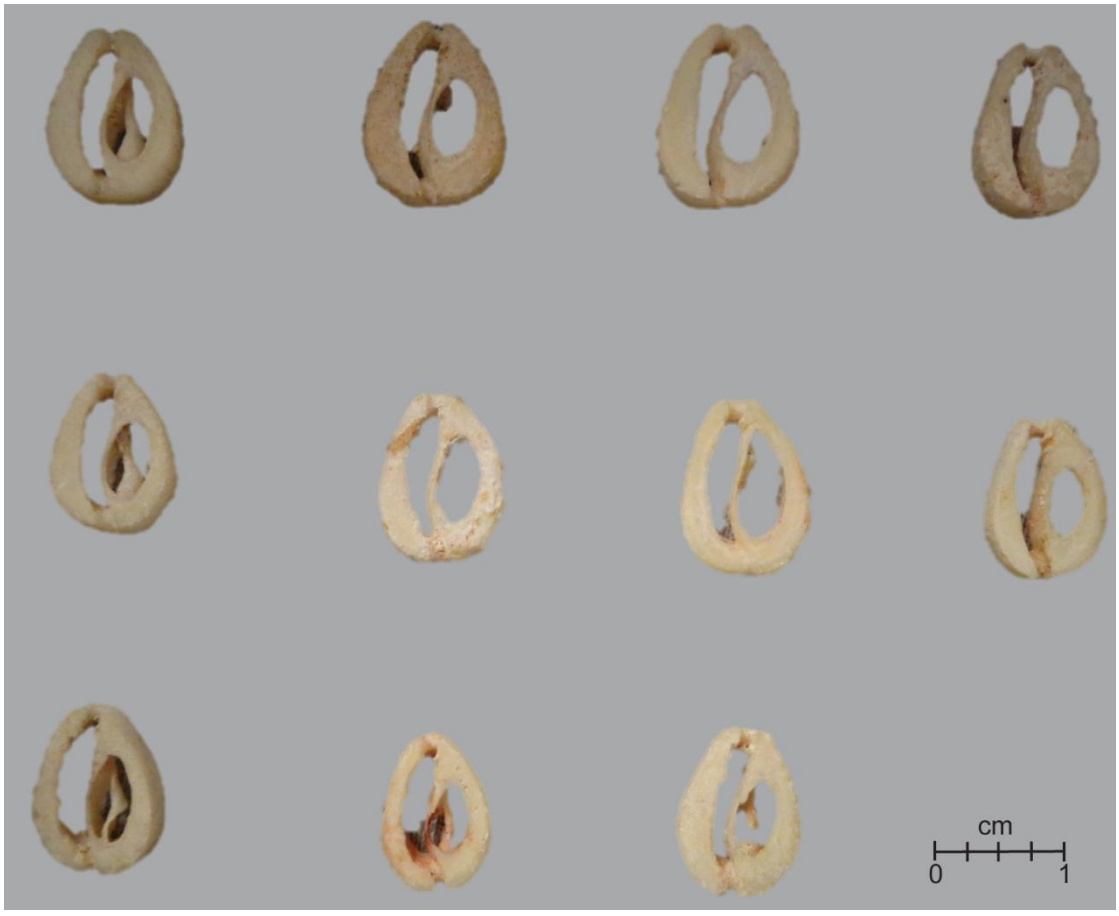

FIGURE 103. COMPLETE BEADS OF CUT AND POLISHED *CYPRAEA* SP. SHELLS, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE.

FIGURE 104. COMPLETE BEADS OF CUT AND POLISHED *CYPRAEA* SP. SHELLS, SHOWN IN ANGLED VIEW, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE. SCALE BARS ARE IN 1-CM INCREMENTS.

FIGURE 105. *CYPRAEA* SP. SHELL BEAD, IN PROCESS OF MANUFACTURE, SHOWN IN TWO VIEWS, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE.

The pieces of body ornaments from 1500–1100 B.C. may be interpreted as elements of ceremonial regalia, worn or used for special occasions such as at the ritual-associated caves. The ornamental assemblage reveals an investment in artistic expression and decorative display not seen in later periods, thus suggestive of a ceremonial tradition that declined after 1100 B.C. Tellingly, the relevant objects at Ritidian were found almost exclusively at the unusual setting of the First Cave, set apart from the daily residential area.

Some of the decorative objects at the First Cave were found inside small pits, suggestive of dedicatory offerings. The pits were small, about 20 cm diameter and 20 cm deep, and they were marked by large shells, such as a *Lambis* sp. (conch) shell and a *Pinctada* sp. (mother-of-pearl) shell (Figure 108). These pits contained specialised artefacts, as well as plain pottery fragments and pieces of animal bones.

Nodules of red ochre and haematite, as well as other nodules of chalky yellow colour, appeared occasionally in the deepest layers at the two caves but not at the habitation area (Figure 109). The red colour may have been used in the red slip of pottery, certain of the pictographs, and perhaps other creations. In many cultures worldwide, red ochre in particular has been an ingredient in burial rites and other ritual events. The ochre offered a softer medium than the haematite mineral, perhaps suitable for different outputs. The yellow nodules are of unclear function at this time.

Of course not all of the artefacts at the First Cave were of a highly specialised character. Pieces of chert were related to general-utility cutting and slicing tools (Figure 110). One chert artefact resembled a drill bit, for instance as used in a hand-pumped drill (Figure 111). Other items were identified as adze fragments, made of *Tridacna* sp. (giant clam) shell (Figure 112).

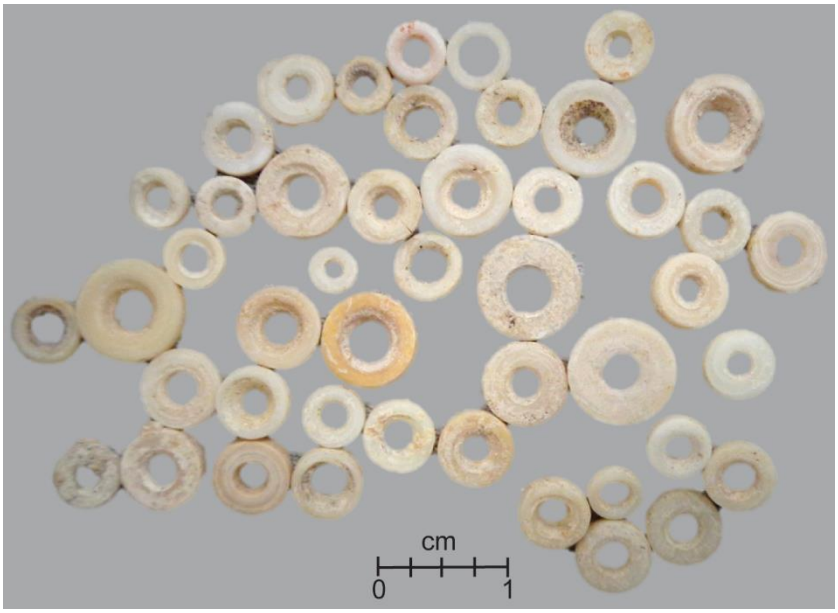

FIGURE 106. EXAMPLES OF SMALL ROUND BEADS OF CUT AND POLISHED *CONUS* SP. AND POSSIBLY OTHER SHELL SPECIMENS, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE. THIS COLLECTION WAS EXCAVATED FROM A SINGLE 10-CM LEVEL OF A 1 BY 1 M UNIT.

FIGURE 107. DETAILED VIEW OF EXAMPLES OF SMALL ROUND BEADS OF CUT AND POLISHED *CONUS* SP. AND POSSIBLY OTHER SHELL SPECIMENS, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C., AT FIRST CAVE.

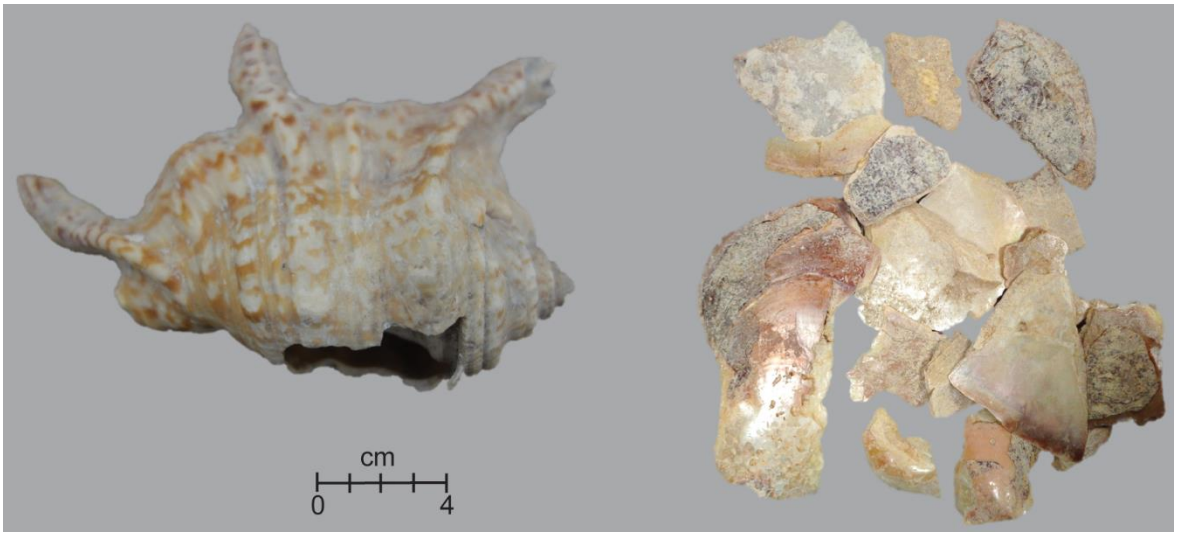

FIGURE 108. APPARENT SHELL OFFERINGS, FOUND IN POSITIONS COVERING PITS IN THE PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C. AT FIRST CAVE. LEFT = *LAMBIS* SP. (CONCH) SHELL, MOSTLY INTACT. RIGHT = RE-JOINABLE FRAGMENTS OF *PINCTADA* SP. (MOTHER-OF-PEARL) SHELL.

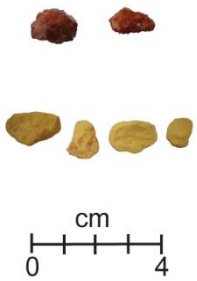

FIGURE 109. RED AND YELLOW NODULES FROM CONTEXTS OF 1500–1100 B.C. UPPER LEFT = HAEMATITE FROM PALAEO-LAGOON CULTURAL LAYER AT STAR CAVE. UPPER RIGHT = HAEMATITE FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. LOWER ROW = FOUR NODULES OF CHALKY YELLOW MATERIAL FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE.

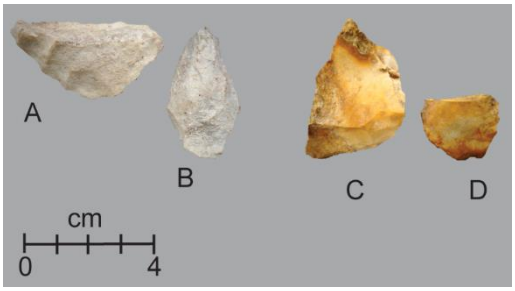

FIGURE 110. EXAMPLES OF VARIATION IN FLAKED ARTEFACTS FORM CONTEXTS OF 1500–1100 B.C. A AND B = FLAKED LIMESTONE FROM PALAEO-LAGOON CULTURAL LAYER AT FIRST CAVE. C AND D = HEAT-ALTERED CHERT FROM PALAEO-LAGOON CULTURAL LAYER AT STAR CAVE.

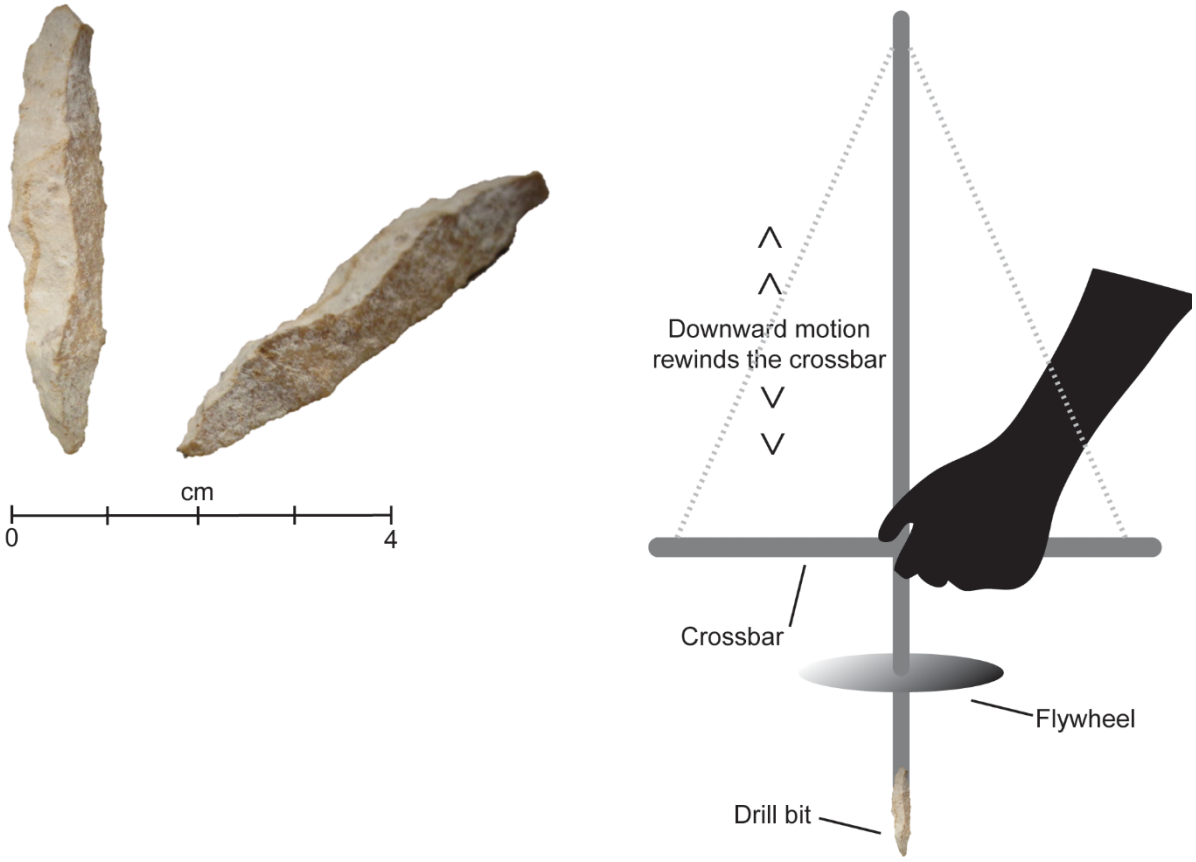

FIGURE 111. CHERT DRILL BIT, SHOWN IN TWO VIEWS, WITH SCHEMATIC MODEL OF HAND-OPERATED DILL. THIS ARTEFACT WAS RECOVERED FROM THE PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C. AT FIRST CAVE.

The oldest food remains were less dense overall yet curiously more diverse at the First Cave than at the nearby residential habitation. The low numbers could reflect less emphasis on basic dietary eating, while certainly people did something unusual here with the significantly different composition of food items. The different food items were not necessarily luxury foods, but they definitely belonged to contexts separate from the regular daily household. Marine shells and fish bones still were the key contributors, but they were joined by the bones of birds. Turtle bones appeared in scattered clusters, suggestive of individual events. Among the marine shells, the usual dietary preference for *Anadara* sp. clams was greatly diminished, instead appearing in notably low concentration, while other shellfish such as *Codakia* sp. and *Tellina* sp. bivalves were represented more strongly.

In contrast to the findings at the First Cave, the Star Cave's initial cultural horizon contained mostly utilitarian or practical materials, but they differed somewhat from the items seen at the nearby residential habitation area. The pottery lacked any of the finely decorated varieties, but instead it included the super-thin red-slipped type and another paddle-impressed type not seen anywhere else. Personal ornaments were entirely absent. Shell and stone tools did not convey any extraordinary artistic expression, yet at least a few items were unique. The food remains were most unusual for completely missing the ordinary dietary contributors, yet nothing here could suggest luxury context or high status.

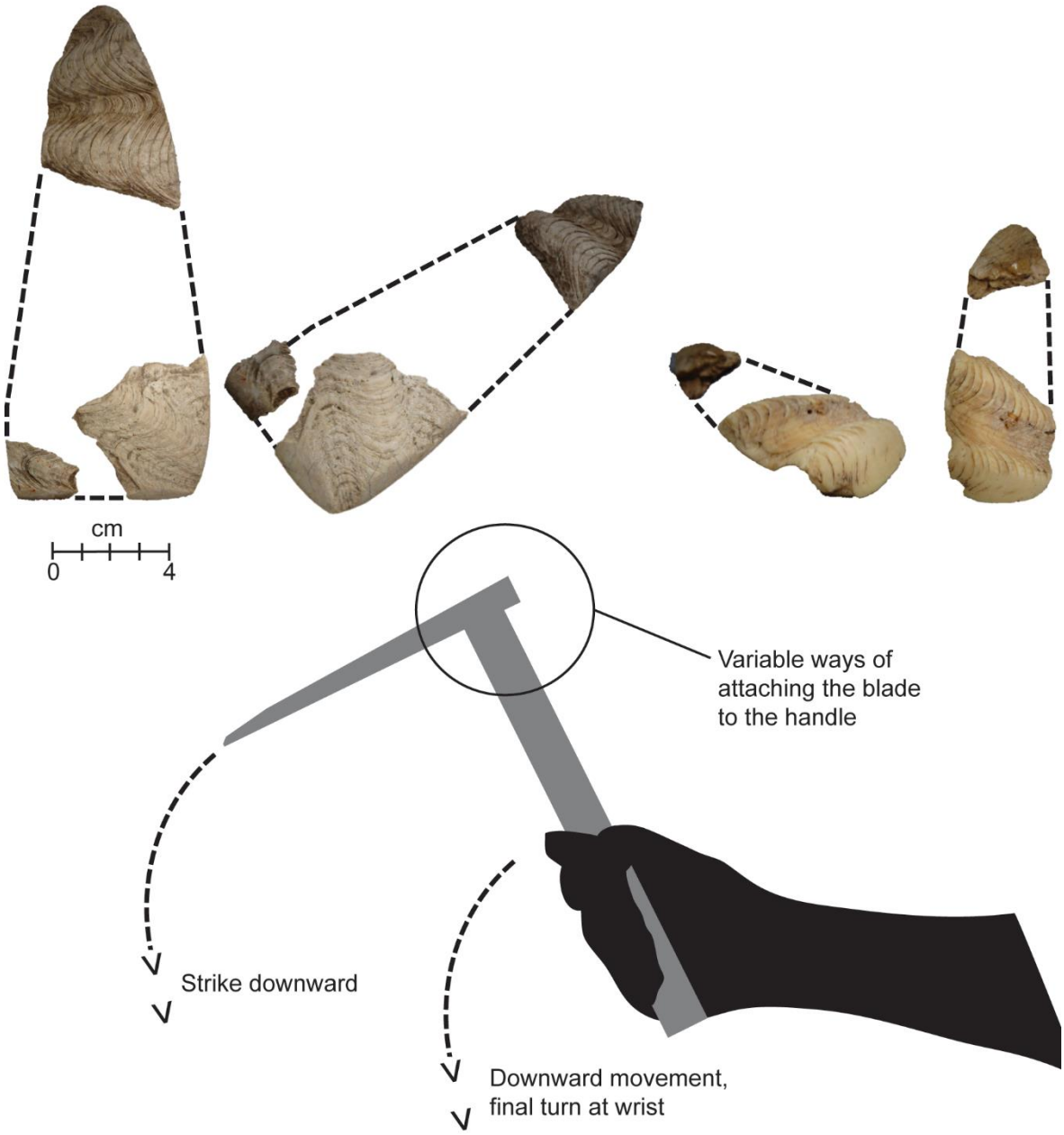

FIGURE 112. *TRIDACNA* SP. SHELL ADZE FRAGMENTS, WITH SCHEMATIC MODEL OF ADZE. THE UPPER LEFT FRAGMENTS WERE RECOVERED FROM THE PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C. AT FIRST CAVE. THE UPPER RIGHT FRAGMENTS WERE RECOVERED FROM THE PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C. AT STAR CAVE.

The initial cultural horizon at the Star Cave is clearly recognisable in a 10-cm-thick occurrence within the palaeo-lagoon bed of *Halimeda* sp. bioclasts, but its dating so far has been imprecise in a range of some centuries, post-dating 2122–1734 B.C. while pre-dating 1456–1096 B.C. (see Figures 65 and 71). The material signature is obvious, given the concentration of broken pottery, shell and stone tools, fish and bird bones, shell midden, and burned pieces of coral and shells. The surviving materials unfortunately are not reliable for radiocarbon dating, lacking preserved wood charcoal or the kinds of shells such as *Anadara* sp. clamshells that could offer the most secure dating results. The parameter of 2122–1734 B.C. refers to the latest dating in the bed of *Halimeda* sp. bioclasts that either pre-dated or occurred equally with the

deposition of the cultural materials, wherein three dates in total for this layer overlapped significantly at 2122–1786 B.C. The parameter of 1456–1096 B.C. refers to an overlaying and necessarily later-aged cultural deposit.

Conceivably, the initial cultural horizon could have co-occurred with the accumulation of the algal bioclasts at the Star Cave, thus pushing the potential age back to 2122–1734 B.C. In fact, the palaeo-lagoon still was accumulating during and after the first appearance of artefacts and midden at the palaeo-shore habitation and at the First Cave, so the same situation could be argued for the Star Cave. In order to validate this argument, however, something else from the Star Cave's initial cultural horizon would need to be dated, for example as seen in the independent dating of the *Anadara* sp. shells at the two other localities as presented here. Without a fair and independent test at the Star Cave, the parameter of dating must remain open for further refinement.

The Star Cave's oldest pottery fragments were broken from two different forms of vessels. The most common type was the familiar category of a red-slipped bowl, about 20 cm in diameter, but here it consisted entirely of the super-thin variety, mostly about 1 mm but approaching 2 mm at critical points of a rim, carination, or base (see Figure 77). The other type was a larger and thicker bowl, with red slip on the bottom half and a unique form of paddle-impressed surface on the upper half (Figures 113 and 114). In this case, the paddle impressions were made by a paddle wrapped in vines or rattan, so far not seen in any other site of the region.

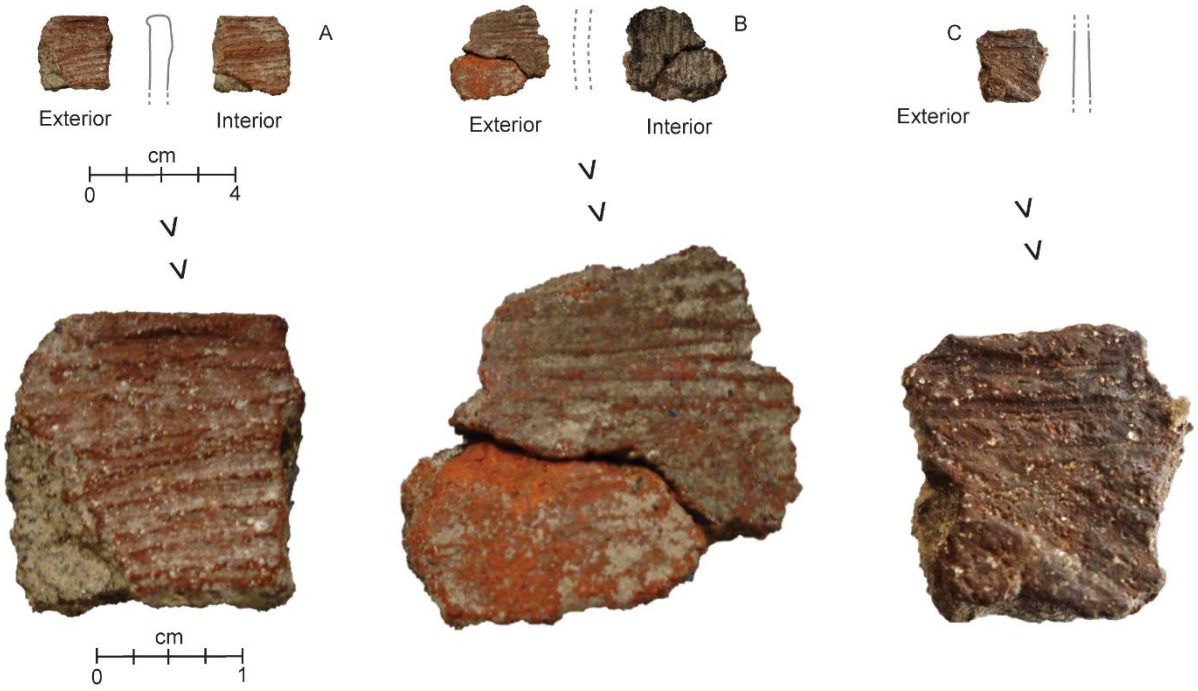

FIGURE 113. EXAMPLES OF PADDLE-IMPRESSED POTTERY FRAGMENTS OF 1500–1100 B.C., MADE BY VINE-WRAPPED OR RATTAN-WRAPPED PADDLE, FROM PALAEO-LAGOON CULTURAL LAYER AT STAR CAVE.

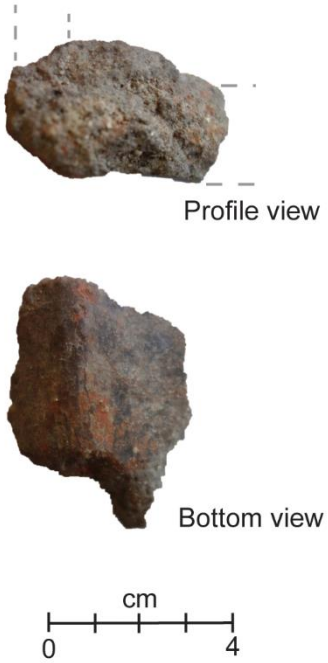

FIGURE 114. EXAMPLE OF FLAT-BASED THICK-BOTTOMED POTTERY FRAGMENT WITH RED SLIP, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C. AT STAR CAVE. THE THICK BASE PIECES CONTAINED SIMILAR CLAY PASTE AND RED SLIP MATERIAL AS SEEN IN THE PADDLE-IMPRESSED PIECES, AND THEY DIFFERED SIGNIFICANTLY FROM THE CHARACTERISTICS OF THE THIN-WALLED RED-SLIPPED POTTERY.

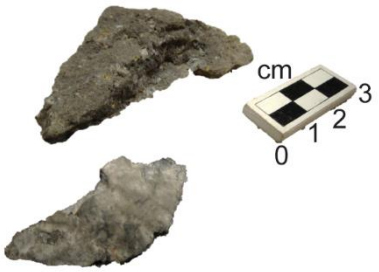

FIGURE 115. TWO VOLCANIC STONE ARTEFACTS WITH CHIPPED EDGES, FROM PALAEO-LAGOON CULTURAL LAYER OF 1500–1100 B.C. AT STAR CAVE.

Other of the oldest artefacts at the Star Cave consisted of stone and shell tools. An adze was made of *Tridacna* sp. (giant clam) shell, as can be seen often in sites of all time periods (see Figure 112), but two volcanic stone items were apparently unique scraper tools not yet discerned in other sites (Figure 115). Pieces of chert included general-utility cutting or slicing tools, as well as the cores of raw material that had been worked into the flaked tools (see Figure 110).

The oldest food remains at the Star Cave were conspicuously unusual. The ordinarily expected *Anadara* sp. clam shells were entirely absent, as compared to their overwhelming popularity at the habitation area and at least a small frequency at the First Cave. Instead, the food remains here referred primarily to chiton, limpets, and sea urchins with small amounts of other shellfish. Animal bones were very few, but they could be identified as the remains of fish and birds. These findings contrasted against the underlying and

older non-cultural portion of the palaeo-lagoon sands that contained none of those materials and instead included shells of *Barbatia* sp. and a few others.

At both caves, the evidence of ancient activity prior to 1100 B.C. was concentrated in the lighted exterior overhang areas, in contrast to extremely little or no evidence in the interior dark zones. The only evidence of dark-zone activity potentially prior to 1100 B.C. was in the black-pigment pictographs, but those pictographs have not yet been dated directly to validate this claim. Excavations showed no cultural material at all pre-dating A.D. 1000 in any dark zone, although a portion of the twilight area at First Cave did contain an early deposit equal with the initial settlement age.

The role of water collection needs to be stressed for the caves, especially prior to 1100 B.C. before the drawdown in sea level. As already described here, the higher sea level created a situation of an accordingly higher level of fresh water, for instance accessible inside the inner dark zones of the First Cave and the Star Cave at Ritidian. This accessibility thereafter lessened when the sea level lowered toward its modern condition.

While people did not actually reside in the caves, these venues nonetheless were essential for the survival of the group living nearby. The freshwater supplies were vital in a fundamental physical or biological sense. In a different sense, though, the caves served as the designated places for rituals and ceremonies that arguably were integral to the well-being of the people.

Larger View

Ritidian was among the first places ever inhabited in the Remote Oceanic region of the world at 1500 B.C. (see Figure 63), a few centuries before people lived in any other of the remote Pacific Islands. At that time, the voyage of more than 2000 km from Island Southeast Asia to the Mariana Islands had been world's longest ocean-crossing migration (Craib 1999; Hung et al. 2011). The exact origin point in Island Southeast Asia is unknown, but it involved a homeland region where people made distinctive kinds of pottery and shell ornaments, spoke an older form of Austronesian language, and mastered skills of long-distance sailing.

At Ritidian and other sites of first settlement in the Mariana Islands, the earliest known archaeological signatures by definition were produced by the first people living in this region. They must have migrated across the ocean from somewhere, and they did so by 1500 B.C. if not slightly earlier. Clues about their origins are seen in the material signatures of the archaeological sites, as well as in surviving cultural traditions, language histories, and genetics lineages.

In terms of the archaeological signature of first settlement, Ritidian and other earliest sites all share at least five key traits:

1) The archaeological layer of an initial cultural horizon is found in subsurface context, disconnected from the surface-visible features of later age.

2) The initial cultural horizon is dated by radiocarbon close to 1500 B.C., and its diagnostic material signature continued through approximately 1100 B.C.

3) At the time when the sites were occupied at 1500–1100 B.C., they were in ancient seashore contexts, signifying that people deliberately targeted these certain nearshore niches instead of the many other ecological zones that so far have shown no evidence of this oldest cultural presence.

4) The palaeo-seashore habitations all were situated in the larger southern-arc islands of the Marianas, where people could find ample biomass, diversity of natural resources, and reliable freshwater sources.

5) The artefacts entailed a unified assemblage of earthenware pottery, stone and shell tools, and personal adornments, indicative of a shared cultural context overall, although each site of course has disclosed varying degrees of individual expression and unique qualities within the overarching shared cultural traditions.

The archaeological knowledge from Ritidian has been different from other sites as the only case of documenting a residential habitation dated to the same period as the cultural use of two specialised cave areas. This scenario has allowed new understanding of how regular daily life was coordinated with ritual activities at the caves, as well as with the contexts of water collection at those caves. Similar scenes conceivably could have occurred elsewhere in the Marianas, but so far the Ritidian Site has been unique in revealing this scope of ancient activities and contexts. Outside Ritidian, no other cave site in the Marianas has yet shown evidence of cultural activity demonstrably prior to 700–500 B.C.

The oldest artefacts at Ritidian already have been presented here, but a few aspects deserve more attention in terms of how they relate to larger regional patterns and connections. In particular, the pieces of pottery and the personal ornaments offer the most opportunities to identify ensembles of technical and artistic choices that belonged to larger cultural traditions. Whereas the most informative decorative objects tend to be found in very small numbers, accounting for 1% or less of the total collections at most sites, the ceremonial venues at the Ritidian caves involved the use of specialised objects in surprisingly dense concentrations.

Pottery is particularly important as an abundant material marker cross-regionally, appearing for the first time in Island Southeast Asia as early as 2200–2000 B.C. and then extending into the Mariana Islands by 1500 B.C. At that time, pottery-making traditions did not yet exist in many areas, so the first appearance in any area is both easily visible and highly significant archaeologically. The regional archaeological records have shown a gradual geographic spread, incrementally covering more and more areas.

When considering the first dated appearance of pottery in each area across the Asia-Pacific region, the results reveal a "pottery trail" roughly from west to east (Figure 116). At the beginning west side of the pottery trail, people already had been living in these areas for many thousands of years of human evolutionary history, and then suddenly pottery-making traditions appeared and thereafter quickly spread over broader geography. Following the pottery trail farther eastward into the islands of Remote Oceania, the first signs of pottery coincided with the first arrival of people, as seen first in the Mariana Islands and then eventually elsewhere.

The oldest pottery assemblage at Ritidian may be viewed as part of the cross-regional pottery trail, representing the step in the trail that arrived in the Mariana Islands about 1500 B.C. In this view, the origins of the first Marianas pottery-making traditions must have existed in an overseas source at 1500 B.C. or slightly earlier. The homeland pottery-makers must have produced red-slipped earthenware bowls, with options of rare decorations such as the dentate-stamped, circle-stamped, and fine-line incised designs highlighted by white slaked-lime infilling. Other traits were extremely rare in the Marianas and did not last for very long, such as the use of handles, foot rings, and paddle impressions.

Outside the Mariana Islands, the only known areas bearing the same pottery-making traits prior to 1500 B.C. were in the northern through central Philippines. Those early dated site records have been reviewed elsewhere (Bellwood et al. 2011; Carson et al. 2013; Hung 2008; Hung et al. 2011). A more generalised red-slipped pottery was produced over a broader region, expanding into a few parts of Indonesia by 1500 B.C., but the distinguishing characteristics of the rare decorations so far cannot be traced to these areas within the time range of interest. At just a few known sites in the northern through central Philippines, the available dating points to an age of perhaps 1800–1600 B.C. as the oldest for the finely decorated varieties with dentate-stamped and circle-stamped designs, but the confirmed sites became much more prevalent after 1500 B.C. when evidently the decorative traditions were gaining popularity and spreading into increasingly numerous areas cross-regionally.

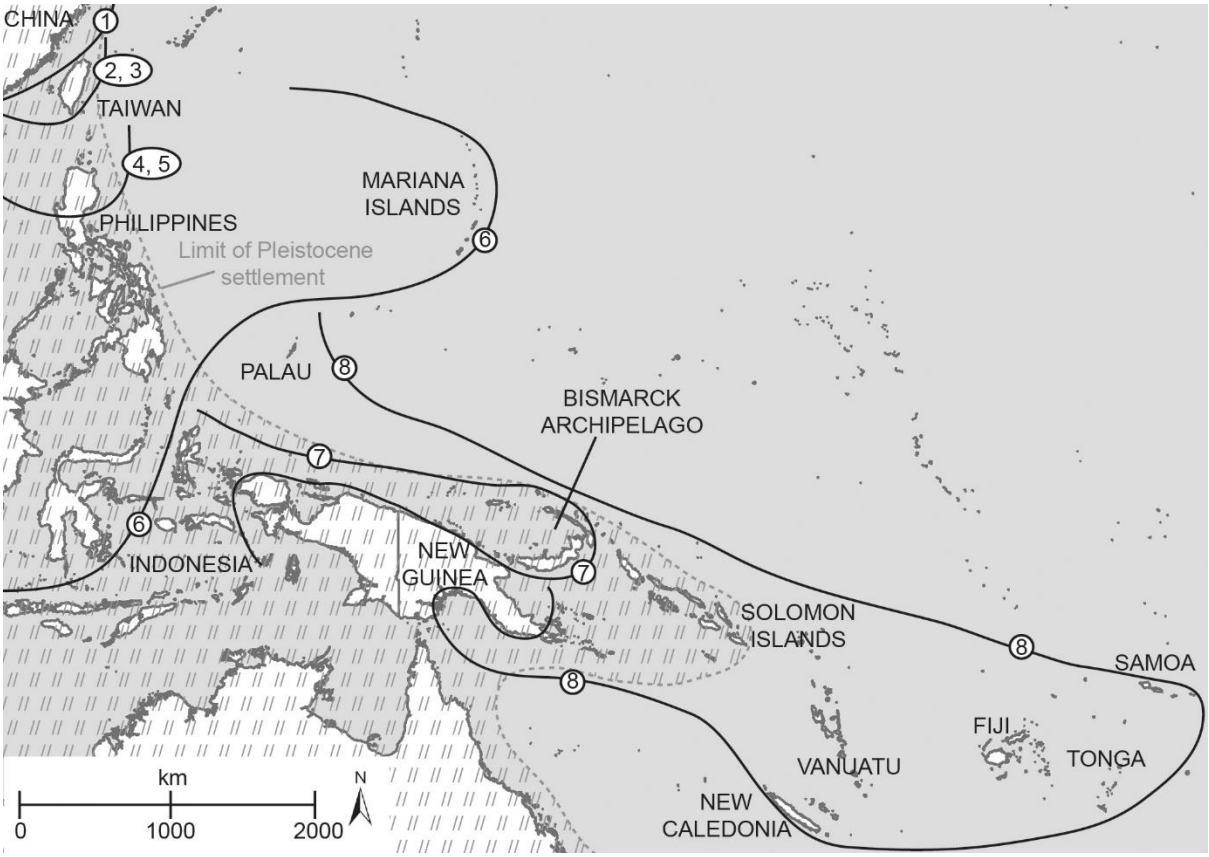

FIGURE 116. OVERVIEW OF THE ASIA-PACIFIC POTTERY TRAIL.
1 = VARIED TRADITIONS OVER TIME, INCLUDING COARSE CORD-MARKED POTTERY BY 5000 B.C.
2 = COARSE CORD-MARKED POTTERY BY 4000 B.C.
3 = VARIED TRADITIONS OVER TIME, INCLUDING RED-SLIPPED POTTERY BY 2500 B.C.
4 = RED-SLIPPED POTTERY BY 2000 B.C.
5 = FINELY DECORATED RED-SLIPPED POTTERY BY 1800 B.C.
6 = FINELY DECORATED RED-SLIPPED POTTERY BY 1500 B.C.
7 = DENTATE-STAMPED LAPITA POTTERY BY 1350 B.C.
8 = DENTATE-STAMPED LAPITA POTTERY AND OTHER TRADITIONS BY 800 B.C.

In a larger scope of the Asia-Pacific pottery trail, a number of different pottery-making traditions developed over several centuries, leading to one particular offshoot of the highly distinctive decorated varieties seen in the Philippines and the Marianas by 1500 B.C. In older contexts, the ancestral pottery traditions in the Philippines and Taiwan were somewhat different prior to 1800 B.C. Still other different ancestral forms and styles could be seen at 4000 B.C. or earlier in Taiwan and coastal China.

In chronological order, the pottery trail can be traced in eight major steps, with further refinement and nuance not covered in detail here.

1) At least as early as 5000 B.C. in coastal southern China, coarse cord-marked pottery was made at several sites.

2) By 4000 B.C., the traditions of coarse cord-marked pottery transferred across the Taiwan Straight into Taiwan.

3) Within Taiwan, the cord-marking transitioned from coarse to fine by 2500 B.C., while a number of locally specific styles developed in different parts of Taiwan. Among those locally-specific styles, a red-slipped earthenware characterised the sites of the eastern coast of Taiwan at 2500–1500 B.C. The cord-marking had disappeared almost entirely by 2000 B.C. in eastern Taiwan.

4) At 2200–2000 B.C., the oldest known pottery in all of Island Southeast Asia appeared for the first time in the northern Philippines. Specifically, this pottery style matched exactly with the red-slipped earthenware forms as seen in eastern Taiwan at the same time.

5) Within the northern Philippines, the red-slipped pottery included a number of localised expressions. A distinctive decorative style developed by 1800–1600 B.C., produced by dentate-stamped, circle-stamped, and fine-line incised designs, often highlighted by white slaked-lime infilling. The decorations were applied to some but not all of the red-slipped pottery vessels. Meanwhile, the generalised red-slipped pottery continued to be the most popular.

6) By 1500 B.C., the finely decorated pottery appeared in several sites of the northern through central Philippines, in a few parts of Indonesia, and in the Mariana Islands as part of the larger red-slipped tradition. At the same time, plain red-slipped pottery spread over a much wider geographic distribution in the Philippines and Indonesia, although the finely decorated varieties were not necessarily reproduced everywhere.

7) Around 1500–1350 B.C., a much more elaborate version of the dentate-stamped pottery style appeared in the Bismarck Archipelago, east of New Guinea. This pottery now is viewed as the "Lapita" style of pottery.

8) Within a tight range of 1100 through 800 B.C., pottery of the Lapita style was brought by the first people settling in the remote islands of Southern Melanesia and West Polynesia.

In this greatly abbreviated outline of the Asia-Pacific pottery trail, the oldest pottery findings at Ritidian and other sites of the Mariana Islands have revealed a link with Island Southeast Asia at 1500 B.C. or perhaps slightly earlier. Furthermore, this overseas link necessitated the first successful settlement of the Remote Oceanic region, definitely involving a movement of people from Island Southeast Asia across the ocean into the Mariana Islands. While so far the best documented evidence has come from the northern through central Philippines as the potential homeland for the pottery tradition coming to the Mariana Islands by 1500 B.C., the door must remain open for new site discoveries in other places of Island Southeast Asia. Notably, the generalised red-slipped pottery tradition had been spreading over a rather broad region at 1500 B.C.

While the pottery-making tradition can be attributed to an external source, the raw materials of clay and tempering agents were obtained locally in the Mariana Islands. In principle, foreign-made pottery and other items came with the first canoes reaching the shores, but then people thereafter must have found local sources of their necessary raw materials. Of the limited analysis of the raw materials so far, the pottery pastes appear consistent with local geological sources, although further examination may yet discover rare elements with other information.

Of the tools, stone and shell adzes, pounders, at least one drill-bit piece, and plentiful flaked implements and debitage reflect general-utility tasks similar to the expectations of using the local raw materials. At present, none of the raw materials can be matched with an overseas geological source, but instead people must have been aware of a diverse range of different qualities of chert and other raw materials from the beginning of settlement in the Marianas. Chert had been fashioned into polished adzes only during the earliest periods, and thereafter chert of variable quality was used for making simple flaked tools.

Concurrent with the practical technology of making pottery and other artefacts in a general sense, the highly decorative items potentially could be linked with ancestral traditions of specialised contexts. The varieties of very finely decorated pottery and personal ornaments were constrained to the centuries of first settlement prior to 1100 B.C., thus suggestive of older traditions that did not survive into later periods. These same decorative objects were found most abundantly in ritual contexts of the Ritidian First Cave, again congruent with the notion of an ancestral ceremonial tradition.

The surviving material evidence has not clarified the precise ritual performances of 1500–1100 B.C., and so far no other sites in the region have shown similar ritual contexts within the same time range. Nonetheless, those ancient activities at Ritidian can be appreciated as part of the overall cultural heritage of the first Marianas settlers, attributable at least partially to an external homeland source. People likely developed their own localised traditions in the Marianas and perhaps even at specific sites such as Ritidian, but logically at least some aspects of their cultural inventory were inherited from their overseas homeland prior to 1500 B.C.

Ritidian and other earliest sites of the Marianas have not yet shown direct physical evidence linked with a specific homeland location, for example in the forms of pottery or stone tools traceable to a particular overseas geological source. Moreover, the most distinctive materials in the potential homeland areas have not been found in the Marianas, for instance including objects made of nephrite (commonly called "jade") from eastern Taiwan, other precious greenstone from the Philippines, or slate again from Taiwan. These kinds of items had been traded in overseas networks (Hung et al. 2007), but they did not reach to the Mariana Islands.

The first settlers at Ritidian and generally in the Marianas at 1500 B.C. produced archaeological records that in many ways reflected their specific seashore habitats, not necessarily matching with the ancient contexts of inland riverside sites known in the Philippines and Indonesia around the same time. The dietary emphasis on *Anadara* sp. shellfish, role of water-collection settings in caves, assortments of shell ornaments, and other aspects of ancient life in the Marianas have not yet been matched with similar-aged sites in Island Southeast Asia. Until more of the ancient seashore sites can be documented in Island Southeast Asia, the available knowledge from different locales must be regarded cautiously when comparing with the definite seashore niche-targeting in the Mariana Islands.

Like at other oldest sites of the Mariana Islands, the initial settlement period at Ritidian can be traced back at least as early as 1500 B.C., and the associated natural and social setting apparently sustained with overall continuity through 1100 B.C. After that time, the context began to transform substantially in terms of sea level, coastal ecology, shellfish resources, access to fresh water, forms and styles of artefacts, and other aspects of the natural-cultural landscape. The foundations of ancient life and landscape at 1500–1100 B.C. definitely shaped the course of later centuries, while at the same time people adapted to continually changing circumstances as outlined in the next chapters.

Chapter 7

Ritidian at 1100–700 B.C.

By 1100 B.C., more people were living at Ritidian, and they needed to adapt to a changing coastal environment (Figure 117). The sea level began to fall from its ancient highstand, and accordingly the shallow-water lagoon gradually became exposed above the falling sea level. Larger areas of sandy beach were available for people to occupy, but the actively lowering sea level created instability in the coastal ecosystem and in the habitats for specific kinds of shellfish.

As the sea level lowered, beach sands were stranded in long lines, forming in parallel with the edge of the lowering tidal mark. One such beach ridge supported a set of post-raised houses at 1100–700 B.C., where people ate increasingly broader ranges of shellfish and other foods, no longer able to rely on the narrowly defined nearshore niches of the previous centuries. Meanwhile, people began to use less decorative pottery and shell objects, and instead the artefacts of this period started a trend of becoming coarser, less ornate, and overall more utilitarian.

Inhabited Site Context

Beginning about 1100 B.C., a lowering of sea level created incremental build-up of broken branch corals, sands, and other tidal-surge debris along patches of land now exposed above sea level. The new sedimentary units began to form in elongate berms or ridges, parallel with the edge of the seashore. They covered and necessarily post-dated the lower pre-existing palaeo-lagoon layers, starting with the first signs of stranded branch coral debris directly dated by radiocarbon about 1100 B.C.

The new beach berms were forming only in the central to western side of Ritidian, in the area of the older palaeo-lagoon. Meanwhile, the rough limestone terrace on the eastern side did not provide the conditions for build-up of beach berms. The coral reefs were affected at both the west and east sides of Ritidian, but only the western to central portion happened to include a horizontal sandy bed of stranded palaeo-lagoon sands close with sea level, where new sandy berms could form most easily as the sea level began a period of drawdown.

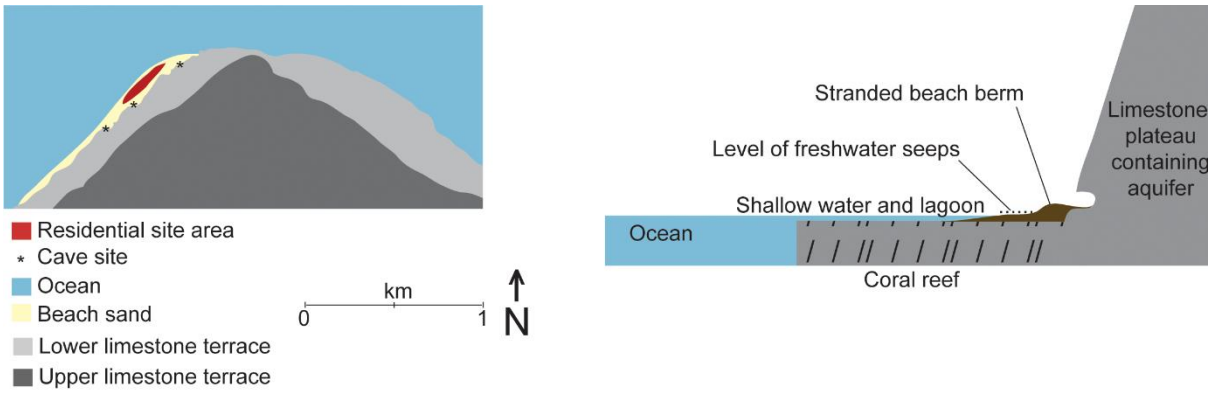

FIGURE 117. RITIDIAN LANDSCAPE AT 1100–700 B.C. LEFT = PLAN MAP. RIGHT = SECTION VIEW.

The sea-level drawdown over time would create a series of stranded beach berms or ridges, eventually creating a prograding coastal plain, but the initial formation at 1100 B.C. consisted of a singular elongate berm. Most of the area still was an unstable near-tidal zone, but the shallow-water lagoon conditions clearly were transforming into more of a sediment-filled environment. At the same time, tidal-surge deposits began to accumulate along the base of the limestone cliff, covering the palaeo-lagoon layers and enabling more consistent access into these locations and nearby caves.

Among the most important factors of this time, the level of fresh water began to lower, following in accordance with the sea-level drawdown, such that the freshwater pools in caves began to diminish. Freshwater seeps shifted to flow at slightly lower absolute elevation, for instance closer to the newly formed beach ridge just above the lowering sea level. Water pools still existed but in smaller size in the same caves, while other water-collection strategies became increasingly important for survival in the transforming environment.

The particular habitat configurations were changing with the lowering sea level, still enabling a seashore-oriented lifestyle but necessarily adapting to the new conditions. The newly formed beach ridge offered more usable land than previously had existed, but people needed to rely on different kinds of shellfish and other resources. In addition to the shifting accessibility of freshwater sources, the lowered sea level and different habitat configuration no longer could support the same kinds of shellfish that had lived in the prior palaeo-lagoon setting.

Material Evidence

The archaeological deposits of 1100–700 B.C. have been identified along the initial beach berm, as well as in three nearby cave localities at the base of the limestone cliff. The beach berm supported a shoreline-oriented residential habitation. As in prior periods, the caves showed unusual food remains and more decorative objects than seen at the shoreline residential area.

Along the top of the initial beach ridge, widespread burned debris reflected the footprint of the inhabited zone. The burned material included the oldest preserved charcoal particles at Ritidian, no longer washed or otherwise compromised by the near-tidal conditions of the palaeo-lagoon setting prior to 1100 B.C. Instead, following 1100 B.C., the nascent stable beach ridge allowed better preservation of charcoal particles, and furthermore the underlying sandy sediments showed signs of fire-hardening and reddening that had not been seen in the older deposits.

Amidst the widespread burning along the beach ridge, a number of former household localities can be inferred by clusters of post moulds, denser occurrences of charcoal and burned coral cobbles, and concentrations of artefacts and food midden. The small sizes of archaeological test pits have not yet clarified the numbers and sizes of individual houses, but the total habitation footprint was extended about 200 m northeast-southwest along the length of the beach berm. The inhabitable top width of the beach berm varied 6 to 12 m from its seaward to landward side, probably sufficient for a single line of houses.

After 1100 B.C., earthenware pottery showed a few changing characteristics, overall becoming coarser than in the prior centuries. The super-thin varieties no longer were produced, and instead the bowls after 1100 B.C. were at least 2 mm thick (Figure 118). The finely decorated pieces no longer were evident, and instead the rare decorations included bolder and simpler lines and circles, still highlighted by white slaked-lime infill but definitely in less detailed patterns (Figures 119 and 120). Most of the pottery continued to be red slipped, but the non-slipped varieties started to increase in popularity.

Concurrent with the loss of finely decorated pottery, the shell ornaments after 1100 B.C. exhibited no more of the speciality items as had been seen previously. The small rounded shell beads still were produced, but they appeared in much smaller numbers (Figure 121). The specialised *Cypraea* sp. shell beads and certain of the discs had ceased entirely in their production.

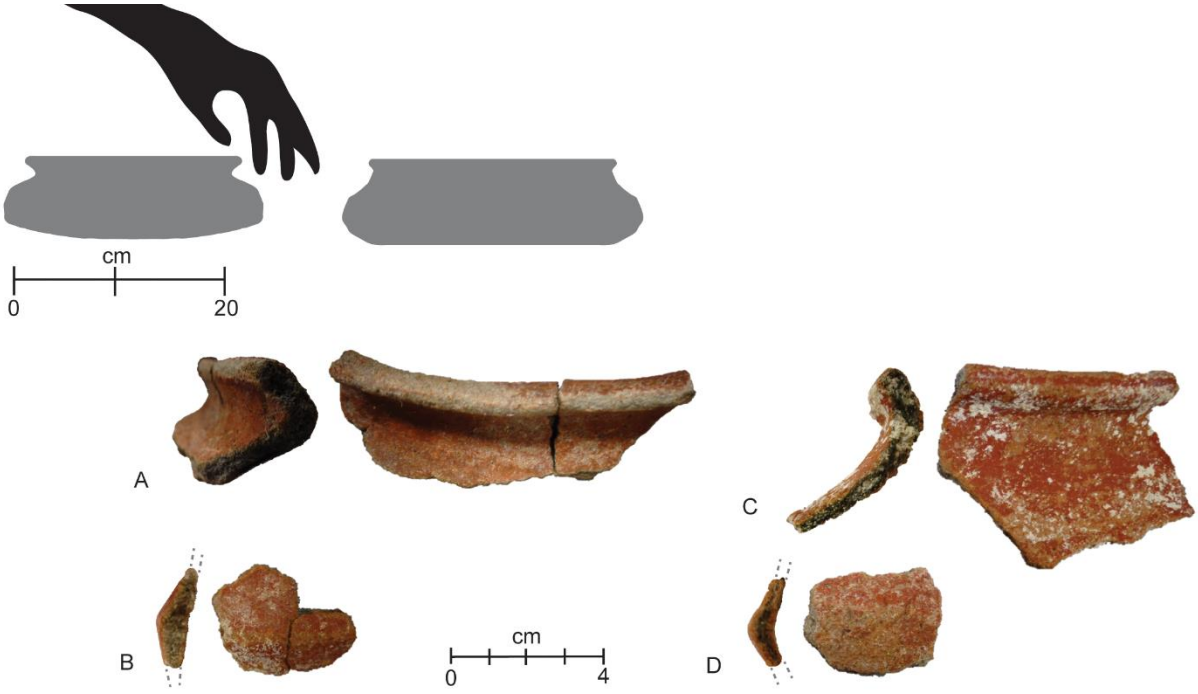

FIGURE 118. POTTERY TYPICAL OF 1100–700 B.C., FROM STABLE BACKBEACH LAYER (BASE OF ASHY SAND) AT FIRST CAVE.

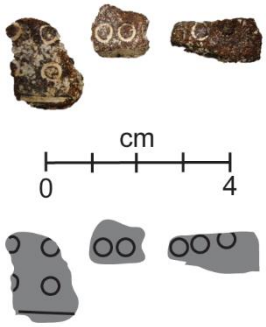

FIGURE 119. DECORATED POTTERY FROM 1100–700 B.C., SHOWING BOLD CIRCLES AND LINE INCISION WITH WHITE LIME INFILLING, FROM STABLE BACKBEACH LAYER (BASE OF ASHY SAND) AT FIRST CAVE.

FIGURE 120. DECORATED POTTERY FROM 1100–700 B.C., SHOWING BOLD CIRCLES AND COMBINATIONS OF VERTICAL AND HORIZONTAL LINES, WITH VARIABLE AMOUNTS OF RETAINED WHITE LIME INFILLING, FROM STABLE BACKBEACH LAYERS. A AND B = EXCAVATED FROM BASE OF ASHY SAND AT GATE CAVE. C AND = EXCAVATED FROM PULVERISED BEACH SAND AT FIRST CAVE.

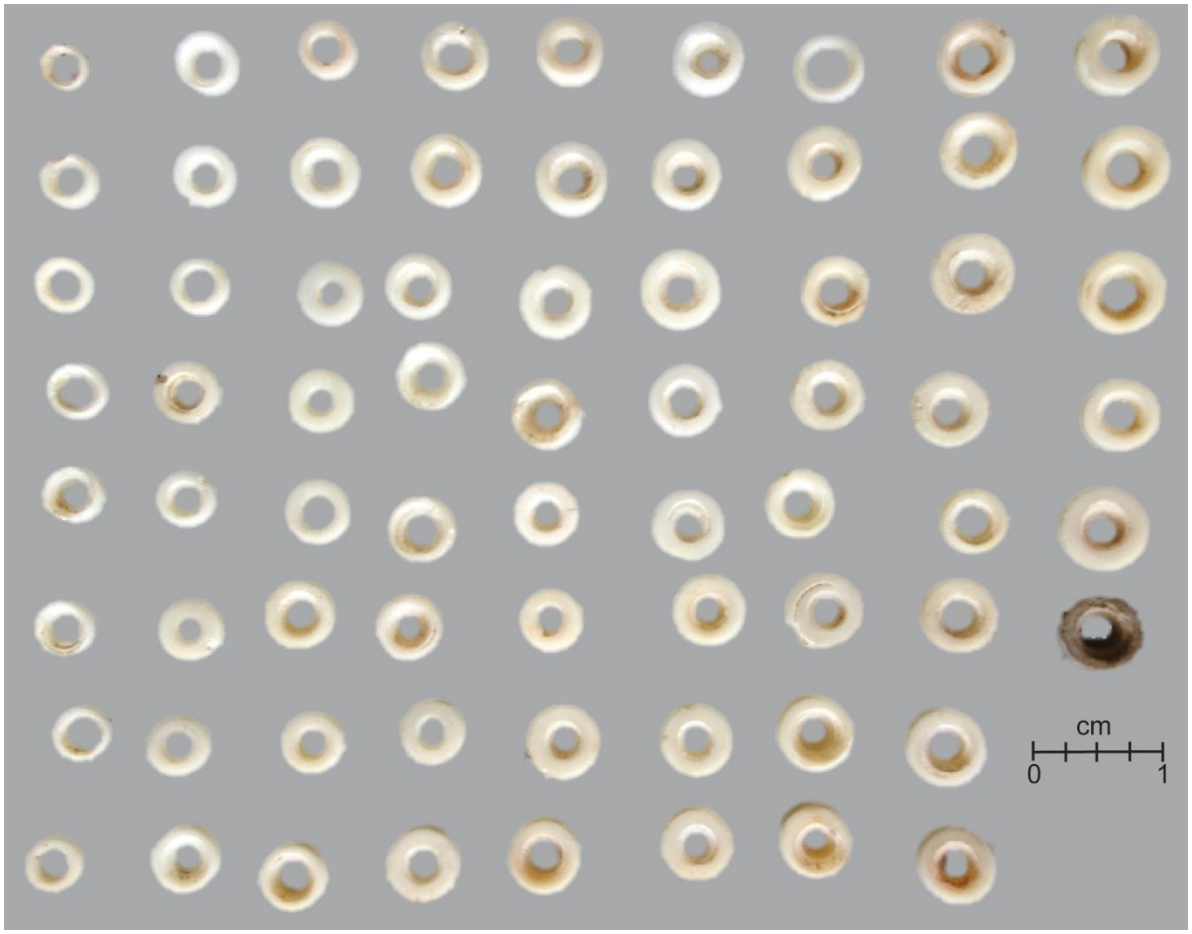

FIGURE 121. SMALL ROUND BEADS OF CUT AND POLISHED *CONUS* SP. AND OTHER SHELL SPECIMENS, EXCAVATED FROM STABLE BACKBEACH LAYER (PULVERISED BEACH SAND) AT GATE CAVE.

Although clearly less ornate by this time, the decorated pottery and personal ornaments were found exclusively in the special-use contexts of the First Cave and the Gate Cave. Other probable ceremony-associated items at both of those caves included shaped bone points and red ochre-stained bone fragments (Figures 122 and 123). Adding to the sense of a special-use context, an extreme rarity of a pottery handle was found at the Gate Cave (Figure 124). These objects, along with plain pottery and food remains, were found in a number of defined clusters and small designated pits at First Cave, Gate Cave, and Star Cave. The findings at Star Cave, however, lacked the specially decorative items.

The caves could support more frequent access after 1100 B.C., due to the emergent stable beach pockets along the base of the limestone cliff and directly at the cave entrances (Figures 125 and 126). These new beach surfaces covered the older paleo-lagoon deposits at First Cave and Star Cave, and they provided the oldest inhabited surface at Gate Cave. All three of those caves contained small pools of fresh water in their deepest portions, but the amount of water was diminishing in all cases.

The three noted caves all contained rock art panels, hinting at their past ceremonial associations. The Gate Cave showed a single pictograph panel at the edge of its entrance, involving a bright red handprint paired with an x-ray version of a hand (see Figure 31). The same motifs occurred at Star Cave, in some instances overlain by later-aged images of white-pigment human figures.

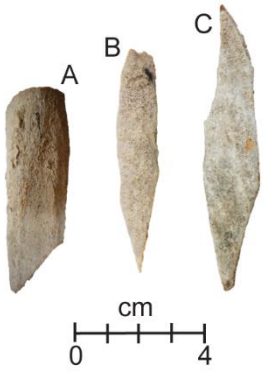

FIGURE 122. EXAMPLES OF BONE POINTS OF APPROXIMATELY 1100–700 B.C. AT RITIDIAN. A = FROM BASE OF ASHY SAND AT FIRST CAVE. B AND C = FROM PULVERISED BEACH SAND AT GATE CAVE.

FIGURE 123. EXAMPLES OF BONE FRAGMENTS WITH TRACES OF RED OCHRE, APPROXIMATELY 1100–700 B.C. AT RITIDIAN. LEFT = FROM PULVERISED BEACH SAND AT GATE CAVE. RIGHT = FROM BASE OF ASHY SAND AT FIRST CAVE.

FIGURE 124. FRAGMENT OF POTTERY HANDLE, EXCAVATED FROM LAYER OF PULVERISED BEACH SAND AT GATE CAVE, APPROXIMATELY 1100–700 B.C.

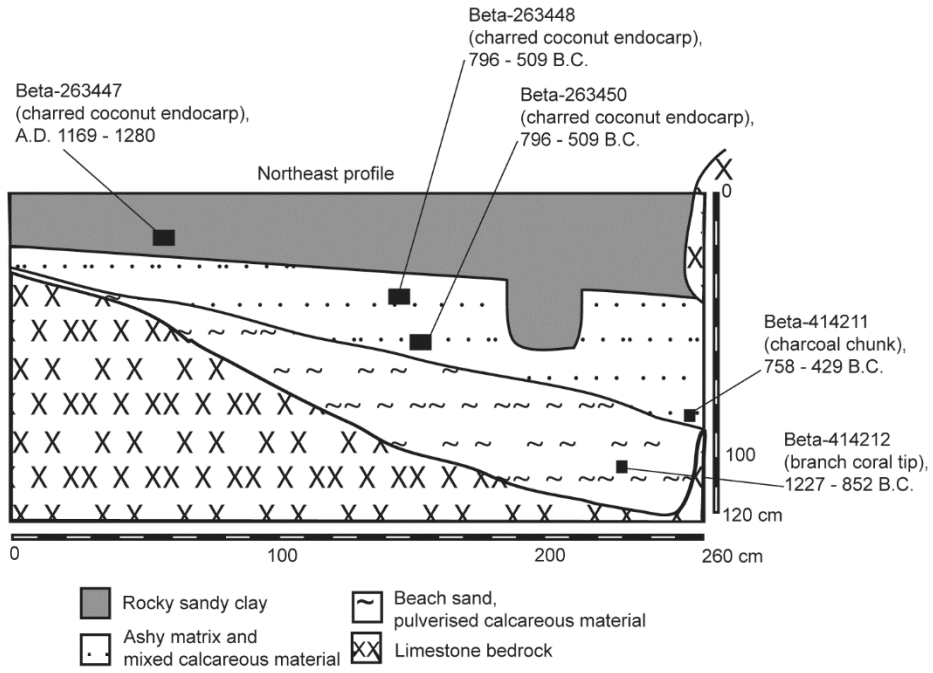

FIGURE 125. GATE CAVE EXCAVATION PROFILE AND RADIOCARBON DATING

FIGURE 126. EXCAVATION IN PROGRESS AT RITIDIAN GATE CAVE, JUNE 2015, EXPOSING THE SURFACE OF THE BASAL LIMESTONE CONNECTED WITH THE ADJACENT LIMESTONE CLIFF. PHOTOGRAPH BY HIRO KURASHINA.

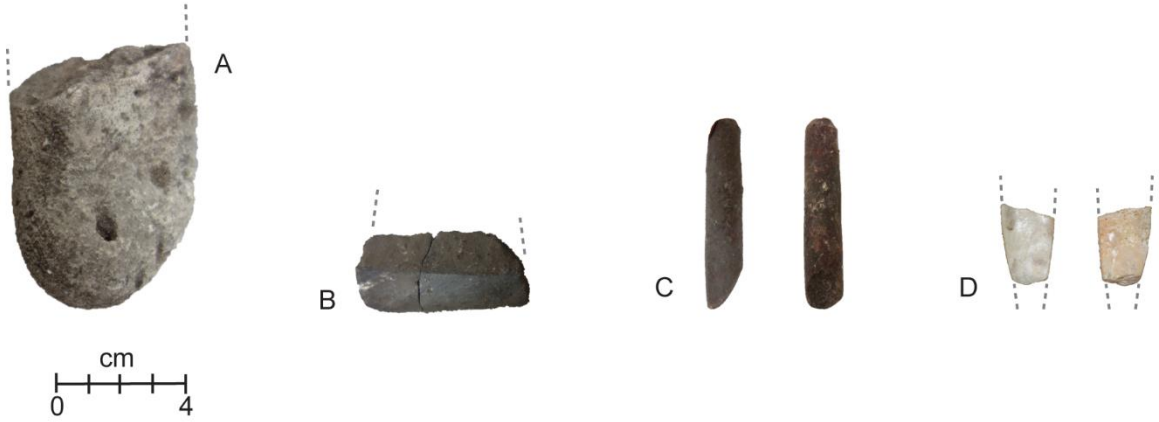

FIGURE 127. STONE AND SHELL TOOLS OF APPROXIMATELY 1100–700 B.C. AT RITIDIAN. A = FRAGMENT OF LIMESTONE POUNDER. B = TWO RE-JOINED PIECES OF BROKEN ADZE OF VOLCANIC STONE. C = SEA URCHIN SPINE ABRADER, SHOWN IN TWO VIEWS. D = CUT AND POLISHED NACREOUS SHELL, POSSIBLY BROKEN FROM A TROLLING LURE, SHOWN IN WO VIEWS. A, B, AND C = EXCAVATED FROM STABLE BACKBEACH LAYER (PULVERISED BEACH SAND) AT GATE CAVE. D = EXCAVATED FROM BEACH BERM LAYER, FENCELINE PIT 35.

The ceremonial associations of the caves can be contrasted against the regular daily habitation along the beach ridge, importantly where the archaeological deposits have revealed sets of houses and definitive household debris. The daily dietary food remains there consisted primarily of shellfish, including decreasing frequency of *Anadara* sp. and other taxa that eventually could not survive in healthy numbers through the sea-level drawdown and other changing habitat conditions after 1100 B.C. The contrasting pattern at the caves revealed rather sparse amounts of these same food remains, instead emphasising *Codakia* sp. and *Tellina* spp. bivalves that were either absent or uncommon at habitation deposits of the same period.

In addition to the pottery fragments, practical tools of 1100–700 B.C. included fragments of shell and stone adzes, general-use stone flakes, an apparent pounder, an abrader made of a sea urchin spine, and a broken piece of a possible trolling lure (Figure 127). The trolling lure cannot be identified conclusively, but it was made of cut and polished nacreous shell consistent with expectations of such an item. All of the other objects were similar to the inventory of general-purpose tools found in nearly all time periods, and nothing in particular appeared notably distinctive when compared to other known Marianas site collections.

Larger View

The sea-level drawdown after 1100 B.C. made more coastal landforms available for cultural habitation, not only at Ritidian but also generally throughout the Mariana Islands. The older preferred seashore niches no longer existed in the transformed coastal environments, but instead people took advantage of different opportunities for coastal settlement and evidently in increasing numbers of successful cases. Growing numbers of settlement sites accordingly have been documented and dated since 1100 B.C., consistently in the settings of the newly emerged beach ridges and other coastal landforms as seen at Ritidian.

While apparently more people were living in greater numbers of coastal sites in the Mariana Islands by 1100 B.C., additional communities were being established for the first time in other islands of Remote Oceania (Figure 128). For instance, sites in Palau have shown a horizon of plainware pottery dated at 1100–900 B.C. at Ngatpang (Liston et al. 1998), Chelechol ra Orrak (Fitzpatrick 2003), and Ulong (Clark et al. 2006). Another population movement at the same time involved the spread of dentate-stamped Lapita style pottery from the Near Oceanic islands of the Bismarck Archipelago (east of New Guinea) into the

remote-distance islands of Southern Melanesia and West Polynesia, dated abundantly in numerous sites at 1100–800 B.C. (Denham et al. 2012).

The overall expanding human settlement of Remote Oceania after 1100 B.C. can be attributed to the growing numbers of people living in the nearby inhabited areas such as the Marianas, Island Southeast Asia, and the Near Oceanic islands east of New Guinea. Many people of course continued to live in those same places multi-generationally, but at least a few groups must have ventured farther overseas in order to create the new settlements in the remote-distance islands previously lacking any archaeological evidence. These events occurred 400 years after the initial settlement at Ritidian and other oldest sites of the Marianas, thus indicating a different social context in addition to the new circumstances of a lowering sea level and transforming coastal environments.

In terms of the numbers of known sites and geographic coverage, the archaeological record of Remote Oceania mostly began after 1100 B.C., but this majority of the record actually had post-dated some centuries of prior successful settlement in the Mariana Islands. Ritidian and other sites of the Marianas have shown how people adapted to new coastal conditions after 1100 B.C. Meanwhile, other islands of Remote Oceania have shown their first cultural presence at sites where the coastal environments already were transforming after 1100 B.C. as in Palau, Southern Melanesia, and West Polynesia.

Unlike the findings at Ritidian and the Marianas generally, the Lapita-associated sites in Southern Melanesia and West Polynesia at 1100–800 B.C. have revealed evidence of significant human-caused impacts on natural resources. The people moving into those islands had brought domesticated pigs and dogs, chickens, rats, and several foreign plants (Kirch 1997) in total allowing the installation of a new artificially modified landscape that otherwise did not exist naturally. The imported and imposed landscape conditions directly depopulated the trees and the animals living there, compounded with the effects of people hunting birds and other animals that had evolved for numerous centuries without invasive predators (Steadman 1995).

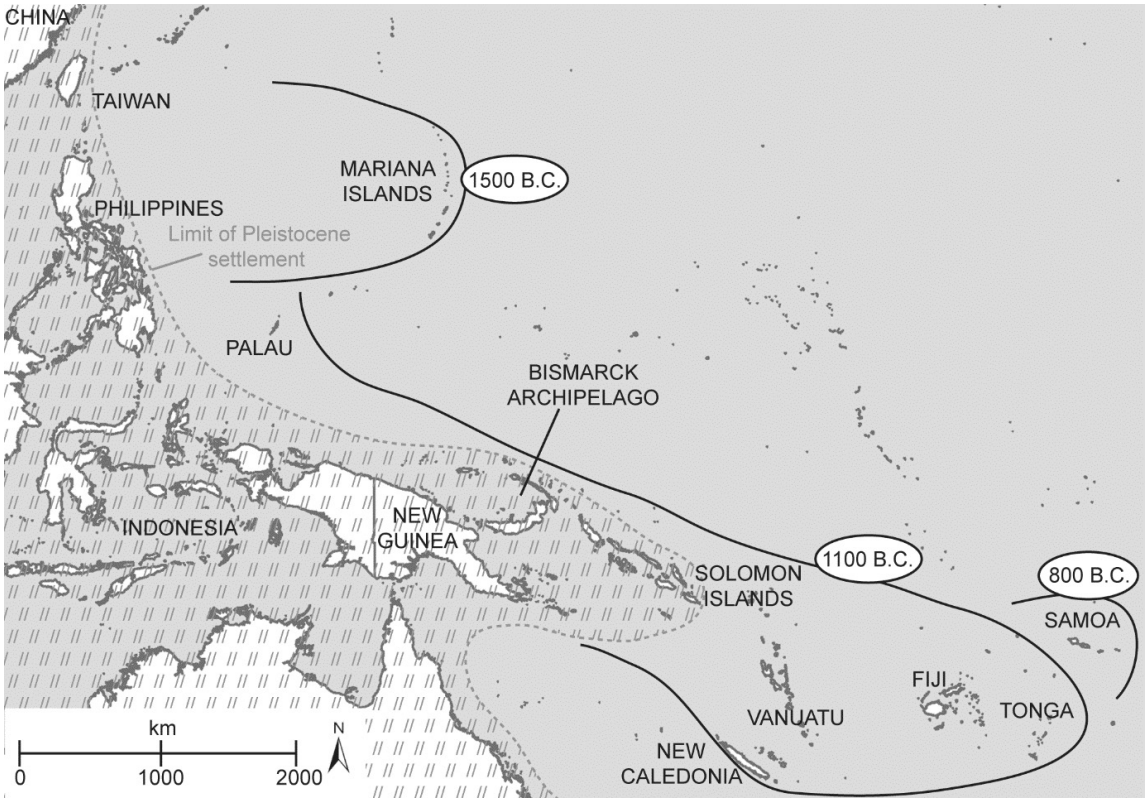

FIGURE 128. INHABITED AREAS OF PACIFIC OCEANIA AT 1100–700 B.C.

The veritable siege of ecological imperialism in most of Remote Oceania after 1100 B.C. has not been evidenced in the longer-inhabited Mariana Islands, perhaps attributable to the fact that the older Marianas settlement occurred in isolation as the first ever human settlement of the Remote Oceanic region under unique circumstances that never again were repeated. Some centuries prior to the other Remote Oceanic settlement instances, the first instances of migrations to Ritidian and other oldest Marianas sites did not involve the overseas transport of domesticated animals as seen elsewhere, and the long-distance transported plant taxa apparently were less numerous as well. In qualitatively different contexts 400 years later, the Lapita-associated Remote Oceanic expansion was occasioned by people migrating from the long-inhabited Near Oceanic islands such as in the Bismarck Archipelago, where older ancestral Lapita sites have been dated most confidently to 1350 B.C. (Summerhayes 2007) and perhaps approaching the age of the oldest Marianas sites at 1500 B.C. (Kirch et al. 2015).

During the time when most of the known Remote Oceanic archaeological sites were showing signs of first human settlement after 1100 B.C., the contemporaneous sites in the Mariana Islands were showing the results of growing populations adapting to new environmental conditions after more than 400 years of successful settlement at Ritidian and other sites. Overall as people spread to inhabit more and more geographic space of Pacific Oceania, significant differences followed with the separate chronological parameters, cultural settings, and environmental circumstances. For example, the settlement dating at Ritidian and other Marianas sites around 1500 B.C. necessarily was linked with more ancient foundational traditions and with different environmental contexts that no longer existed for the people moving into other islands of Remote Oceania some centuries later.

Chapter 8

Ritidian at 700 B.C.–A.D. 1

During the centuries after 700 B.C., people began to invest more formally in a broad spectrum of resource usage, rather than the prior ancestral practice of targeting a narrow set of shoreline niches. This shift can be documented at the scale of the Ritidian site complex as a whole, but perhaps more impressively it occurred at a region-wide scale, along with a pronounced decline of decorative output in artefact categories at the same time. The same transitions co-occurred cross-regionally throughout the inhabited areas of Remote Pacific Oceania, at approximately the same time but with slight variations.

After 700 B.C., the effects of sea-level drawdown had forced people to abandon their older preference for shoreline-oriented housing, and people shifted their focus to other landforms and habitats. The previous shallow-water lagoons and nearshore niches no longer existed at Ritidian and other sites, so people needed to adjust according to their new settings. While the coastal ecosystems of course continued to provide important foods and other resources, the nearshore zones were unstable and unreliable for supporting large numbers of people. By 700 B.C., the older coral reef no longer was living, but a new reef ecosystem could not yet develop in a healthy fashion while the sea level still was lowering.

People moved away from their beachfront residences, and instead they started living in more assuredly stable landforms of elevated backbeach (Figure 129). At Ritidian, the inhabited patches of backbeach settings at 700 B.C. were situated directly at the base of the steep limestone cliff (Figure 130). These newly stable landforms supported thick forest growth, attested in a sudden appearance of an organic horizon and soil formation, as well as in the shells of tree snails that had been absent in the older beachfront context. Over the next centuries, increasingly more area of backbeach became available, due to the ongoing drawdown of the sea level, exposure of more and more beach sands above the falling sea level, and continual build-up of sands and corals from tidal-surge and storm-surge events.

Inhabited Site Context

Archaeological habitation layers of 700 B.C.–A.D. 1 continued to be confined to the western side of Ritidian, but people had shifted their focus away from the prior preference on the ancient shoreline zones that no longer had existed by this time. Instead of living directly at the seashore, people inhabited a newly formed backbeach closer to the base of the limestone cliff. Of course the seashore still existed in a transformed condition and within easy access, but it no longer was the directly targeted habitation niche of prior centuries.

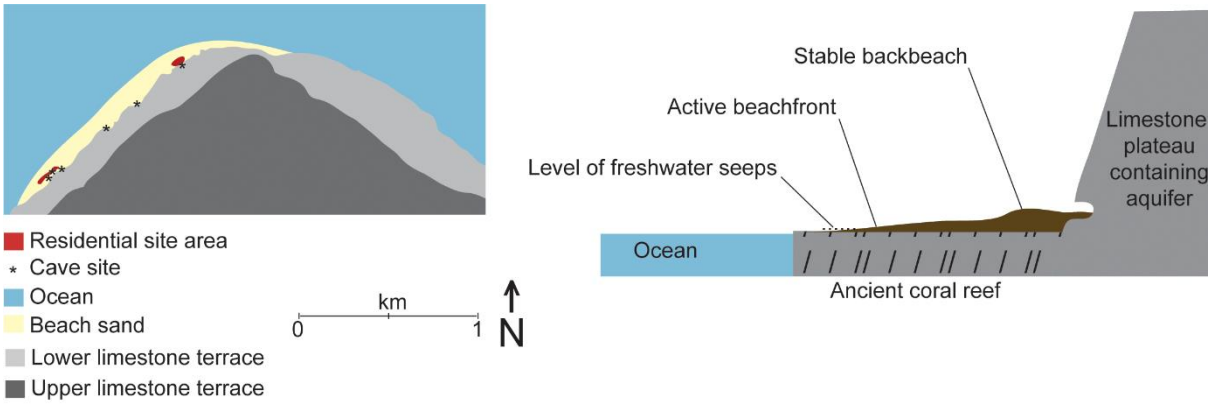

FIGURE 129. RITIDIAN LANDSCAPE AT 700 B.C.–A.D. 1. LEFT = PLAN MAP. RIGHT = SECTION VIEW.

FIGURE 130. LOOKING DOWN AT A CLIFF BASE HABITATION AREA, VIEW DOWN TO NORTHWEST, JULY 2013. THE TEST PIT HERE WAS 1 BY 1 M, SHOWING THIN CULTURAL LAYERS OVER THE PALAEO-LAGOON SAND.

Throughout the period of 700 B.C.–A.D. 1, the sea level continually lowered, thereby disallowing the steady coral growth and attendant productivity that had existed previously. The coral reefs and related habitats of the prior sea-level highstand could not survive after exposure above the lowering sea level, and then the ongoing sea-level drawdown allowed only minimal coral growth. Specifically at Ritidian, the older components of coral reef and palaeo-lagoon floor beds had been affected adversely since 1100 B.C., and any enduring last vestiges of their associated habitats were entirely vanished by 700 B.C. A long-term stable sea level would not again allow healthy growth of horizontal coral reefs here until some centuries later.

While the nearshore resource zones overall had declined in their productivity, the sea-level drawdown resulted in the creation of larger coastal landforms at Ritidian and elsewhere. By 700 B.C., a stable backbeach had formed in the landward area, close to the base of the limestone cliff, and it gradually prograded from there. The prograding beach landform covered the prior beach ridge and continued to expand seaward, thus providing more stable and reliable surfaces for habitation and other cultural use.

The landward backbeach zone supported the formation of an organic soil horizon, overlaying the older beach sands. Shells of snails, notably of *Pythia* sp. and *Partula* sp., began to accumulate in these organic layers, further evidencing the existence of trees and leaf litter specifically in this location for the first time. The deeper and older layers of beach sands showed no such evidence of soil formation or forest growth.

By 700 B.C., people no longer could rely heavily on the nearshore niches that had been essential in prior centuries, but other resource habitats were becoming available for the first time. The nearshore habitat would be notably less productive throughout another few centuries of continued sea-level drawdown, but meanwhile the landward backbeach offered new opportunities in the western side of Ritidian. For the first

time in this particular location, stable backbeach landforms could support reliable plant growth. Previously, such stable terrain had been available in the rough limestone exposures of the upper plateau and along the eastern side of Ritidian.

The site layers of this period at Ritidian referred to a number of small habitations in newly stable backbeach pockets, situated near the base of the limestone cliff. These same localities were often but not always adjacent to the many caves in the limestone escarpment. By 700 B.C., these particular caves no longer contained freshwater pools, but rather the lowered sea level had resulted in new positions of freshwater seeps along the prograding shoreline at some distance from the caves.

Material Evidence

Throughout the period of 700 B.C.–A.D. 1, the archaeological materials followed the same trends of lessening decorative aspects as had started previously, and a significant transition occurred around 500 B.C. in the artefact inventories. Approximately at 500 B.C., even the less finely executed variants of lime-infilled pottery traditions and detail-oriented shell ornaments had vanished, thereafter replaced by coarse and plain objects. People made larger sizes of pots than previously, more suitable for serving greater numbers of people at once and without the highly specialised ornamental aspects of prior periods. The same pottery showed residues of starchy plants, such as breadfruit, yams, and taro that had been less prominent in older pottery, suggestive of a greater emphasis on plant foods in places removed from the active beachfronts. Meanwhile, the records of food debris showed fair amounts of shellfish as always, but people discarded significantly more bird and bat bones than in older periods, as expected when people focused more on their forest zones.

The pottery after 700 B.C. included increasingly more non-slipped and straight-sided vessels (Figures 131 and 132), while the traditions of red-slipped bodies and outcurved rim profiles declined rapidly, nearly obsolete by 500 B.C. along with their older decorative styles. The surviving pottery forms were the thicker and coarser varieties, typically made with less refined clay fabric and medium to large temper inclusions. The new vessel forms were decorated only rarely with simple incisions on the lip edge. No such decorated lips have yet been identified at Ritidian, but they are known from other sites of this time range.

By 500 B.C., a preference emerged in the pottery inventory for producing coarse, thick, flat-bottomed, and straight-sided vessels of various size that would continue in popularity for another several centuries. One new product of this period was a flat-bottomed and shallow-sided vessel (Figure 133), often retaining thick burned residue in the interior and light scorching on the underside exterior, as may be expected of a pan or griddle. The underside sometimes would display the impressions of a plaited mat (Figure 134), impressed when the wet pot had been drying on a matted surface prior to its firing. These pans or griddles mostly were about 2 cm thick or up to 2.5 cm thick, thus distinguished from the options of thinner-bodied and generally smaller-sized cups or jars.

After 500 B.C., the small and finely finished round shell beads had ceased in the material repertoire. A cluster of these beads was found at Ritidian Gate Cave, dated around 700–500 B.C., representing one of the last such instances known in the region. They had been declining in frequency since 1100 B.C., along with the complete loss of the rare *Cypraea* sp. shell beads and varied fine discs.

While the decorative expressions of artefacts clearly diminished, the practical daily-use objects such as adzes and chisels continued to be produced in much the same forms as previously (Figure 135). The only notable difference after 700 B.C. was a vastly reduced frequency of chert for any kind of flaking tool. Formal objects of chert adzes had not been seen at Ritidian since 1100 B.C., although small pieces of flaked chert continued to be used for general-utility cutting, scraping, and slicing.

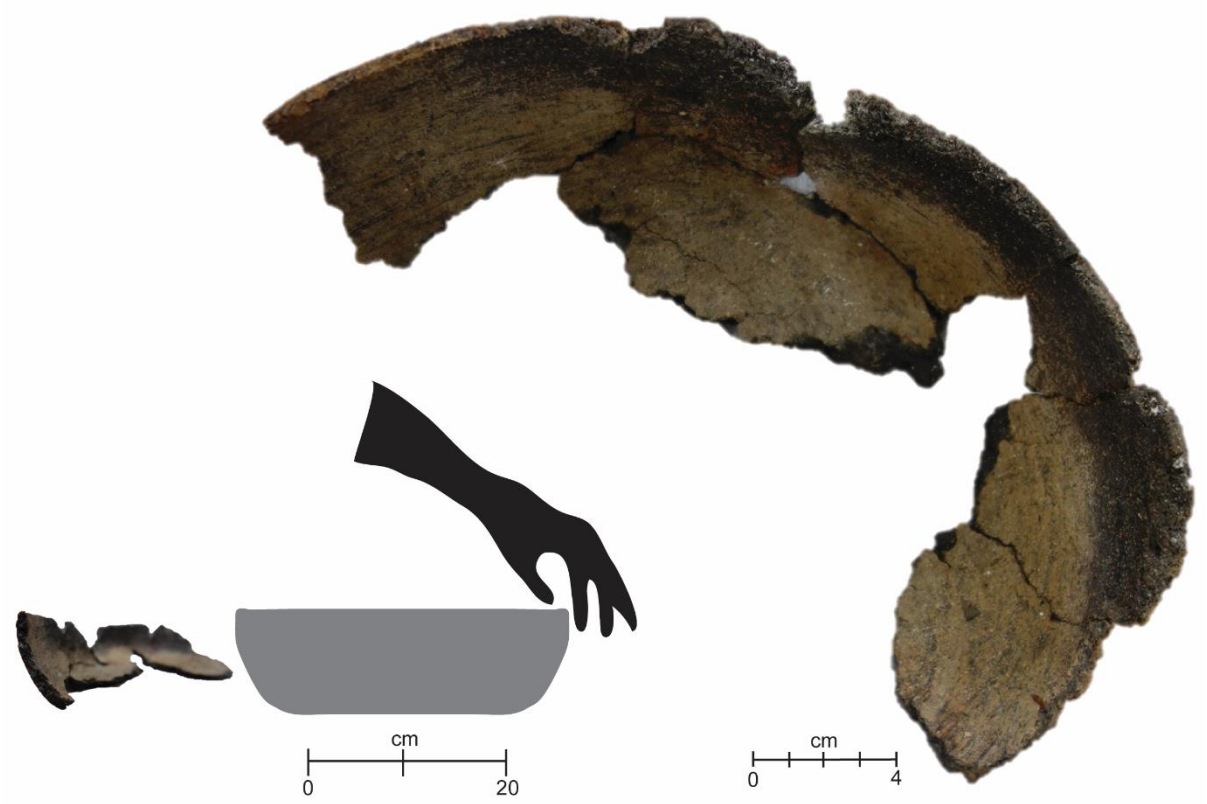

FIGURE 131. PARTLY RECONSTRUCTED EARTHENWARE BOWL, EXCAVATED FROM ASHY SAND AT GATE CAVE, APPROXIMATELY 700–500 B.C.

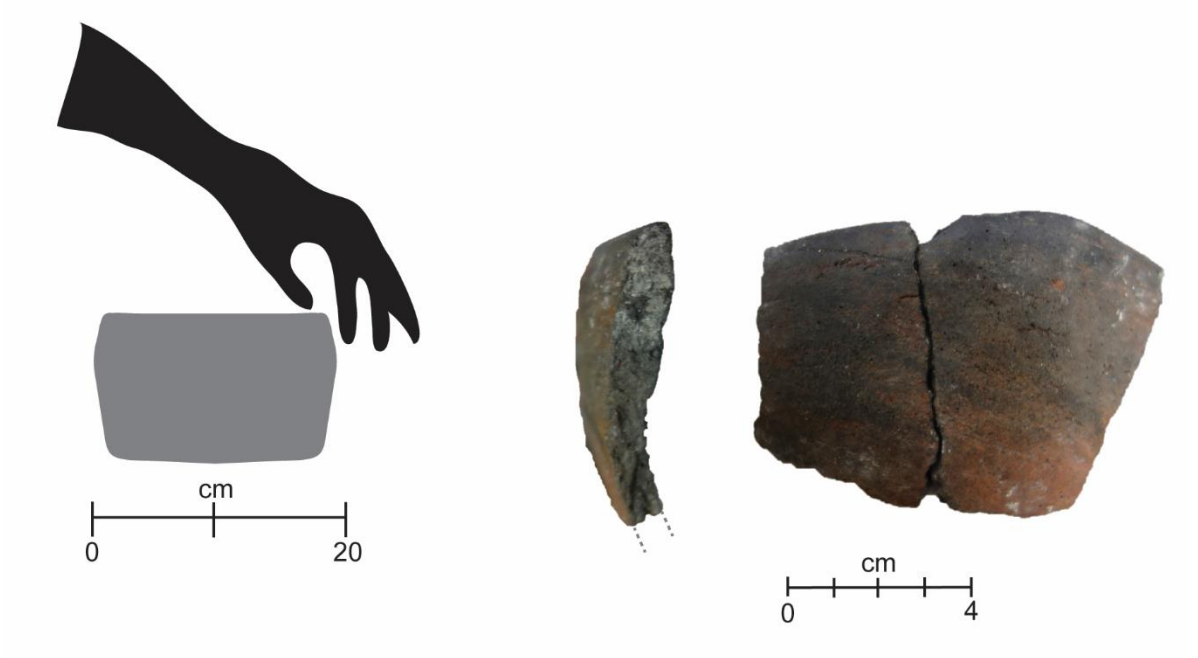

FIGURE 132. FRAGMENTS OF NARROW CUP, EXCAVATED FROM ASHY SAND AT GATE CAVE, APPROXIMATELY 700–500 B.C.

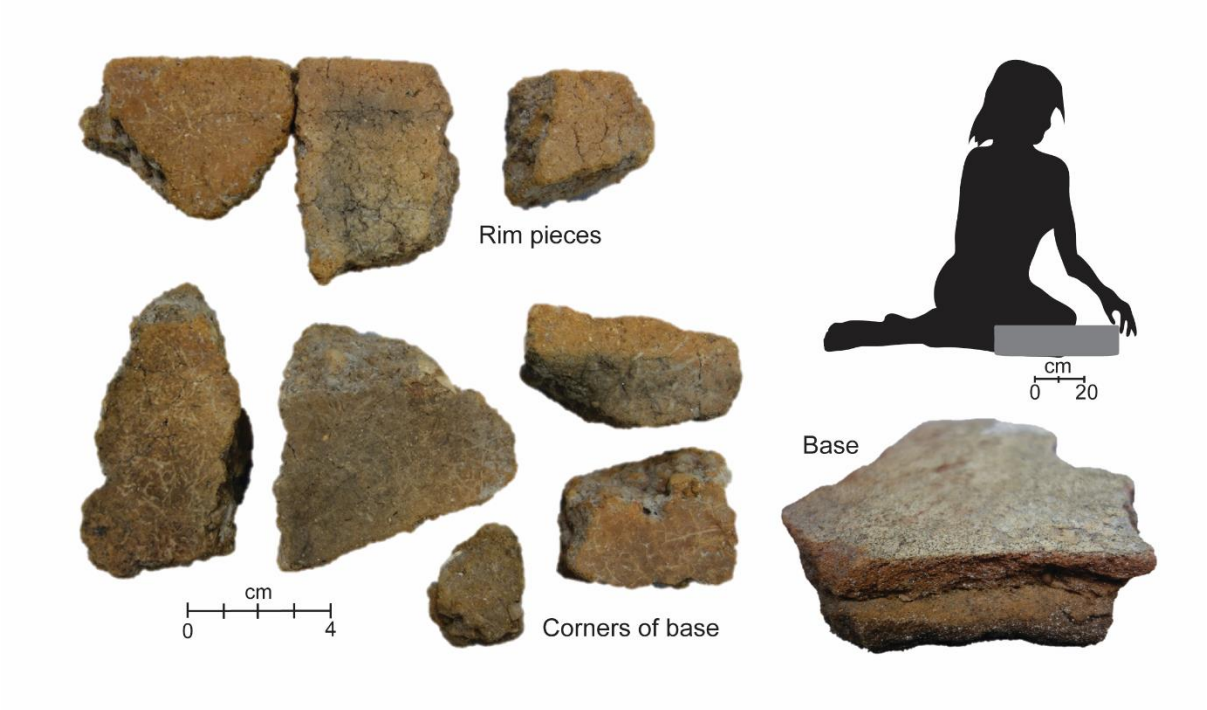

FIGURE 133. FRAGMENTS OF THICK-WALLED AND FLAT-BOTTOMED POTTERY, EXCAVATED FROM UPPER COMPONENT OF ASHY SAND AT FIRST CAVE, APPROXIMATELY 500 B.C.–A.D. 1.

FIGURE 134. FRAGMENT OF MAT-IMPRESSED POTTERY BASE, VIEW FROM BOTTOM, EXCAVATED FROM ASHY SAND AT GATE CAVE, APPROXIMATELY 700–500 B.C.

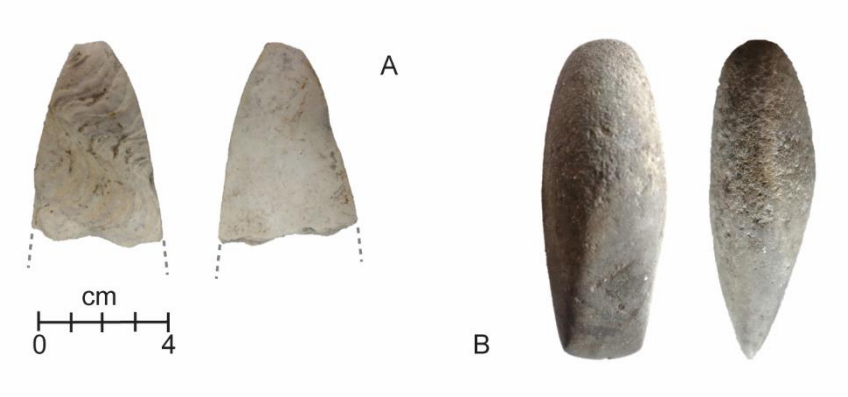

FIGURE 135. *TRIDACNA* SP. SHELL ADZE FRAGMENT (ITEM A) AND VOLCANIC STONE CHISEL (ITEM B), BOTH SHOWN IN TWO VIEWS, EXCAVATED FROM UPPER COMPONENT OF ASHY SAND AT FIRST CAVE, EXCAVATED FROM ASHY SAND AT GATE CAVE, APPROXIMATELY 700–500 B.C.

By default with the lesser use of chert, tools of volcanic stone became more popular, yet still the most frequent material choice was the hard shell of *Tridacna* sp. or giant clam. Given the different mechanical properties of these raw materials, the forms of adzes and chisels varied. Additionally, the shell tools could not exceed the thickness of the natural shell, but the objects of volcanic stone in principle could be fashioned into thicker shapes.

The material findings of 700 B.C.–A.D. 1 at Ritidian all referred to a few small areas near the base of the limestone cliff, including both residential habitations and special-use cave ritual locales. By this time, the caves here had become less important for water collection, and meanwhile the range of ceremonial objects had diminished. The positions of freshwater seeps had shifted father seaward with the lowered sea level, but the caves naturally remained fixed in place and thus supported new kinds of ceremonial venues.

The food middens of this period followed the expectations of a transforming nearshore ecosystem. They contained dramatically less amounts of the nearshore shellfish such as *Anadara* sp., chiton, limpets, and sea urchin that had characterised the older periods. Instead, people were harvesting shellfish from zones slightly farther from the shoreline in deeper water, for instance targeting more of the *Turbo* spp. and *Trochus* spp. gastropods.

With the changing shellfish compositions, the food middens revealed more numerous bones of birds and possibly of fruit bats than had been evident in the older deposits, overall indicative of increased access to forested habitats. This trend partly could be attributed to the better preservation of bones in the stable backbeach deposits, but at least some change in the overall diet may be expected with the shift away from the older practice of shoreline-oriented residence. Similarly, the pottery fragments of large pans or griddles began to exhibit burned starchy residues much more frequently than had been observed in the older pottery, thus implying a stronger role of plant foods after 700 B.C. and especially after 500 B.C. when these new pottery styles gained more popularity.

Larger View

The transition from shoreline niche-targeting to more broad-spectrum resource usage correlated with the loss of decorative artefact expressions, already started since 1100 B.C. but then losing even the coarser types of decorative output after 700 B.C. The simultaneous effects in both the natural and cultural setting became most strongly established by 500 B.C. The timing was roughly the same at Ritidian and throughout

the Mariana Islands, as well as apparently cross-regionally throughout the inhabited areas of Remote Pacific Oceania around 500 B.C.

The shift toward a broad-spectrum land-use pattern during the period of 700 B.C.–A.D. 1 created the context for a later expansion of populations to inhabit more territory and more diverse settings. These trends continued for several centuries, such that eventually during the *latte* period after A.D. 1000, people expanded to live in almost every inhabitable part of the Mariana Islands (Kurashina 1991). This later result can be traced back to the pivotal point of when people previously had invested deliberately in a broad-spectrum strategy departing from the older ancestral practice of inhabiting specialised nearshore niches. Some of these aspects had started to change with the initial sea-level drawdown about 1100 B.C., but then people needed to adapt to the more intensive and long-term continuing effects after 700 B.C. and with the most pronounced transformations evidently underway by 500 B.C.

The parameters of broad-spectrum land-use pattern need to be understood in terms of relative scale, in essence meaning something different in a large land mass as compared to a small island. For the generations of people who lived at sites such as Ritidian since 1500 B.C., their spectrum of available habitats necessarily was condensed into a small package of geographic space. In these kinds of settings, the overall natural-cultural ecosystem can undergo major change due to just a small degree of environmental transformation or stress in the land's ability to provide food. Furthermore, if a change happens to occur specifically in an especially critical resource zone such as had occurred in the nearshore niche habitats at Ritidian and other early sites of the Marianas, then the resulting system-wide response can be rather dramatic as was evident cross-regionally by 500 B.C.

Regarding the correlation of the ecological shift with the loss of decorative artefact output, at least two "stages" were attested in the material record. An initial transition around 1100 B.C. resulted from the first signs of sea-level drawdown and termination of the most finely decorated pottery and shell ornaments, but people maintained a slightly different format of shoreline-oriented settlement and coarsely decorated artefact inventory for another few centuries. By 700 B.C., people were forced to accept that even the modified version of their shoreline lifestyle no longer was sustainable, and likewise the less finely decorated artefact repertoire lost its prominence. By 500 B.C., the last vestiges of those older ancestral practices were being replaced by newer traditions, and similar trends would continue thereafter.

The sea-level drawdown, loss of decorated pottery traditions, and shift to broad-spectrum resource usage all were cross-regional occurrences around 500 B.C. (Nunn and Carson 2015), evident not only in the Mariana Islands but also throughout the inhabited areas of Remote Oceania at that time. In those other areas, for instance in the islands of Southern Melanesia and West Polynesia where Lapita pottery-makers first settled about 1100–800 B.C., the highly distinctive dentate-stamped Lapita pottery disappeared around 500 B.C., coincident with the ultimate demise of the lime-infilled pottery decorations and other elements as noted in the Mariana Islands. Furthermore, the Remote Oceanic Lapita site inhabitants targeted similar shoreline niches as seen in the Mariana Islands, no longer tenable after 500 B.C. and co-occurring with a dietary shift to include a broader range of plant foods and domesticated animals as documented in faunal remains (Bedford 2006), stable isotope signatures in human and animal bones (Kinaston et al. 2014; Valentin et al. 2010), and residues of foods preserved in dental calculus (Horrocks et al. 2014). In all cases, the sea-level drawdown by 500 B.C. disallowed human use of the older seashore habitats that simply ceased to exist by that time, thus affecting the overall natural and cultural context.

Chapter 9

Ritidian at A.D. 1–500

During the centuries of A.D. 1–500, the rate of sea-level drawdown temporarily was slow, resulting in more stability of coastlines, healthier growth of new coral reef, and reliability of nearshore resources. People saw renewed benefits of their coastal zones, adding to their established traditions of farming and forest management that had been strengthening throughout prior centuries. People expanded their residential habitation areas at Ritidian and elsewhere, still occupying the most stable landforms of backbeach and inland terrain as their primary sites while accessing broader habitats for their foods and other resources.

Albeit temporary, the coastal stability at A.D. 1–500 brought more broad-ranging habitat stability than had been witnessed in the immediately preceding several centuries of continual sea-level drawdown. The coast always had been productive to some degree, but the centuries of sea-level drawdown had created an overall lesser amount of the most preferred dietary shellfish. Numerous generations of people had developed increasing reliance on inland zones for their essential foods, but now the nearshore zone once again supported a healthy coral reef and ecosystem that previously had been lacking during some centuries of sea-level drawdown.

Inhabited Site Context

A new coral reef began to grow at the coast during this time of stable coastlines, greatly increasing the base food supply for the local residents. Shellfish such as *Strombus* sp. gastropods began to contribute notably more to the food middens, effectively replacing older preferences for other taxa that had been vastly depopulated. These characteristics were not at all unique to Ritidian, but rather they occurred throughout the region wherever nearshore ecosystems were beginning to re-stabilise in their new conditions.

While the coastal zone definitely offered reliable attractions, people during the years of A.D. 1–500 continued to reside in the most stable landward terrain near the cliff base at the western side of Ritidian (Figure 136). The individual habitation localities persisted from the previously established areas but in larger footprints, plus a few new locales were occupied. In all of those cases, the archaeological layers occurred within more strongly developed soil horizons than had been evident previously, thus indicating well established terrestrial habitats after A.D. 1.

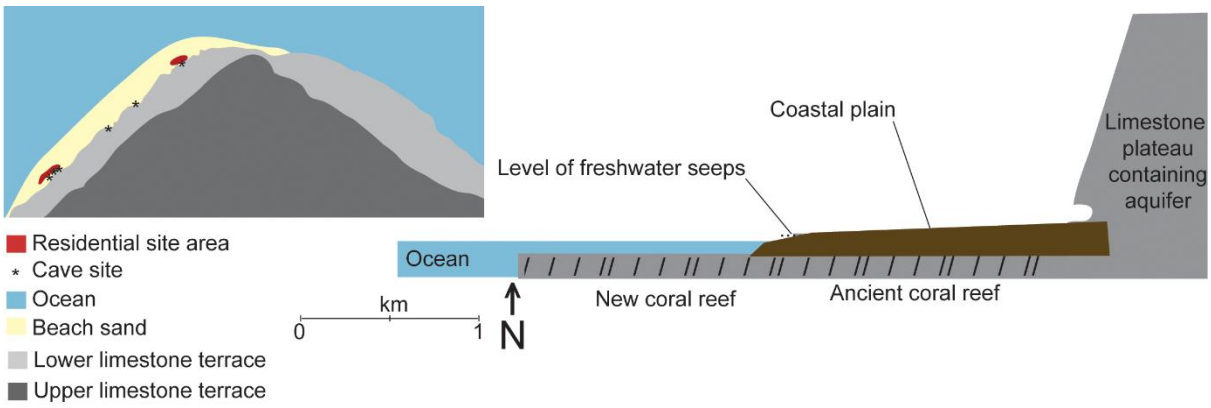

FIGURE 136. RITIDIAN LANDSCAPE AT A.D. 1–500. LEFT = PLAN MAP. RIGHT = SECTION VIEW.

Perhaps related to the cliff base habitation focus, the cultural use of caves in the limestone escarpment began to change around this time. People likely were accessing a greater number of caves with more frequency than had occurred previously, yet the specific activity contexts have remained unclear in the surviving material records. For instance, faint traces of ash and shells were noticed for the first time in the floor of Upper Cave with dating of the organic sediment at A.D. 53–236 and at A.D. 241–411, although no pottery or other artefacts were present until much later (Figure 137). Meanwhile, a new habitation had been established around 45 B.C.–A.D. 77 along the base of the cliff outside Upper Cave (Figures 138 and 139) This location furthermore was within very close range of both Lower Cave and Unnamed Cave, although the archaeological layers so far have not been dated to such an early period in those specific caves.

Material Evidence

In terms of their artefact contents, the site layers of A.D. 1–500 portrayed a continuation from the immediately preceding centuries. The pottery fragments mostly were broken from the large flat-bottom vessels that had become popular by this time (Figure 140). Stone and shell adzes and flaked tools persisted as general-purpose items, but limestone pounders and edge-used flakes of volcanic stone appeared in slightly greater numbers than previously had been noted (Figure 141).

Due in large part to the enhanced physical stability of the inland terrain, the archaeological layers after A.D. 1 formed in new sedimentary units, separately from any trace of the older underlying layers with traditions of red-slipped pottery, outcurved rim profiles, or other artefact traits that had been declining over the preceding several centuries. While a few of the later-aged items occasionally had intruded downward into the deeper and older layers, no older artefacts have been observed as displaced upward into the layers dated securely in the range of A.D. 1–500. With the stronger soil formation characteristics after A.D. 1, the archaeological layers of this time period coincided with visually identifiable sedimentary units in coastal sites such as at Ritidian.

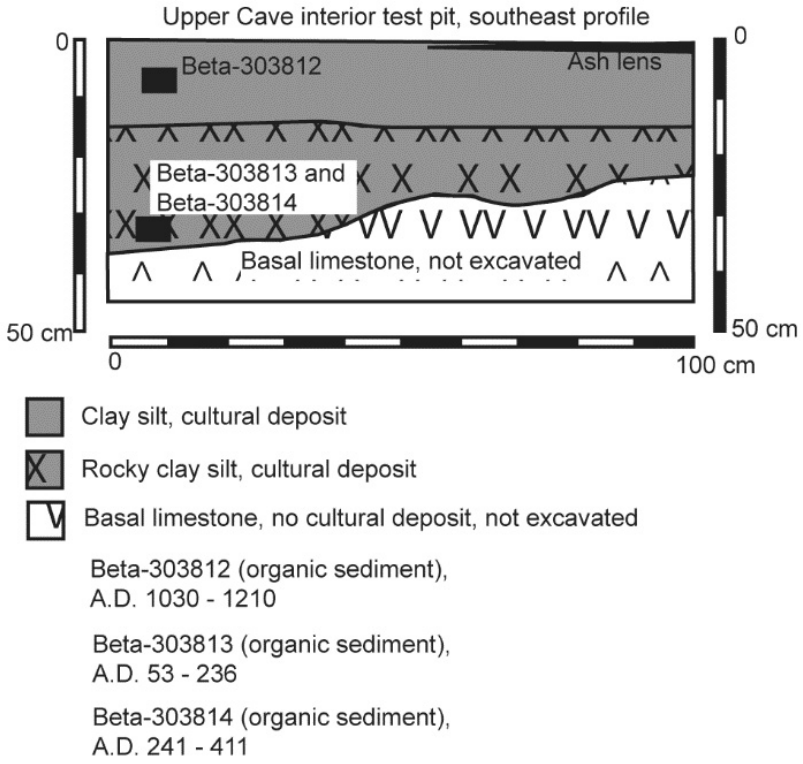

FIGURE 137. UPPER CAVE INTERIOR TEST PIT, STRATIGRAPHIC PROFILE WITH RADIOCARBON DATING.

FIGURE 138. EXTERIOR OF UPPER CAVE, VIEW TO SOUTHWEST. SCALE BARS ARE IN 20-CM INCREMENTS. THE GROUND-LEVEL OPENING IS A SMALL OVERHANG AREA. THE ENTRANCE TO UPPER CAVE IS UPWARD THROUGH THE CAVITY IN THE LIMESTONE CLIFF, POSITIONED HERE ABOVE THE SCALE BARS.

Larger View

The period of A.D. 1–500 witnessed enlarged coastal landforms and more reliably productive nearshore habitats not only at Ritidian but also throughout the region. The slowed rate of sea-level drawdown was a region-wide event, affecting all locations in the same manner, overall beneficial for cultural habitation. In some places, coastal habitations became practical for the first time after A.D. 1, while coastal life continually evolved in places such as Ritidian where many generations of people already had been living.

The newfound coastal productivity after A.D. 1 allowed for communities to persist primarily in sandy coastal plains such as at the west side of Ritidian, but at least a few inland zones began to support new habitations by this time. The amount of territorial expansion was minimal during A.D. 1–500, perhaps due to the increased reliability of food supplies in the coastal areas. Only after another several centuries, after A.D. 1000, would people be forced to move permanently into the far northern islands with significantly less volumes of freshwater resources. Likewise, people did not yet expand into the less preferable areas of rough limestone terrain in the east side and upper plateau landforms at Ritidian.

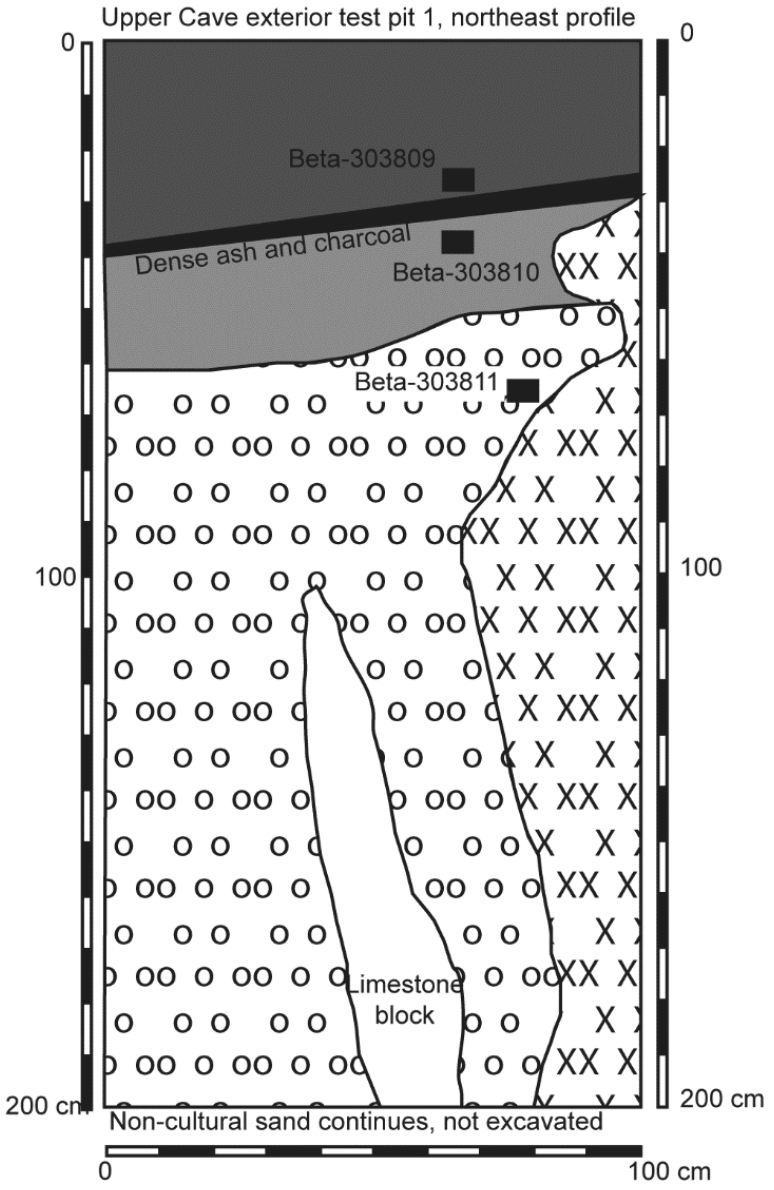

FIGURE 139. UPPER CAVE EXTERIOR TEST PIT, STRATIGRAPHIC PROFILE WITH RADIOCARBON DATING.

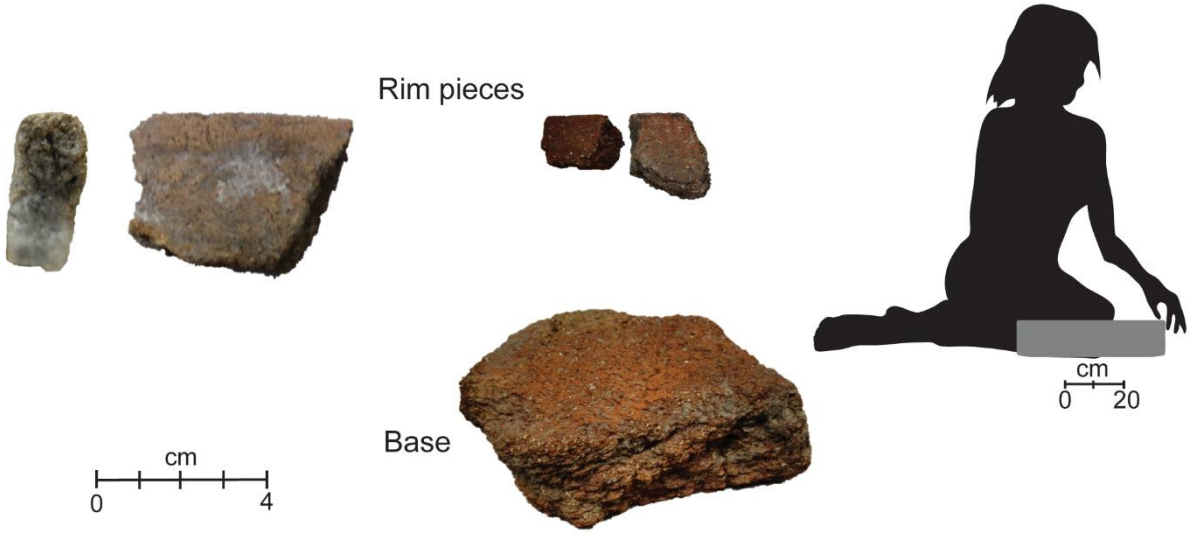

FIGURE 140. POTTERY FRAGMENTS TYPICAL OF THE PERIOD A.D. 1–500. UPPER LEFT = RECOVERED FROM UPPER COMPONENT OF SILT LAYER AT EXTERIOR OF UPPER CAVE. ALL OTHERS = RECOVERED FROM LOWER COMPONENT OF ROCKY CLAY SILT AT FIRST CAVE.

FIGURE 141. STONE TOOLS OF APPROXIMATELY A.D. 1–500, RECOVERED FROM LOWER COMPONENT OF ROCKY SANDY CLAY AT GATE CAVE. A = LIMESTONE POUNDER, SHOWN IN TWO VIEWS. B = VOLCANIC STONE WITH CHIPPED EDGE, SHOWN IN TWO VIEWS.

By the first few Centuries A.D., the lowered sea level opened an "atoll highway" through Micronesia, making this large portion of Pacific Oceania inhabitable for the first time (Figure 142). The sea level had lowered to a point of exposing the many low-lying atolls of Micronesia above the ocean (Dickinson 2003). In those low-lying atoll formations, people dug shallow pits to access lenses of fresh water that floated above the ocean level, thus securing their vital resource for daily living and for growing their crops (Weisler 1999; Yamaguchi et al. 2005).

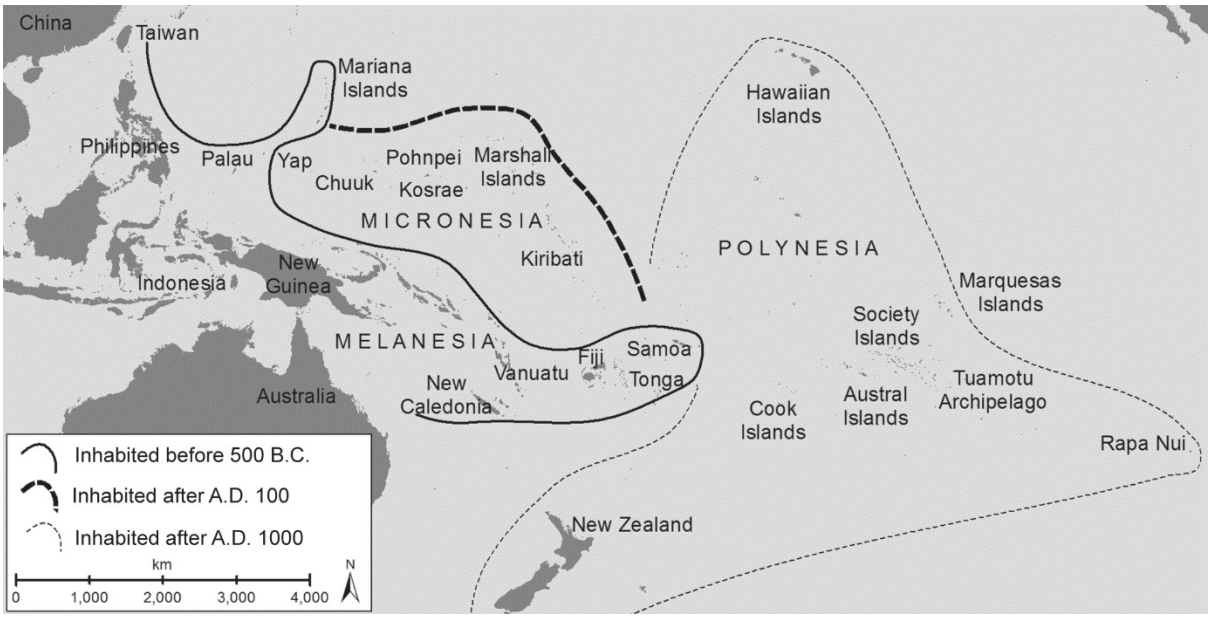

FIGURE 142. INHABITED AREAS OF PACIFIC OCEANIA AT A.D. 1–500.

While the inhabited space of Pacific Oceania was expanding in Micronesia, a quite different development was underway in Island Southeast Asia, involving trade networks and connections at multiple interlinked scales. Iron, bronze, glass, gold, carnelian, and other objects created a much more visible and durable archaeological record than ever had been seen so far in the region, along with new social, religious, and political contexts that profoundly altered regional and indeed world history with the emergence of a globalised economy. One set of networks already had been established for several centuries, connecting the communities around all edges of the South China Sea, and those relations continually strengthened and grew (Hung et al. 2013). Other activities related to the Indian influences moving through Mainland and Island Southeast Asia, initially at the southern edge of the pre-existing networks of the South China Sea and then extending eastward at least as far as Bali in Indonesia (Ardika and Bellwood 1991).

As important as these larger-scale developments were in cultural, political, and economic history, they created very little or no observable effect in the Mariana Islands and certainly not at the scale of individual sites such as at Ritidian. People of the Marianas very well may have been involved in seafaring traditions connecting with other parts of Micronesia and elsewhere, but so far no physical evidence can confirm this scenario, no matter how likely it may have been. Instead, the archaeological record refers to the groups who stayed in the Marianas with little or no external contact ever since initial settlement. The numerous new materials of the Iron Age (or Metal Age) in Southeast Asia did not intrude into the Mariana Islands or any other Pacific Island until well after European imperial contacts more than 1000 years later. Likewise, the geologically distinctive material signatures in pottery or stone tools so far have shown no contacts between the Marianas and other island groups during any time period. Meanwhile, the language histories of different island communities point to their long-term separate cultural identities, specifically with the Chamorro language of the Marianas as an outlying entity bearing its own unique character.

Chapter 10

Ritidian at A.D. 500–1000

During the period of A.D. 500–1000, a broad-spectrum reliance on coastal and land-based resource zones had strengthened at Ritidian, and the same trend occurred in all of the inhabited areas of Pacific Oceania. People continued to live in the island areas where communities already had been established for some centuries, while larger numbers of people created overall larger footprints in their landscapes. The trends of population growth eventually would approach critical thresholds, but such did not yet occur prior to A.D. 1000.

At Ritidian and generally throughout the region, archaeological layers of A.D. 500–1000 have been understudied in comparison to the more abundant, widespread, and formalised sites that developed after A.D. 1000. The later-aged elements overlaid or overprinted the older layers, and often they remained surface-visible as the durable records of the last cultural occupation of an area. As seen at Ritidian, the site records after A.D. 1000 have supported a rich depiction of the cultural context overlapping with later historical chronicles, but at least some aspects must have developed from the immediately ancestral period of A.D. 500–1000.

Inhabited Site Context

By A.D. 500, people occupied more of the expanded coastal plain landform, now well established above sea level and with widespread forest growth (Figure 143). The coastal environment approached present-day conditions, with a broad sandy coastal plain and a healthy coral reef still growing today. Furthermore as seen today, freshwater sources were most reliable in coastal seeps just above sea level in sandy substrates, while some of the caves provided occasional access to pools and ceiling drip.

The residential sites at this time still were concentrated mostly in the coastal plain at the western side of Ritidian. Meanwhile, just a few scattered incidents of broken pottery have indicated past cultural activity of this age in the interior upland of limestone plateau terrain. Overall, the site records of A.D. 500–1000 indicated an expansion of residential occupation from the prior centuries, but the expansion did not yet bring people at a large scale into the rough limestone terrain of lesser resource productivity at Ritidian. Small-scale forays resulted in sparse concentrations of broken pottery and no other durable material evidence in the upper plateau and eastern limestone terrain at Ritidian.

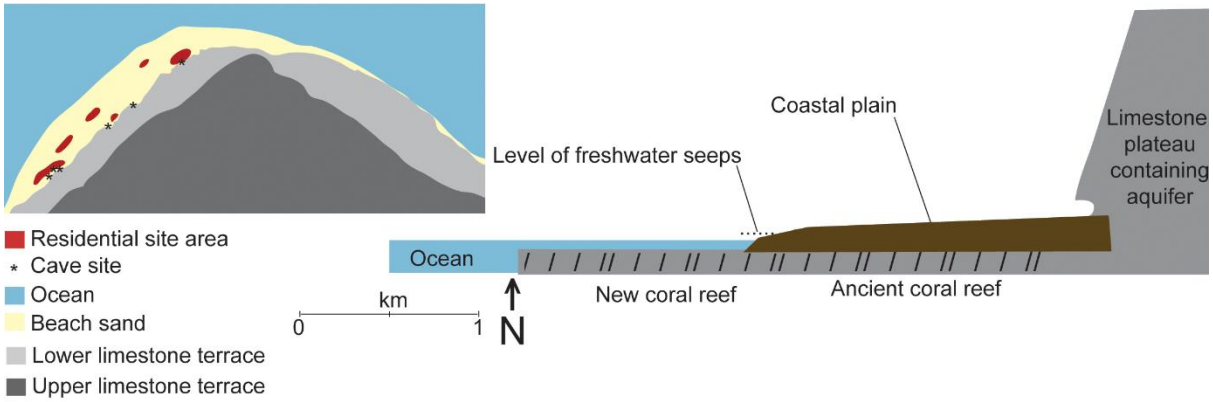

FIGURE 143. RITIDIAN LANDSCAPE AT A.D. 500–1000. LEFT = PLAN MAP. RIGHT = SECTION VIEW.LANDSCAPE RECONSTRUCTION.

Elsewhere in Guam and other islands, increasingly more inland locales were being inhabited during the period of A.D. 1–500, but people were not yet forced to move into the most marginal resource habitats. The overall trend depicted a growing use of a broad spectrum of coastal and land-based ecological zones, but the preference apparently was at coastal areas such as at Ritidian. Much more severe population expansion would occur after A.D. 1000 at a large scale throughout all of the Mariana Islands.

Material Evidence

People during A.D. 500–1000 made pottery in varied sizes of simple bowls, almost entirely plain and with overall coarser clay and temper than seen in older periods (Figure 144). Rough-textured exteriors were seen on some of the bowls, usually for those made with more compacted clay paste. Other bowls, lacking the rough-textured exteriors, were larger and made with slightly incurved walls and also slightly thickened-rim profiles.

The tradition of thickened-rim pottery would become a defining characteristic of the next period after A.D. 1000, but its origins now can be traced at least as early as A.D. 500–1000. The popularity and the pronounced degree of rim thickening both were greatest in Guam and Rota as compared to the islands farther northward, so Ritidian may have been situated within the core area of where the thickened-rim tradition originated. Ritidian may not have been the singular origin point, but the people here eventually would use thickened-rim pottery in extraordinary abundance.

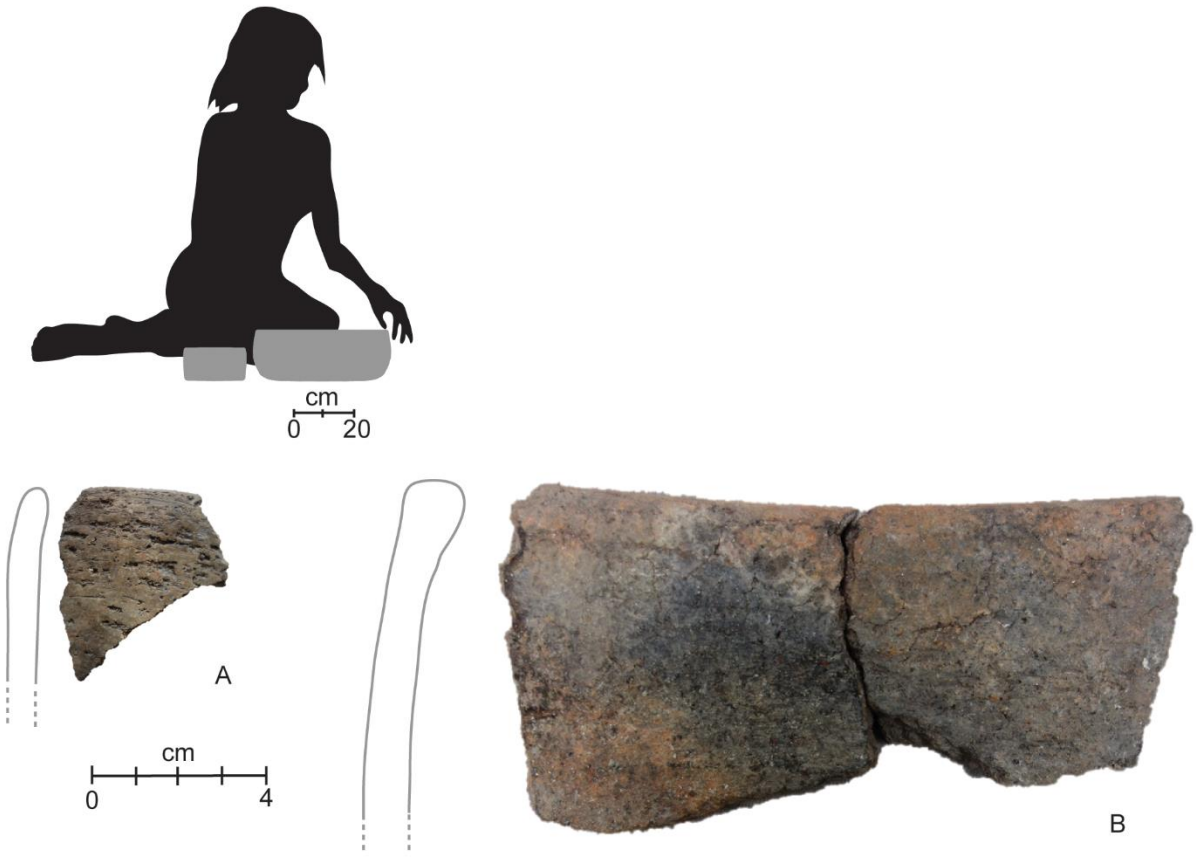

FIGURE 144. POTTERY TYPICAL OF A.D. 500–1000, RECOVERED FROM LAYER OF DENS ASH AND CHARCOAL AT EXTERIOR OF UPPER CAVE. A = ROUGHENED EXTERIOR. B = SLIGHTLY THICKENED RIM.

The stone and shell artefacts were consistent with the preceding periods. The only ornaments from A.D. 500–1000 at Ritidian were rare fragments of plain shell bands, and similar items were found in the layers of all time periods. None of this period's stone and shell artefacts so far have been notably diagnostic or remarkable, but this picture may yet change with possible future increased representation of the archaeological layers of A.D. 500–1000.

As mentioned in regards to the upper limestone plateau, scattered areas have shown concentrations of broken pottery that resemble the most popular forms of approximately A.D. 500–1000 (Figures 145 and 146), although similar pottery has been found in slightly older and younger contexts. The defining characteristics were the thickness of 8–18 mm, very slightly inward-curving shape, hint of thickening rim profile, coarse clay paste, mixed beach sand and volcanic sand temper inclusions, and lack of red slip or decoration. The sparse occurrences have not been found in datable subsurface layers, but instead they have been found on the surfaces of the rough limestone or rare pockets of rocky clay silts of generally less than 15 cm thickness over the limestone. The potsherds were observed in maximum concentration of 31 pieces per sq m of associated ground surface, but most instances were recorded as only 4–6 pieces per sq m.

Larger View

The site records of A.D. 500–1000 at Ritidian in many ways fit with the larger regional patterns. No major population expansions occurred during those centuries, but rather people throughout the already-inhabited islands of Pacific Oceania engaged in general broad-spectrum use of their coastal and land-based ecological zones. Meanwhile, the inventories of artefacts in each island area were mostly plain and supporting general-purpose utility.

FIGURE 145. CONCENTRATION OF BROKEN POTTERY IN THE UPPER LIMESTONE TERRAIN, JUNE 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

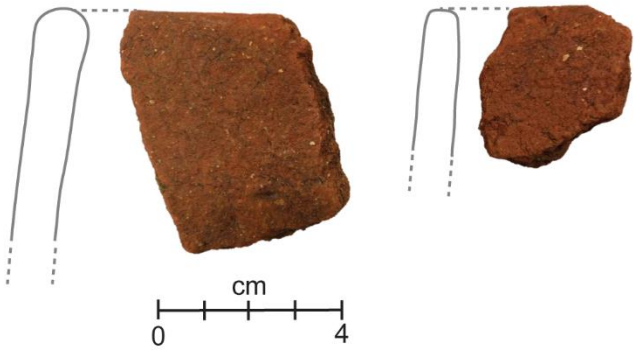

FIGURE 146. EXAMPLES OF POTTERY RIM PIECES FROM A HIGHEST DENSITY CONCENTRATION OF 31 PIECES IN A 1 BY 1 M OCCURRENCE IN THE UPPER LIMESTONE TERRAIN.

By A.D. 1000, substantially different patterns would emerge in all areas of Pacific Oceania, along with a vastly impressive spread of populations into East Polynesia. Perhaps most visibly, formalised stonework constructions and monuments would characterise all island communities after A.D. 1000. Those later outcomes effectively replaced older traditions, and their widespread occurrence after A.D. 1000 be traced at least partially to the pre-existing conditions and trends of the immediately preceding centuries of A.D. 500–1000. Similarly, pottery-making was a dying or dead art in West Polynesia and Eastern Micronesia around A.D. 1000 (Carson 2014d), but this outcome followed from a massive decline in pottery production during the preceding centuries.

Chapter 11

Ritidian at A.D. 1000–1700

The period of A.D. 1000–1700 corresponded with the traditions of *latte* in the Mariana Islands (Figures 147 and 148), referring to the distinctive format of houses raised on stone pillars (*haligi*) and supporting capital stones (*tasa*) (see Figure 23). The use of stone in this particular housing design was found only in the Marianas, seen nowhere else in the world. This new expression had developed from an older practice of post-raised housing as known pervasively in Island Southeast Asia and much of the western margin of the Pacific. The fixing in stone, however, was uniquely a Chamorro tradition in the Mariana Islands after A.D. 1000.

At Ritidian, as seen generally throughout the Mariana Islands, the most abundant record of the *latte* period refers to the last time when people inhabited the traditional Chamorro villages prior to the profound Spanish imperial impacts. A dating of the 1600s at Ritidian is verified through multiple radiocarbon results, as well as corroborated by findings of pieces of ship's iron nails, high-fired porcelain, and glass beads that definitely came from Spanish ships of the 1600s. Furthermore, Ritidian was one of the places where the Jesuit missionaries had established an outpost during the late 1600s, with recorded historical documents about the interactions between the missionaries and the local Chamorro villages in this vicinity.

In a few spots of the western side of Ritidian, remnants of subsurface layers have yielded thickened-rim pottery diagnostic of the *latte* period and dated as early as A.D. 1000–1200. These subsurface layers were not directly linked with actual structures of *latte*, but rather they disclosed much the same material culture inventory of the *latte* period at an age pre-dating today's surviving *latte* structures. People very likely built *latte* prior to the 1600s and perhaps as early as A.D. 1000–1200, but those ancient traces in most cases have been obscured or removed due to the continual re-use of site areas by successive generations.

FIGURE 147. PRESERVED *LATTE* OF FEATURE B OF SITE CLUSTER 01, IN THE EAST *LATTE* VILLAGE COMPLEX, ALONG GUIDED-ACCESS HIKING TRAIL, VIEW TO EAST, APRIL 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 148. PRESERVED *LATTE* AT THE WEST SIDE OF RITIDIAN, ALONG THE PUBLIC-ACCESS HIKING TRAIL LOOP, VIEW TO THE EAST. DECEMBER 2016. SCALE BARS ARE IN 20-CM INCREMENTS.

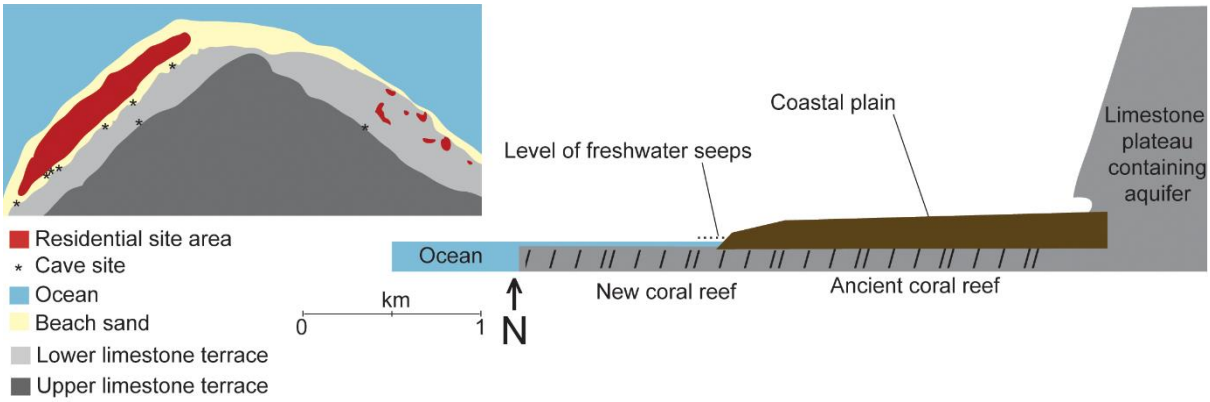

FIGURE 149. RITIDIAN LANDSCAPE AT A.D. 1000–1700. LEFT = PLAN MAP. RIGHT = SECTION VIEW.

Inhabited Site Context

People constructed *latte* villages throughout the islands, including two discernible habitation areas at Ritidian, identified today as the western and eastern coastal areas (Figure 149). In both of these areas, all of the surface-visible ruins, artefacts, and food debris are dated to the middle through late 1600s. The western *latte* village has been disturbed by hand-dug wells during the 1800s and then bulldozing during the 1900s, but its remnants still exist in stone ruins and archaeological layers, dated as old as A.D. 1000–

1200 and then continually overlaid in occupations through the end of the 1600s. The eastern *latte* village was constructed over rough limestone terrain, inhabited within a tight window of the middle through late 1600s, without any deeper or older component.

Concerning the two *latte* villages at Ritidian, the numbers and configurations of individual houses are vague in the western area, but they are clearly recorded in the eastern area (Figures 150 through 170). Given the disturbance of hand-dug wells and later bulldozing in the western area of Ritidian, only scattered remnants of *latte* structures still are visible today in a few locations, but the remaining archaeological layers confirm that the original *latte* village was widespread throughout this area. By comparison, the eastern area of Ritidian has been well preserved, with the ruins of 20 different *latte* structures still visible today.

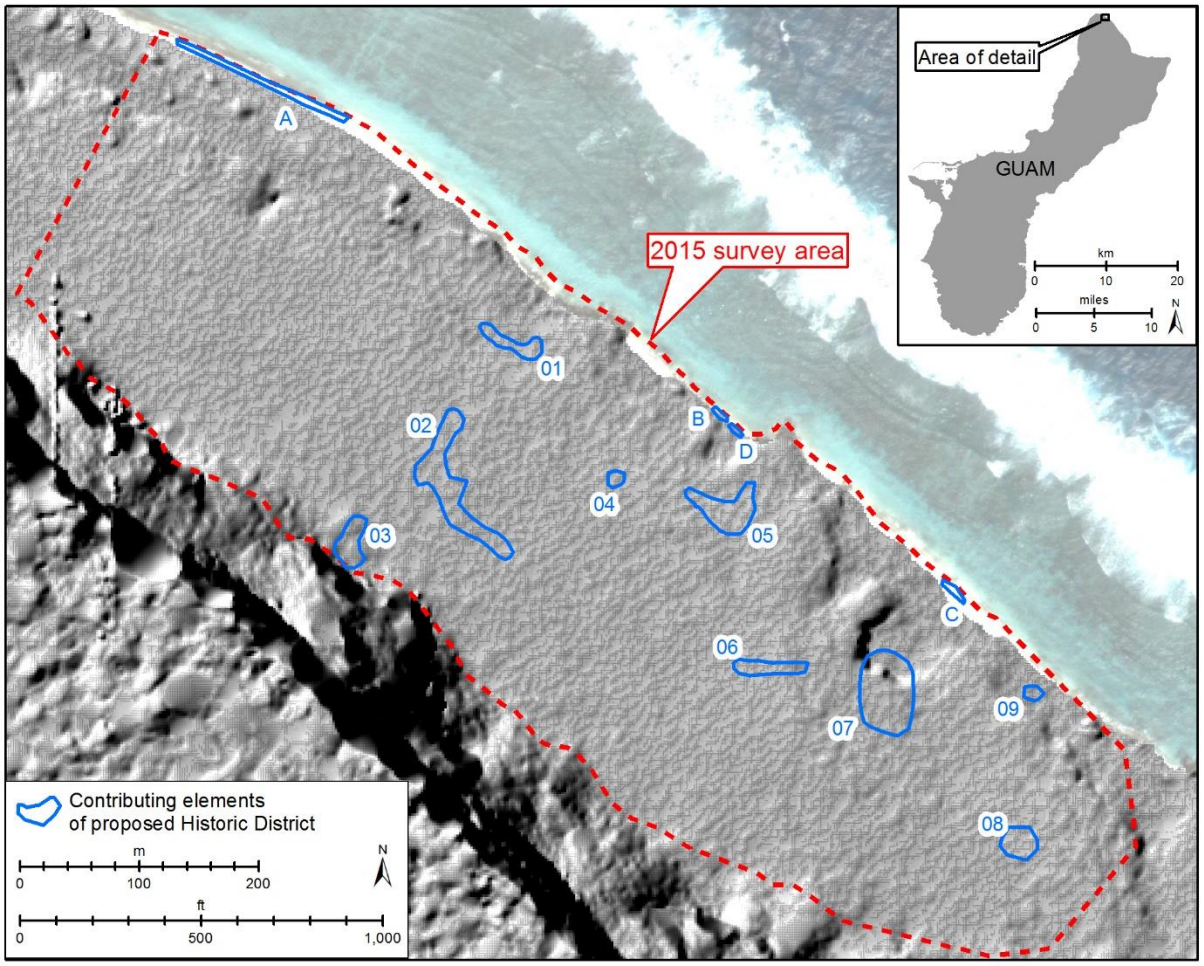

FIGURE 150. SITE CLUSTERS CONTRIBUTING TO THE EAST *LATTE* VILLAGE COMPLEX, SURVEYED FORMALLY IN APRIL THROUGH SEPTEMBER 2015. NUMBERS 01 THROUGH 09 REFER TO AREAS OF CLEARLY DEFINABLE ARCHAEOLOGICAL MATERIALS SUCH AS *LATTE* RUINS, ARTEFACTS, AND MIDDEN. LETTERS A THROUGH D REFER TO AREAS OF INTEREST, DENOTING NATURAL FEATURES SUCH AS A FRESHWATER SEEP (D) AND LIMESTONE FORMATIONS OF POSSIBLE *LATTE* QUARRIES (A, B, AND C). PORTIONS OF SITE CLUSTERS 01, 02, AND 05 AND OF AREAS B AND D ARE OBSERVABLE ALONG A GUIDED-ACCESS HIKING TRAIL. MAP FROM CARSON ET AL. (2015).

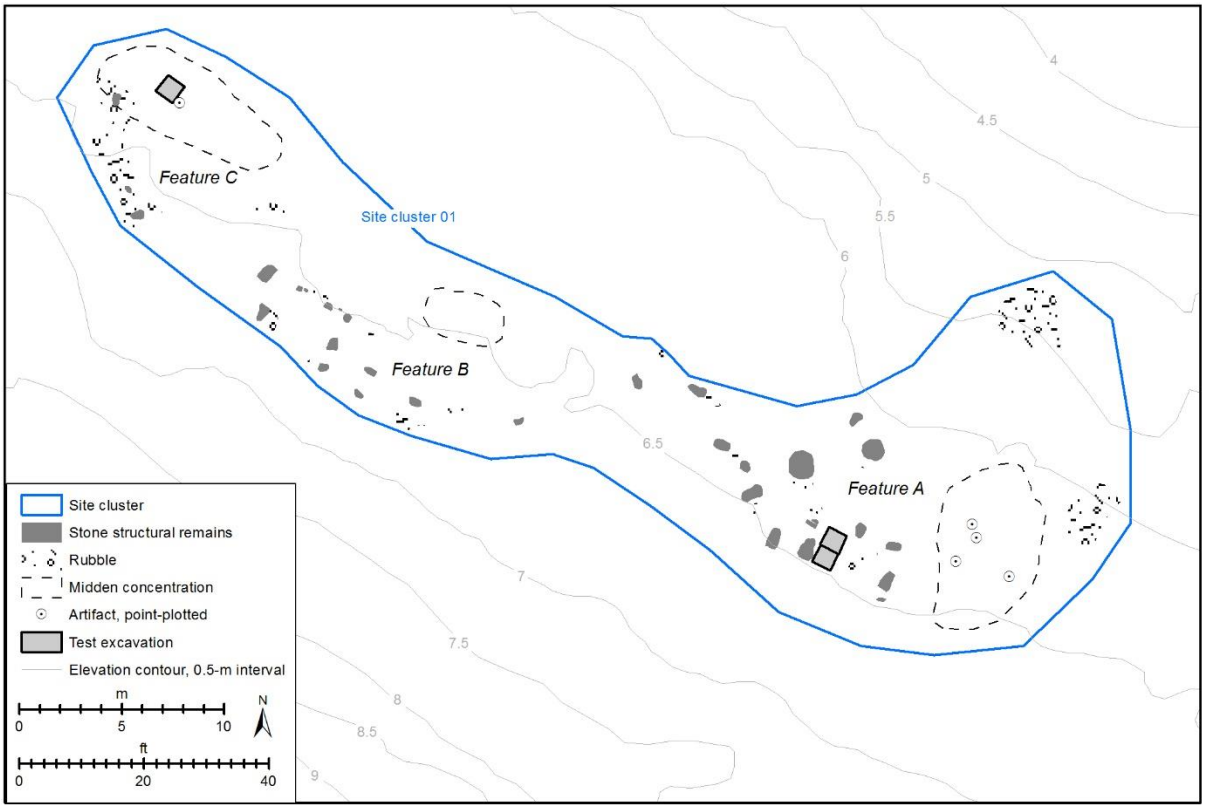

FIGURE 151. OVERVIEW MAP OF "SITE CLUSTER 01" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

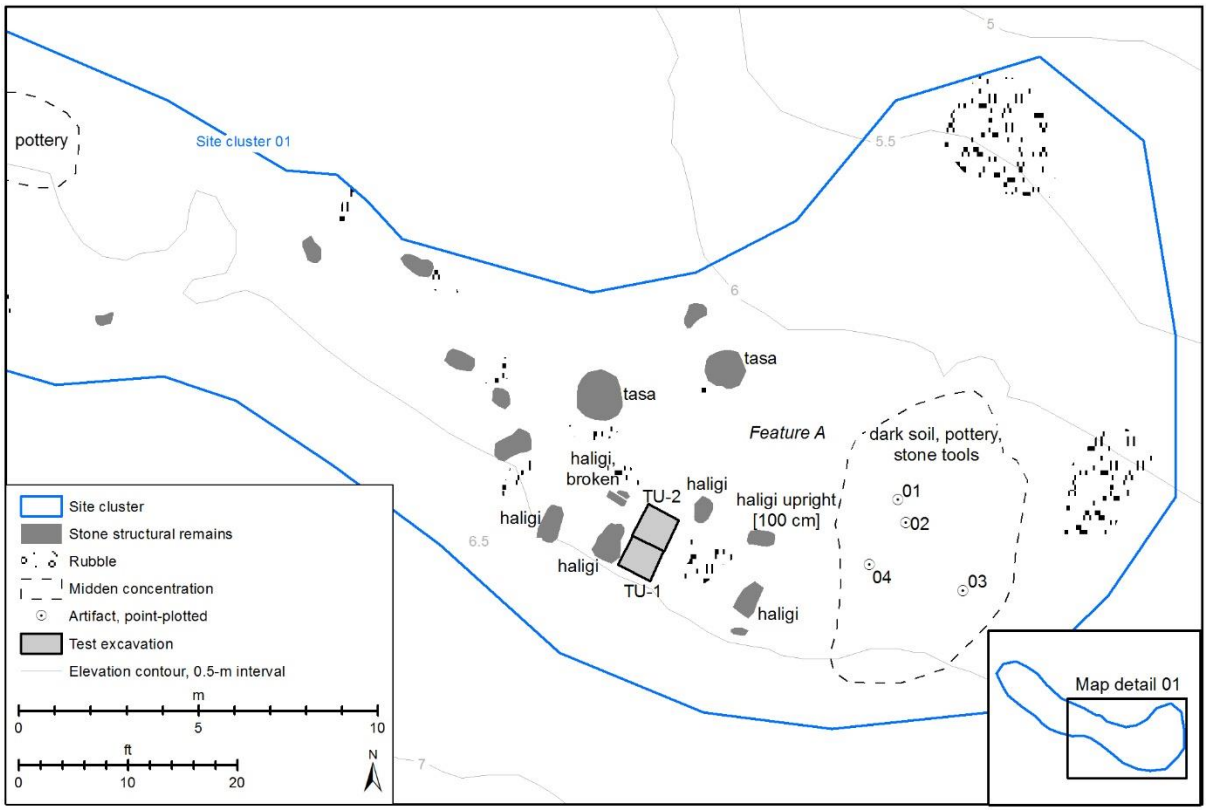

FIGURE 152. DETAIL MAP, PART 1 OF 2, OF "SITE CLUSTER 1" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

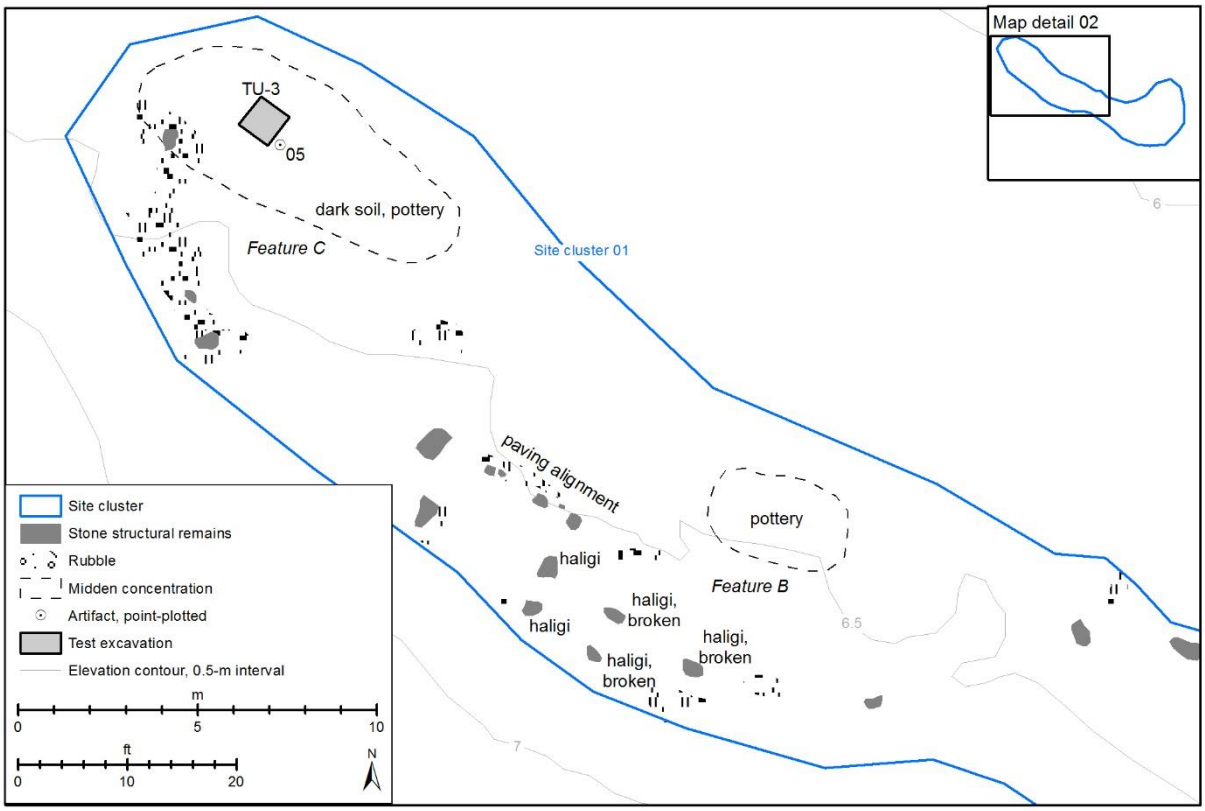

FIGURE 153. DETAIL MAP, PART 2 OF 2, OF "SITE CLUSTER 1" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

The natural environment of A.D. 1000–1700 was very much similar to the modern conditions, most importantly in terms of the sea level, coastal habitat ecologies, shapes of landforms, and distributions of freshwater resources. Today's observations of *latte* sites therefore can provide a reasonable guide to ascertain their original contexts, accounting for only small degrees of environmental change since the time of their last cultural use. This sense of continuity with the past is most strongly evident in the surface-visible *latte* remnants of the 1600s.

The cultural use of the rough limestone terrain, especially in the form of a *latte* village complex, signified that people were willing to move into marginal habitats by the 1600s. This occurrence at Ritidian was mirrored at a larger scale throughout the Mariana Islands during the *latte* period as a whole, as attested by widespread *latte* villages in almost every inhabitable zone of every island generally post-dating A.D. 1000. The rather late dating of the 1600s at the eastern limestone terrain of Ritidian may have represented one of the last episodes of a community expanding into a new territory.

The *latte* villages brought more formalised use of the landscape than had been evident in prior centuries. The layouts of houses and communities became more durably structured and thereby created more sense of permanence in place for the communities who lived there, not only in the *latte* footprints but also in the larger surrounding landscapes. Individual houses were fixed in place through their stone construction and furthermore through burial features at those houses. Those aspects of permanence in the designated residential locations by extension affected the possible cultural use of all surrounding areas, with implications about access to water resources, fishing spots, forest zones, gardening or farming plots, ritual caves, and other elements of the inhabited landscape.

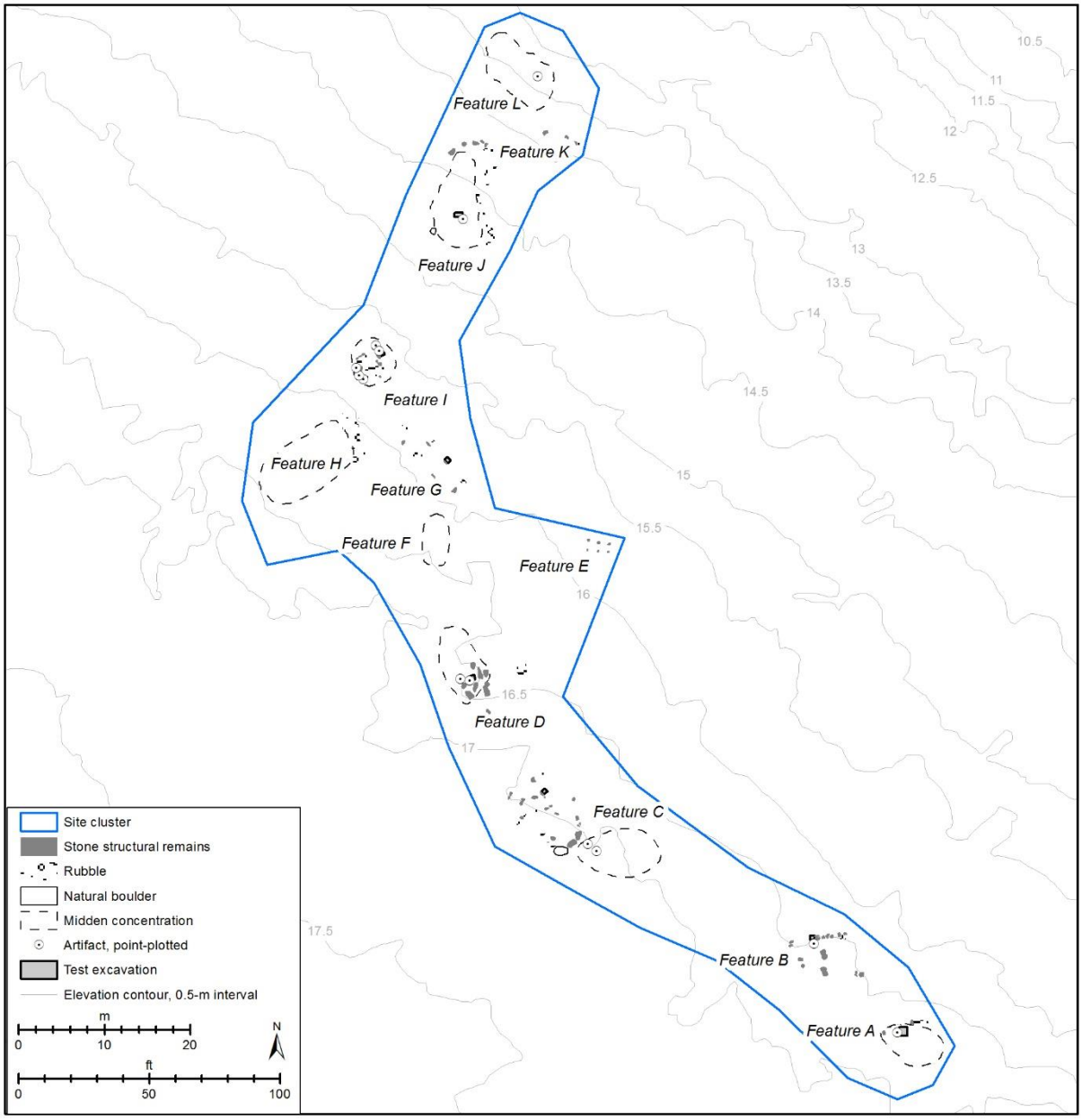

FIGURE 154. OVERVIEW MAP OF "SITE CLUSTER 02" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

Material Evidence

The individual *latte* structures displayed their own characteristics of architectural design, artistic expression, and identities of the people who had lived there (Figures 171 and 172). Some were made larger than others, used for accommodating more people or perhaps for conveying a sense of higher status. Meanwhile, some of the *haligi* and *tasa* were made with extra attention to the details of their shape and design, hinting at the prestige associated with them. The *latte* at Ritidian furthermore have revealed some of the techniques that people had developed, such as for bracing the *haligi* firmly into the ground (Figure 173), as well as for enhancing the fit between the *haligi* and *tasa* (Figure 174). In some cases, people arranged cobbles and boulders to demarcate the edges of housing footprints or to organise their cultural space (Figures 175 and 176).

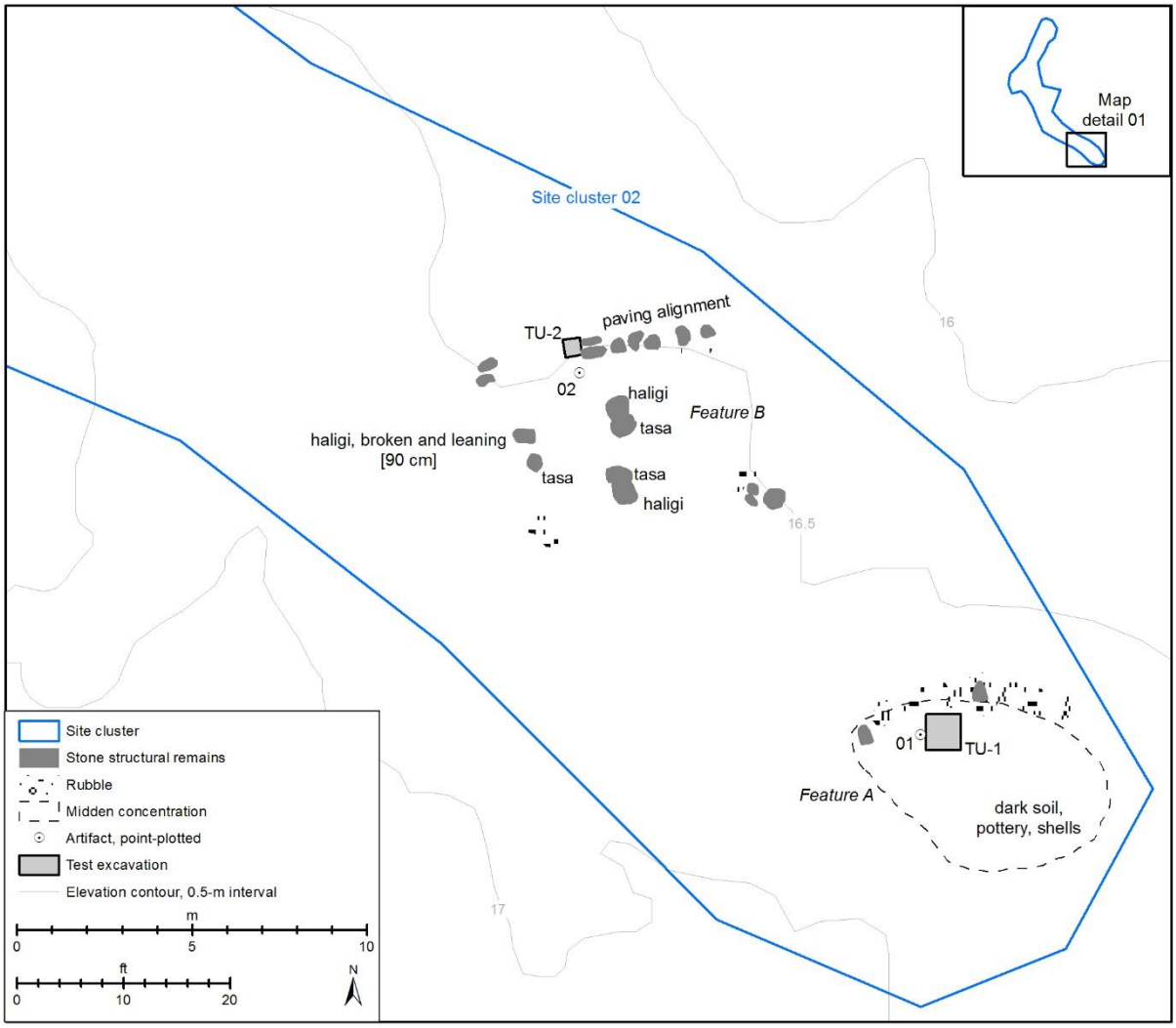

FIGURE 155. DETAIL MAP, PART 1 OF 5, OF "SITE CLUSTER 2" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

Thorough survey has enabled a detailed map of the *latte* ruins, most informatively in the eastern coastal limestone terrain where the village has remained largely intact. Those site records have shown not only the unique characteristics of each *latte* structure but also the overall organisation of the community in the landscape. Furthermore, the recording of each *latte* element has allowed fact-based illustration of how the structures may have looked when they had been standing during the 1600s (Figure 177), although the details of the long-since decayed wood and thatch are more speculative at this time.

The eastern *latte* village overall was well preserved, but a number of the *latte* had been deliberately dismantled and burned, resulting in cleared spaces of burned debris, bordered by piles of rubble on their downslope edges (Figure 178). The surviving cultural deposits have been dated by radiocarbon most probably to the 1600s and equal with the habitation layers at the non-destroyed *latte* structures of the surrounding village complex. The destroyed *latte* were distributed in scattered locations throughout the eastern-side village, definitely not confined to any specific cluster. No such evidence has survived in the western-side village, possibly due to the large-scale land modifications since the 1800s.

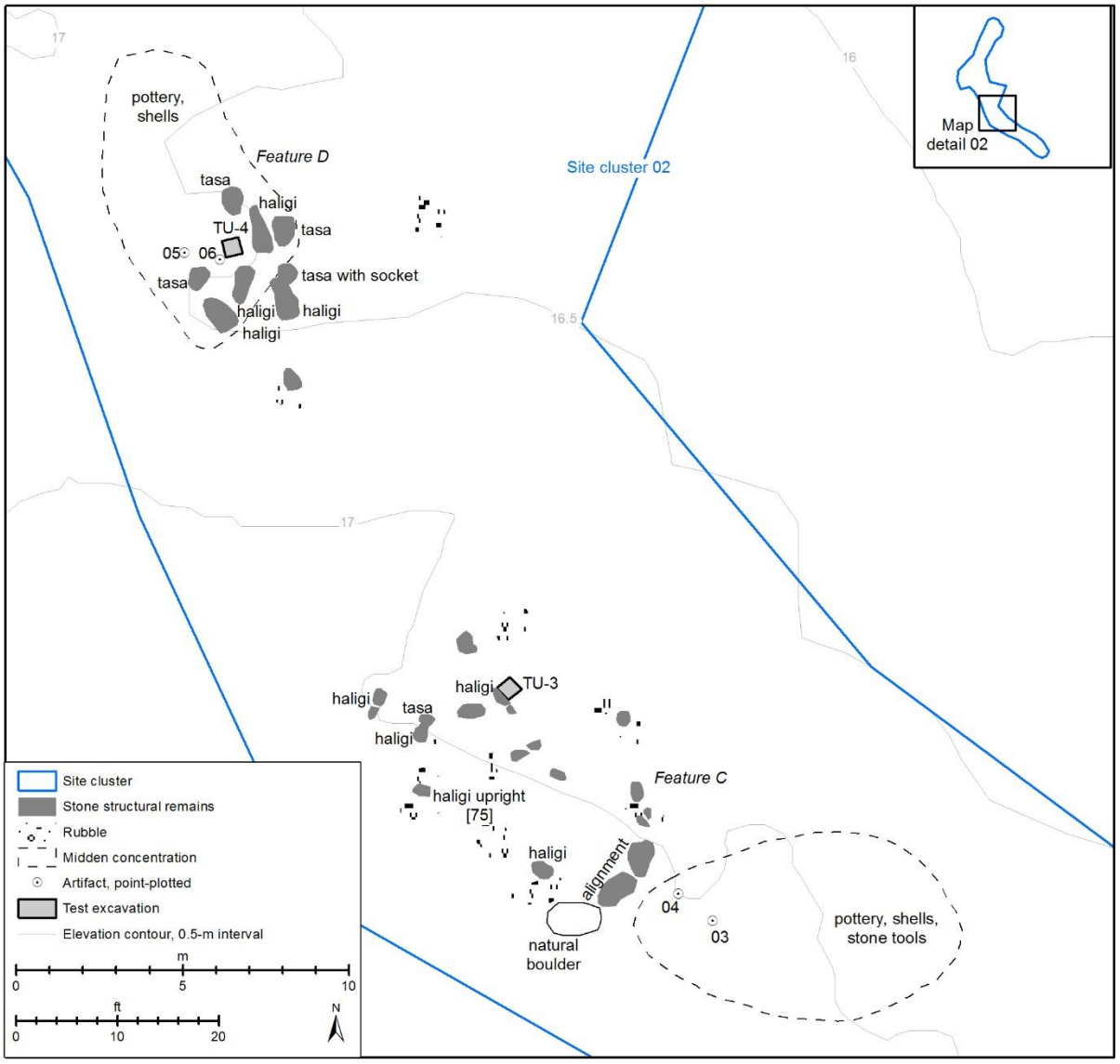

FIGURE 156. DETAIL MAP, PART 2 OF 5, OF "SITE CLUSTER 2" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

The destroyed *latte* were consistent in terms of how they were dismantled and burned, but so far they have not shown any direct evidence of the reasons for their destruction while so many others avoided this fate. In the absence of convincing evidence, hypothetical scenarios may have related to the conflicts with the Spanish Jesuit missionaries and militia during the late 1600s. While those conflicts have been chronicled in local traditions and in written documents, the specific details have been vague. The exact reasons may not ever be known for the destruction of some but not all of the *latte* at Ritidian.

Ultimately, the *latte* villages at Ritidian and throughout the Mariana Islands were abandoned as residences approximately by 1700, due to the forced removal of populations as part of the Spanish-imposed *reducción* program of the late 1600s. People remembered these sites as important cultural places, and eventually they have become recognised as places of ancestors. While the *latte*, caves, and other elements of the ancient landscape were forcibly disjointed from their original contexts of living cultural activities, their archaeological remnants have allowed rediscovery of those contexts.

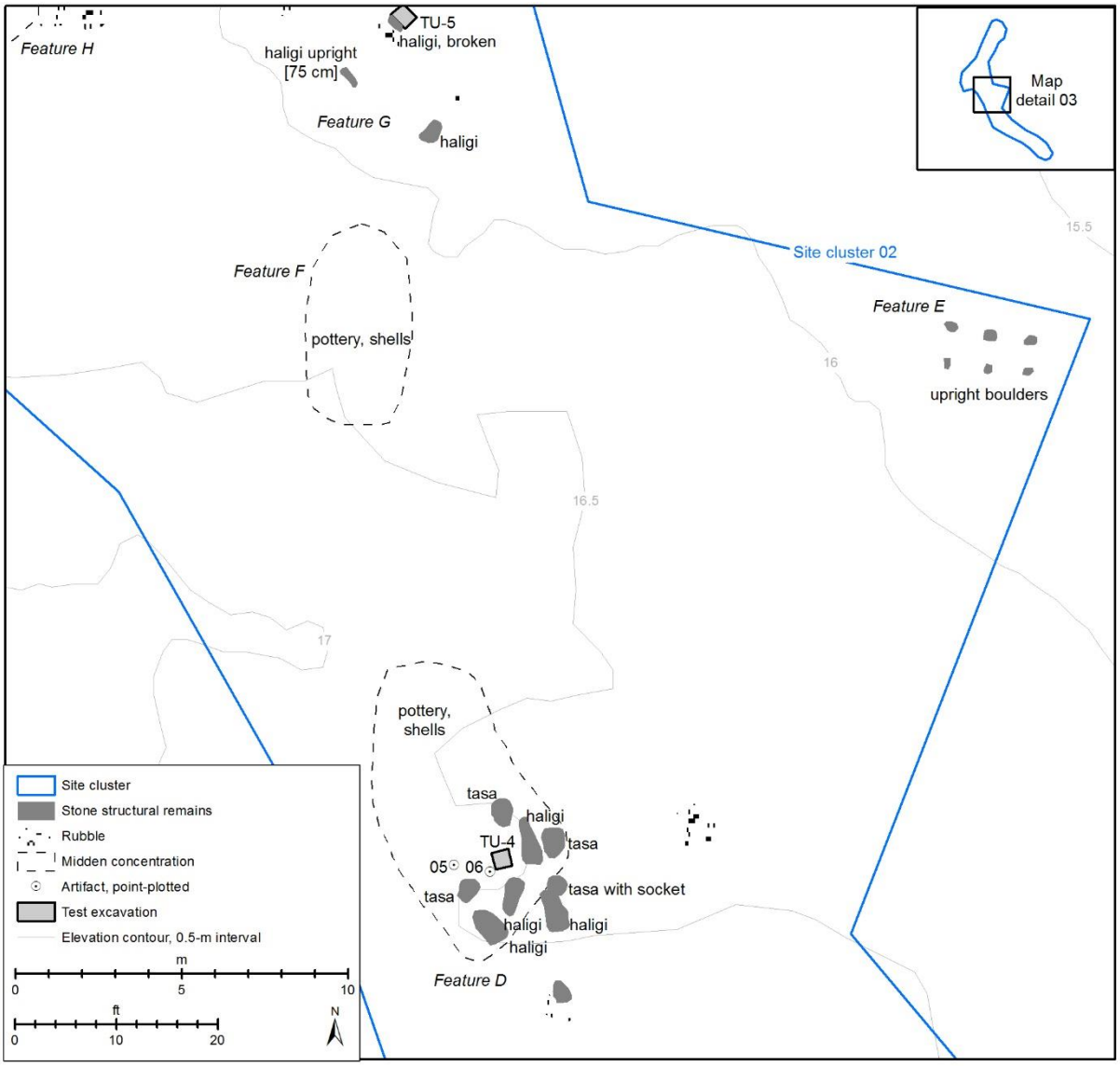

FIGURE 157. DETAIL MAP, PART 3 OF 5, OF "SITE CLUSTER 2" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

The archaeological record of the *latte* period of course has involved much more than just the stone ruins of *latte* structures. Those site ruins now can be understood as key components of a larger inhabited landscape, wherein the record at Ritidian included two large village complexes, a number of ritual caves, and other inter-related elements dated to the same general period. Additionally, the physical environment can be visualised largely on the basis of modern-day observations, for example confirming the positions of freshwater seeps that must have been vital for supporting the evidently large populations of the *latte* period.

The areas beneath *latte* houses often were places of formal burial pits, indisputably strengthening the links between individual people and defined places. The tradition of at-house burial was noticed by Hans Hornbostel (1925) at *latte* of Ritidian and numerous other sites. The newer archaeological investigations have avoided these most likely burial locations, but a few instances were verified and immediately documented in place without undue disturbance.

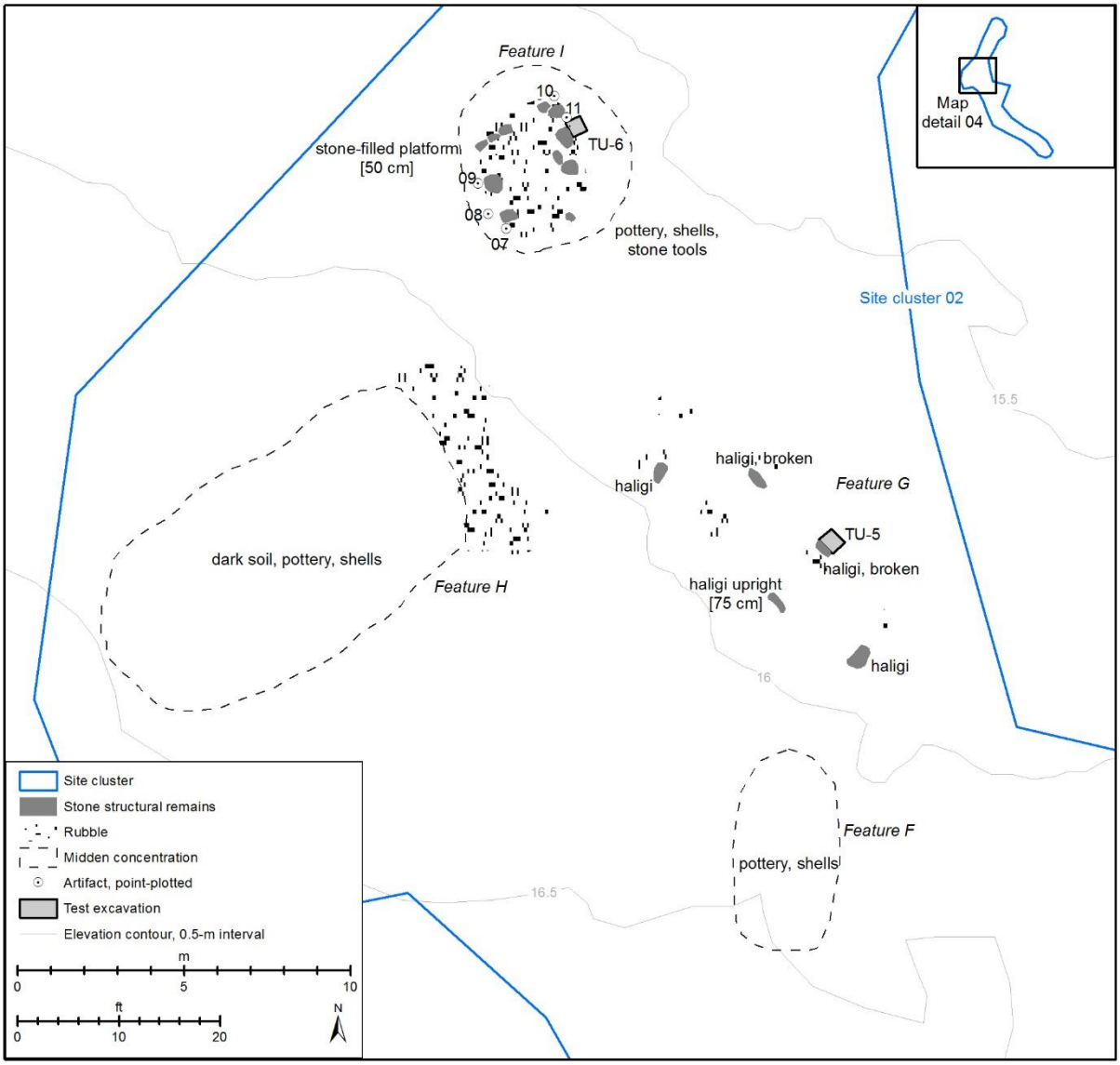

FIGURE 158. DETAIL MAP, PART 4 OF 5, OF "SITE CLUSTER 2" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

Within and around the *latte* structures, patterns of past activity areas can be ascertained through the differential concentrations of broken pottery, other artefacts, and food midden. In most cases, the densest amounts of debris had accumulated in patches outside the individual *latte* house footprints, while lesser amounts of artefacts and midden were found within the housing footprints. These surface-detected patterns generally were consistent with the findings from test pit excavations.

Whatever specific tasks were represented in the clusters of artefacts and midden, they occurred both inside and outside the individual house structures. The evident patterns can be interpreted in various ways, depending on notions of how people had used those specific items of pottery, stone and shell tools, and food midden. For example, differential spatial patterning could reflect divisions of social groups, labour tasks, or other aspects of the people who had lived at a site (Bayman et al. 2012a, 2012b). Without advocating any particular viewpoint of the social implications, however, the material categories each can be considered in practical terms of how they were made and used as technical objects.

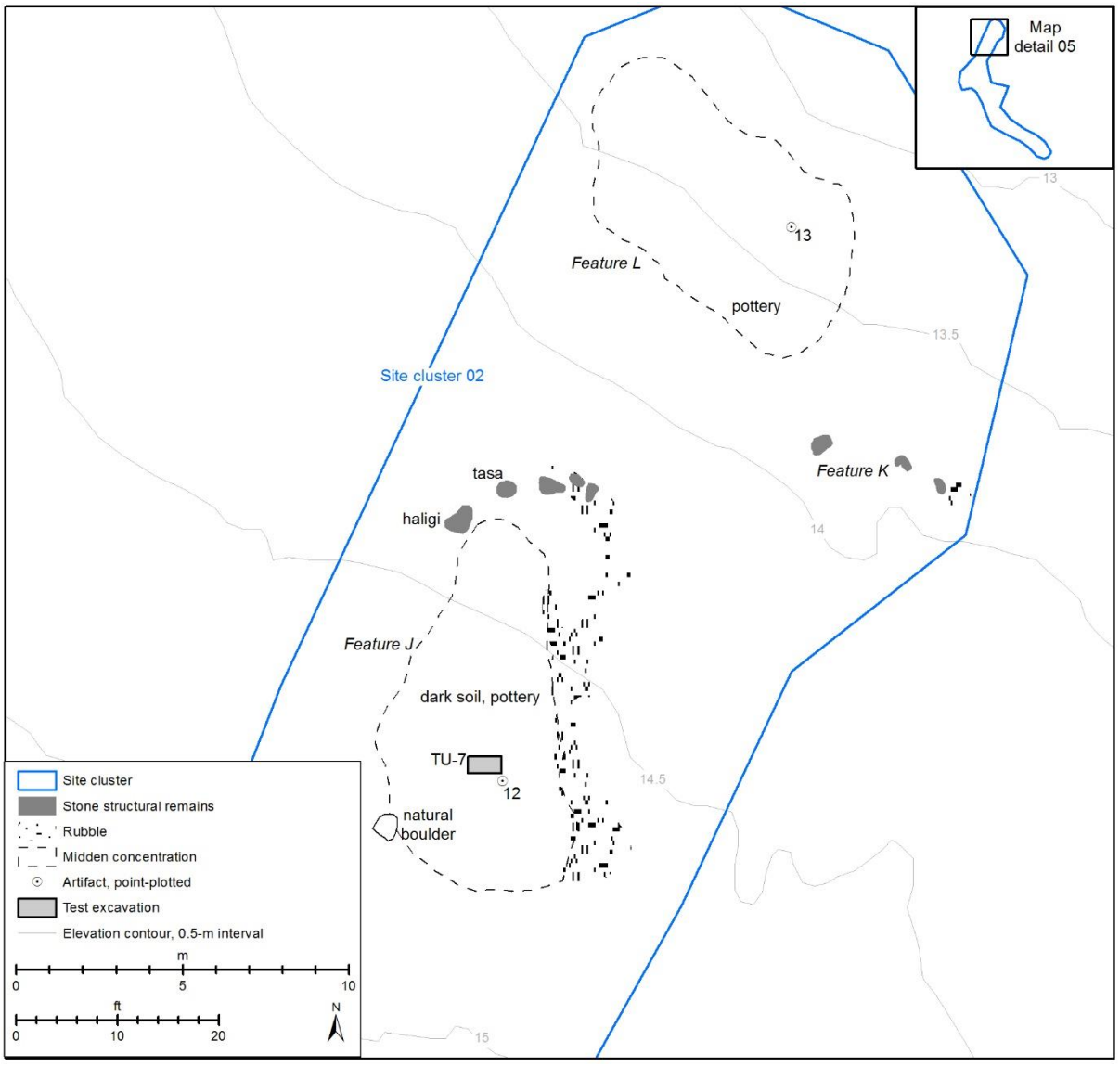

FIGURE 159. DETAIL MAP, PART 5 OF 5, OF "SITE CLUSTER 2" IN THE EAST LATTE VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

Pottery fragments were the most profuse materials, and they were very much typical of the *latte* period (Figures 179 through 181). These pieces were broken from large-sized bowls with robustly thickened rims, coarse clay paste, and often combed exterior surfaces. The largest pots may have been used for water collection and storage, but many pieces have shown charred surfaces indicative of cooking. In any case, the large sizes indicated a marked change in comparison to all prior periods, most likely related to the increased demands of larger numbers of people using the same pots in each household.

The thickened-rim pottery comprised a defining characteristic of the *latte* period, especially visible at the later-aged sites of the 1600s and in Guam and Rota. Farther north and in prior centuries, the thickened-rim profile was less popular and less exaggerated than seen in the surface-related contexts at Ritidian. Similarly, the vertically combed exteriors were most frequent and most robust in sites such as Ritidian, but this kind of combing was applied only very rarely in pottery found farther to the north.

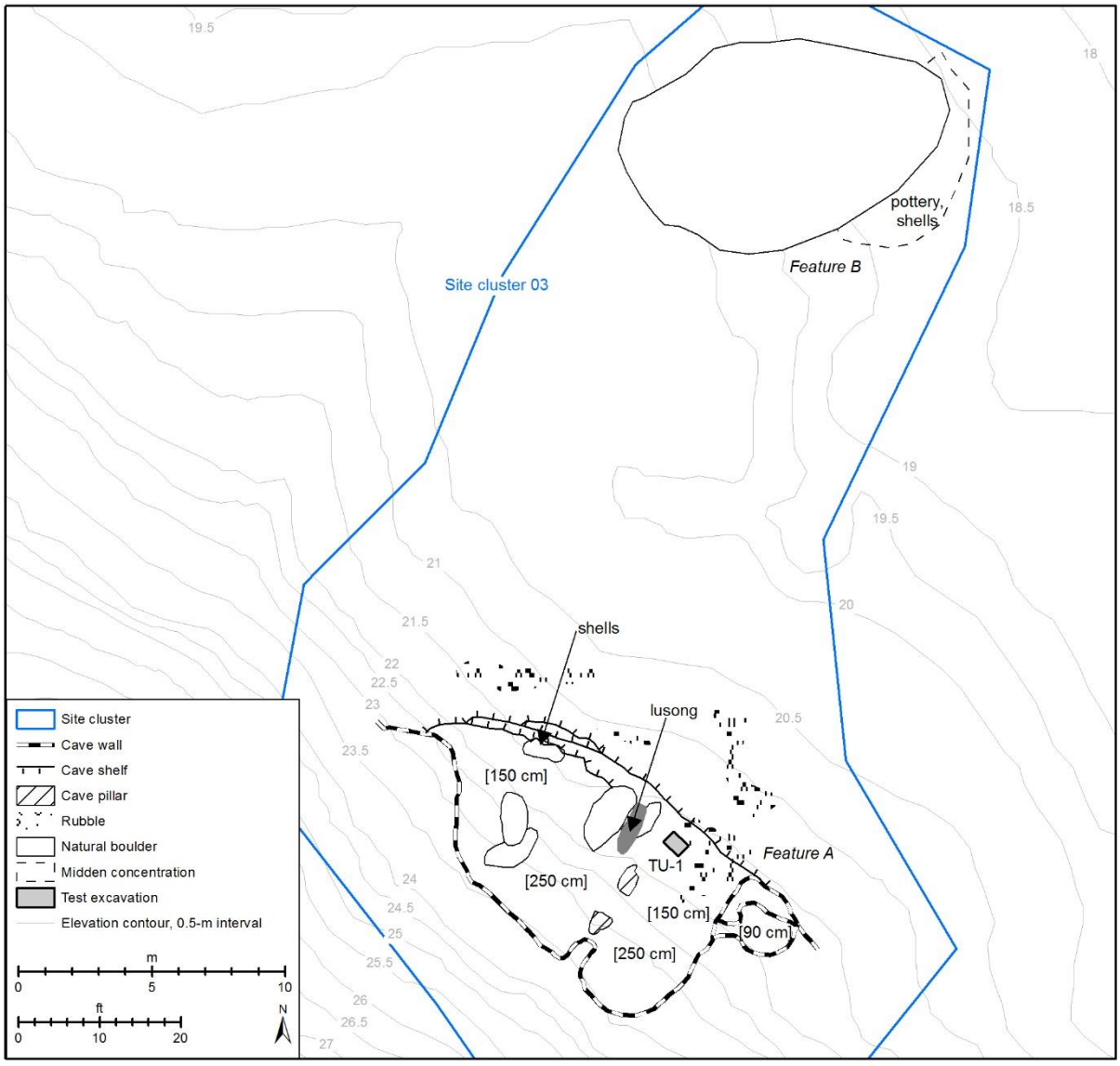

FIGURE 160. MAP OF "SITE CLUSTER 03" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

The thickened rim shape was made by moving the potter's hand over the rim of the wet cay before firing the pottery into its final form (Figure 182). The potter's thumb was positioned along the interior side of the rim, while the palm and fingers were posed over the top and exterior. The motion was extended all around the rim, in some cases showing slightly uneven shape and thickness.

The thickened rims accompanied the incurved design of the bowls. Together, these traits increased the ability to control the interior space and whatever it contained. Accidental spills were minimised. The bowls could be tilted while still holding their contents. An additional utensil most likely could facilitate access of the contents, for example by using a spoon, hollowed coconut shell, or smaller pottery bowl or cup.

The thickened-rim pottery fragments very often displayed vertically combed exteriors, and this trait increased in popularity through time at Ritidian. Combing was found on about 90% of the potsherds in surface-visible contexts and within the upper 10 cm of sedimentary layers, primarily referring to the A.D. 1600s. In subsurface layers dated as early as A.D. 1100–1200, the percentage of combed potsherds was more variable, sometimes as common as 80% or as rare as 20% in the test excavation samples.

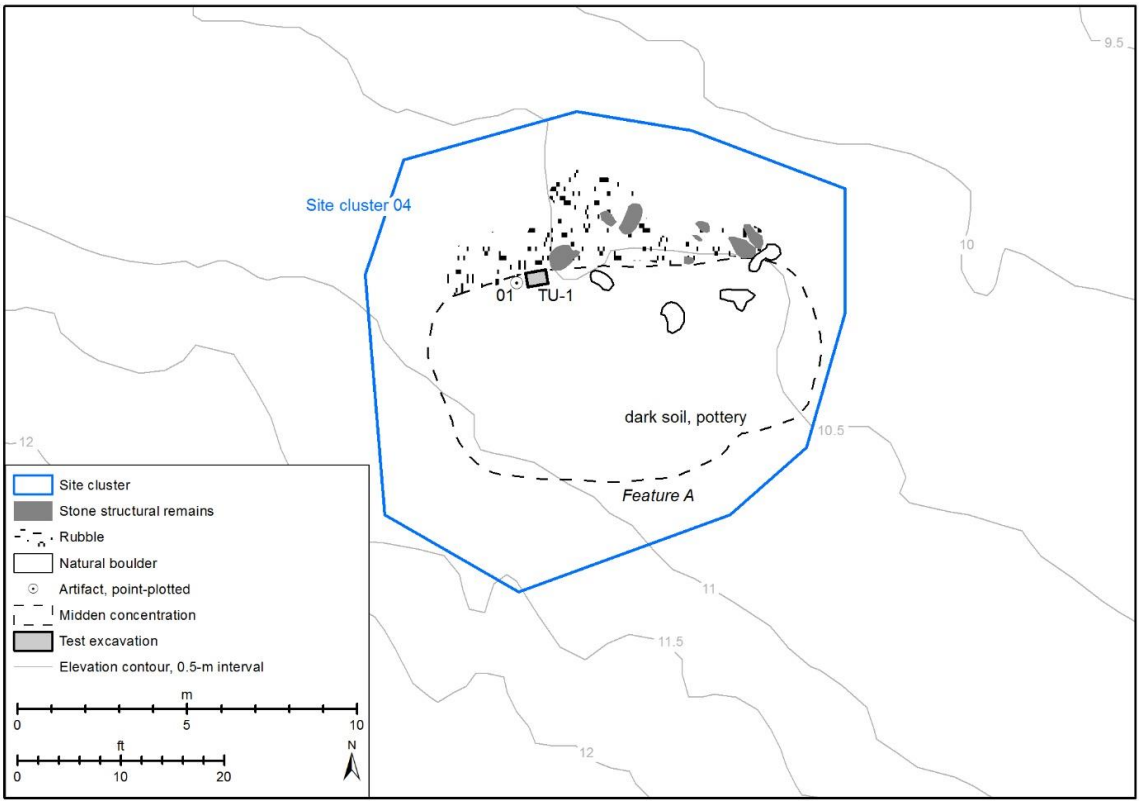

FIGURE 161. MAP OF "SITE CLUSTER 04" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

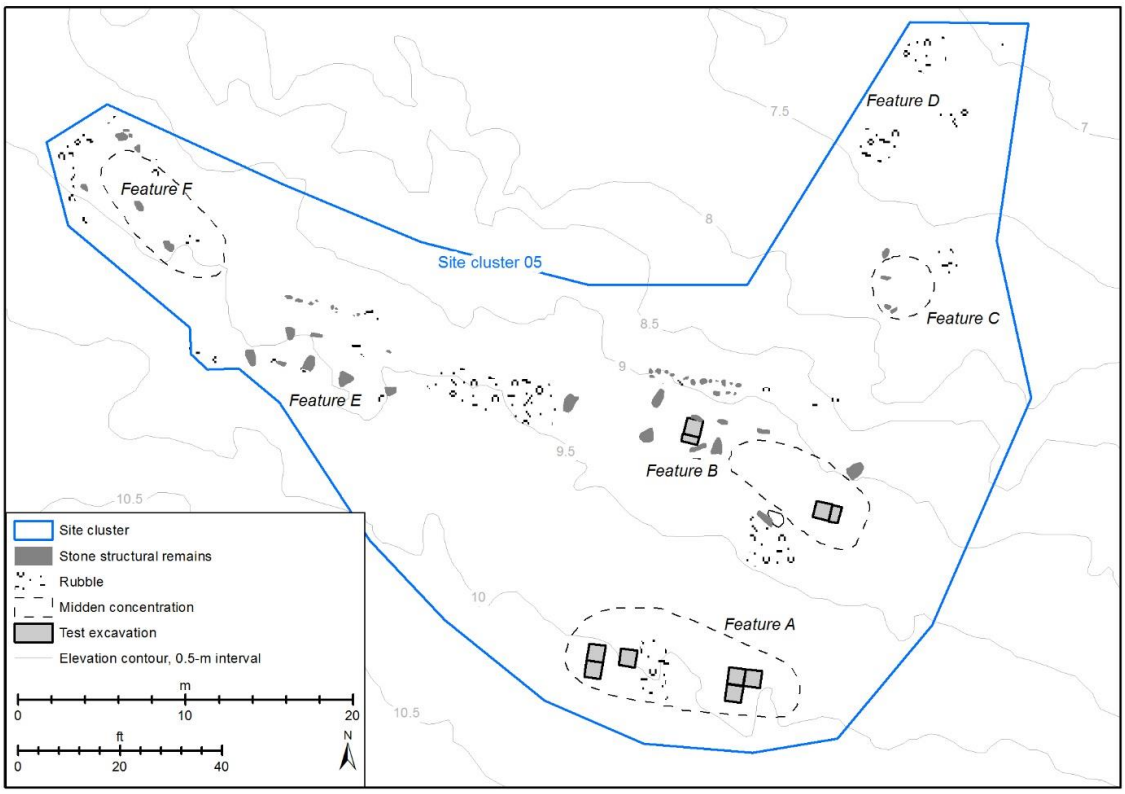

Figure 162. Overview map of "Site cluster 05" in the east *latte* village complex. Map from Carson et al. (2015).

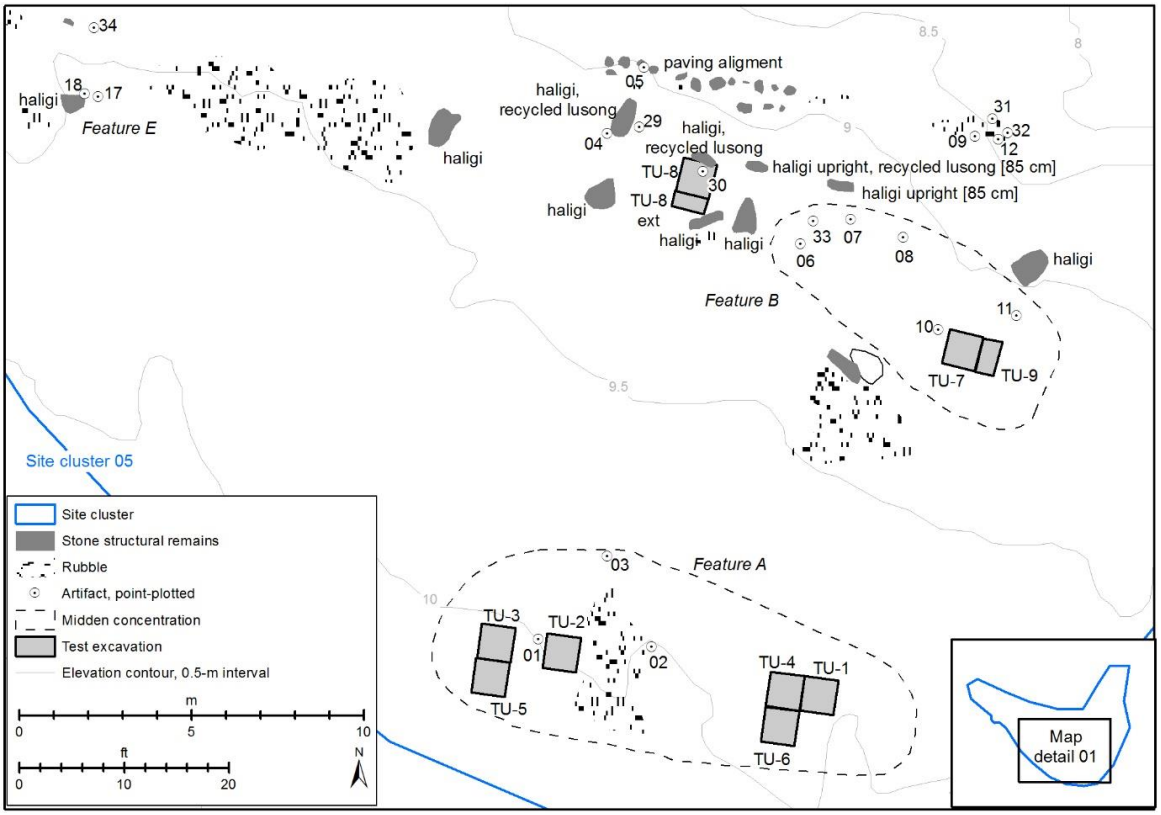

FIGURE 163. DETAIL MAP, PART 1 OF 3, OF "SITE CLUSTER 5" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

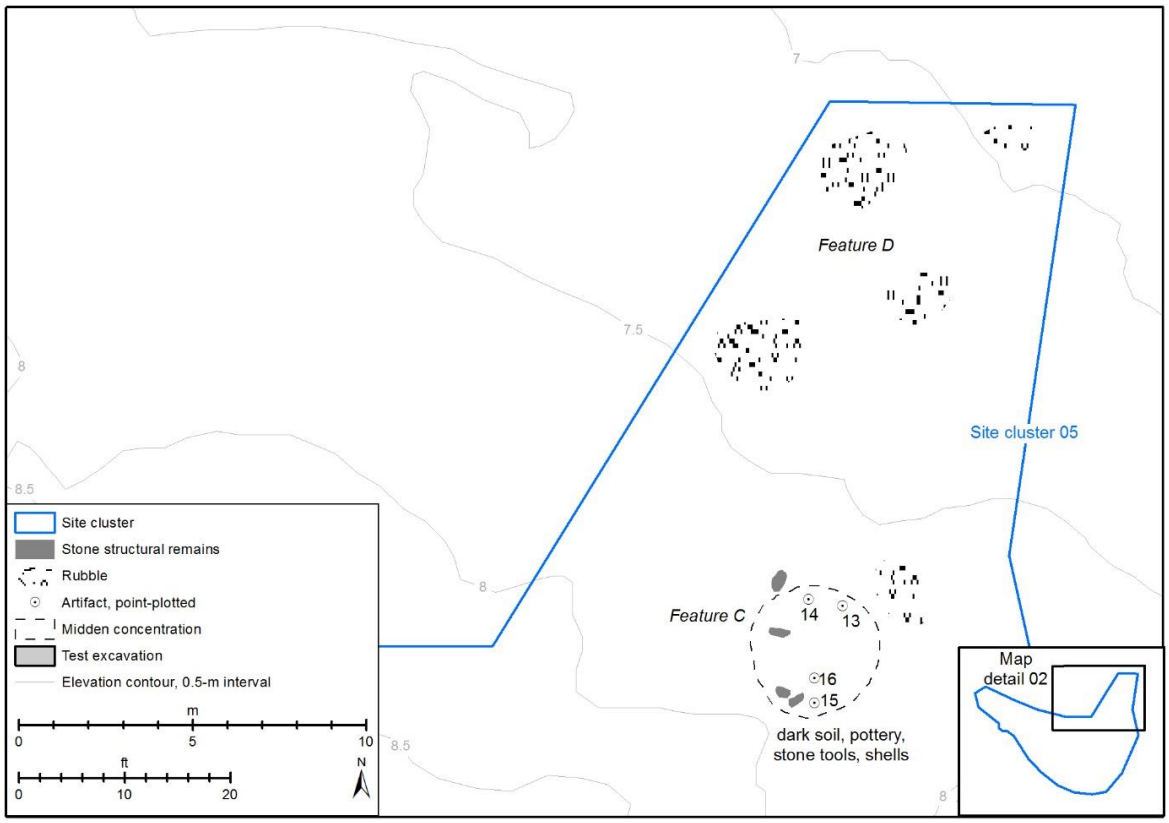

FIGURE 164. DETAIL MAP, PART 2 OF 3, OF "SITE CLUSTER 5" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

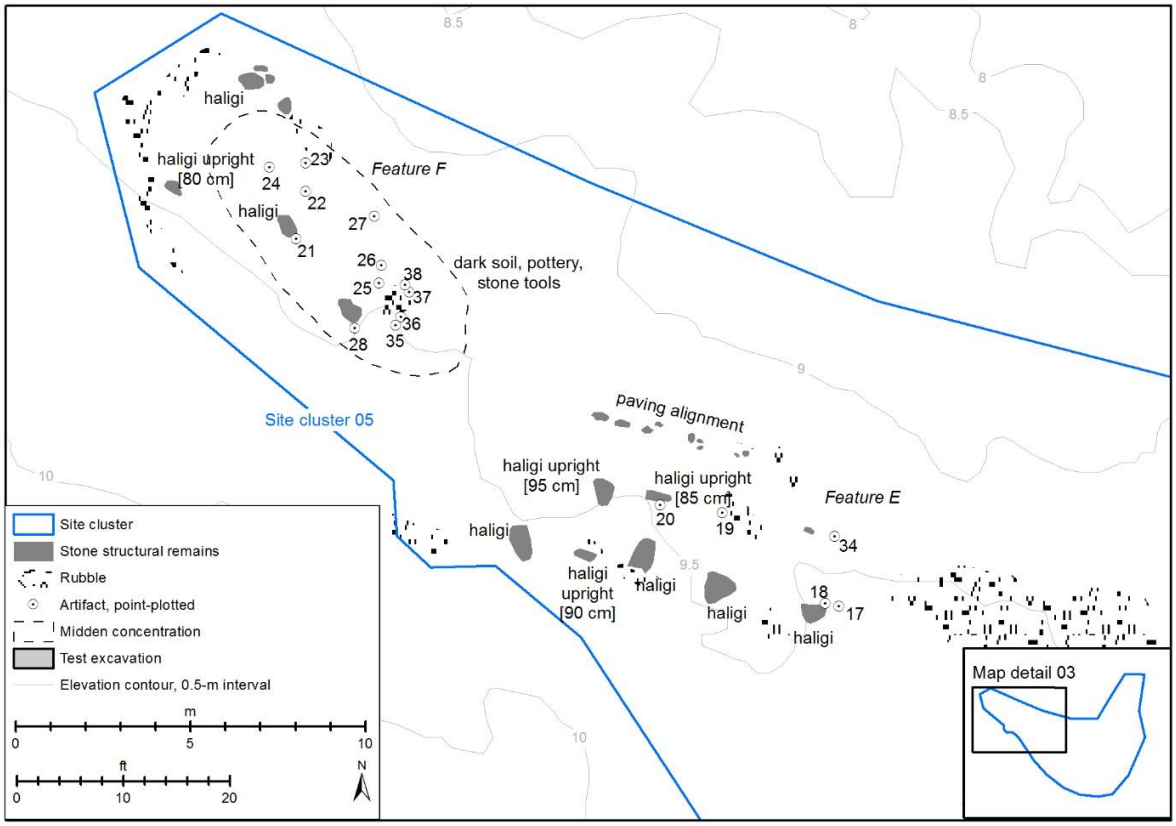

FIGURE 165. DETAIL MAP, PART 3 OF 3, OF "SITE CLUSTER 5" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

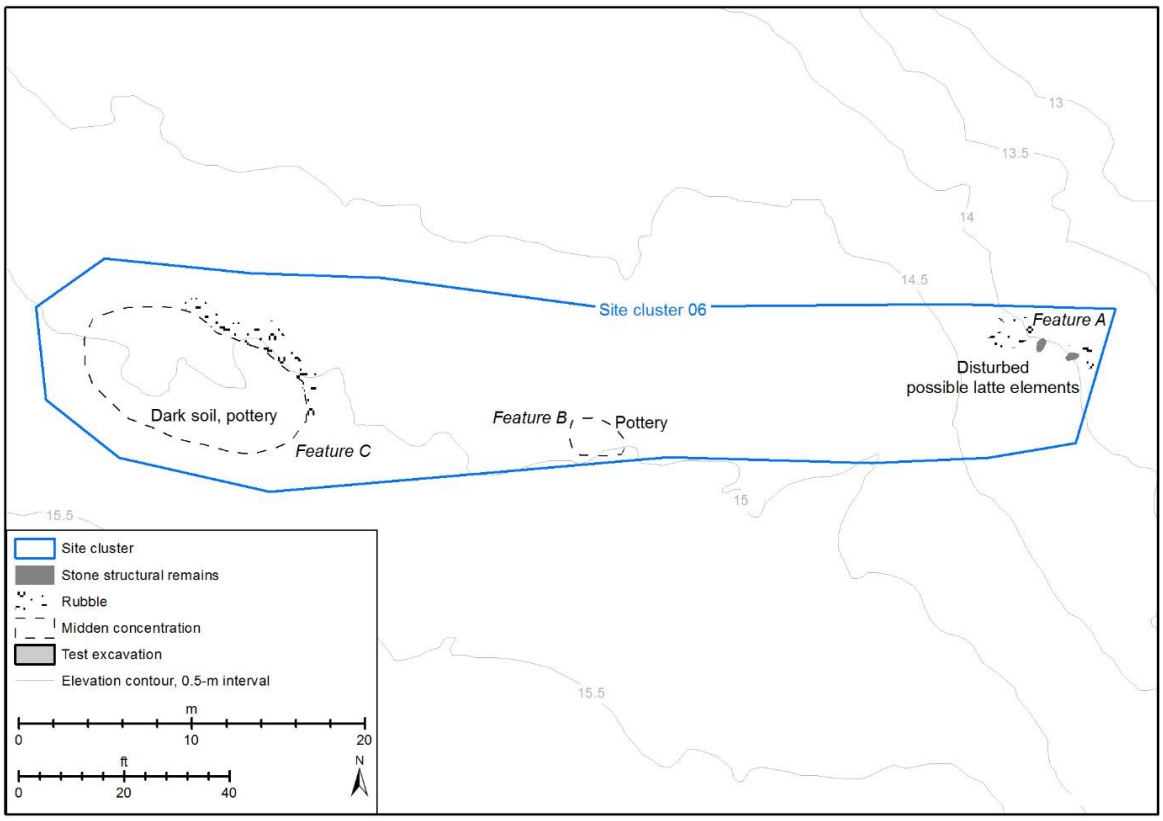

FIGURE 166. MAP OF "SITE CLUSTER 06" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

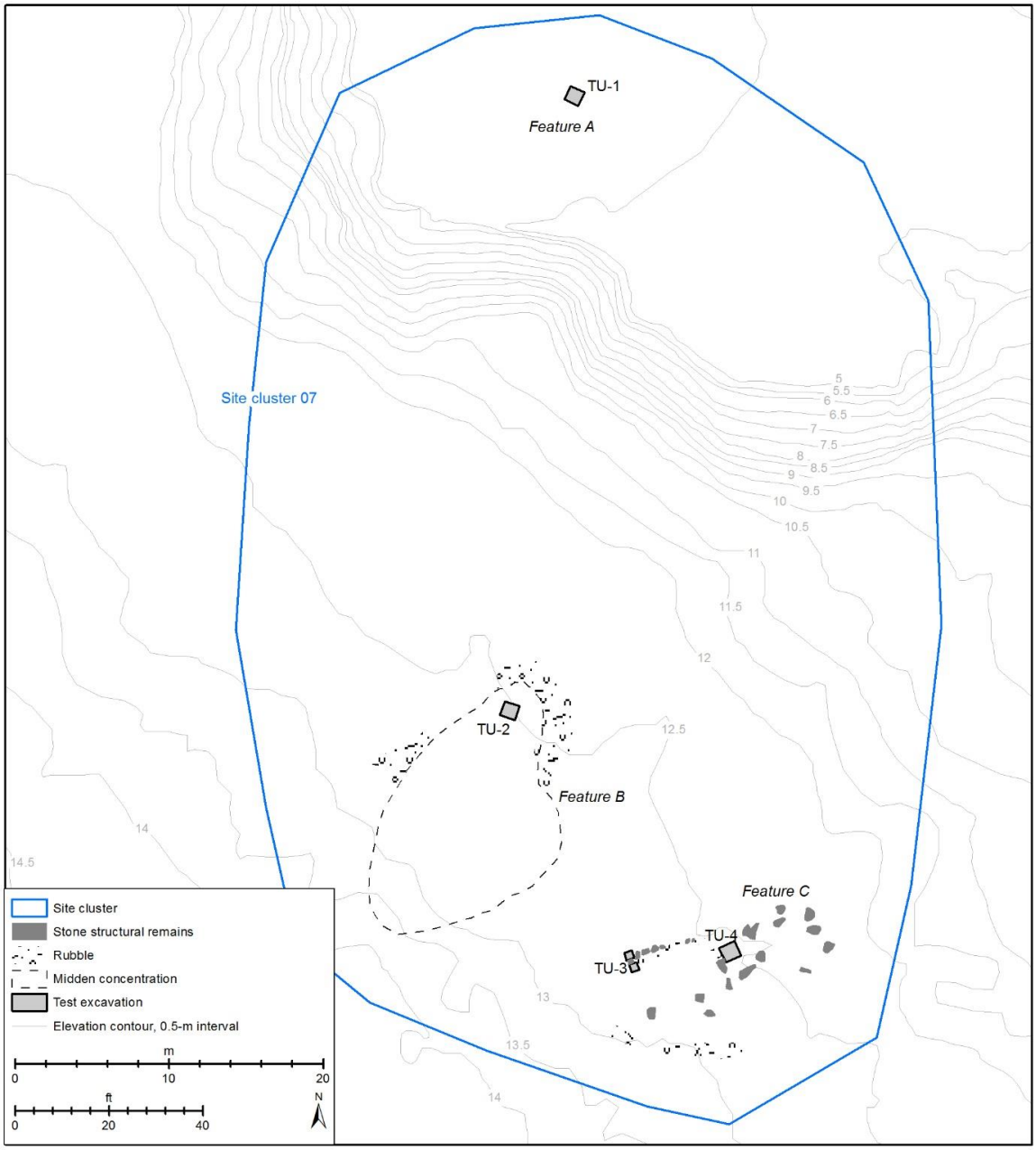

FIGURE 167. OVERVIEW MAP OF "SITE CLUSTER 07" IN THE EAST *LATTE* VILLAGE COMPLEX. FEATURE A REFERS TO A SUBSURFACE CULTURAL DEPOSIT, CONTAINING BROKEN POTTERY AND MIDDEN TYPICAL OF THE *LATTE* PERIOD. MAP FROM CARSON ET AL. (2015).

Exterior combing was accomplished in variable fine to coarse lines, always drawn or dragged downward vertically along a bowl's exterior. Multiple vertical drags or swipes were necessary for covering a full pot's surface. The specific tools likely differed from one case to another. At least at Ritidian, the most frequent form was a broad or coarse vertical combing or dragging.

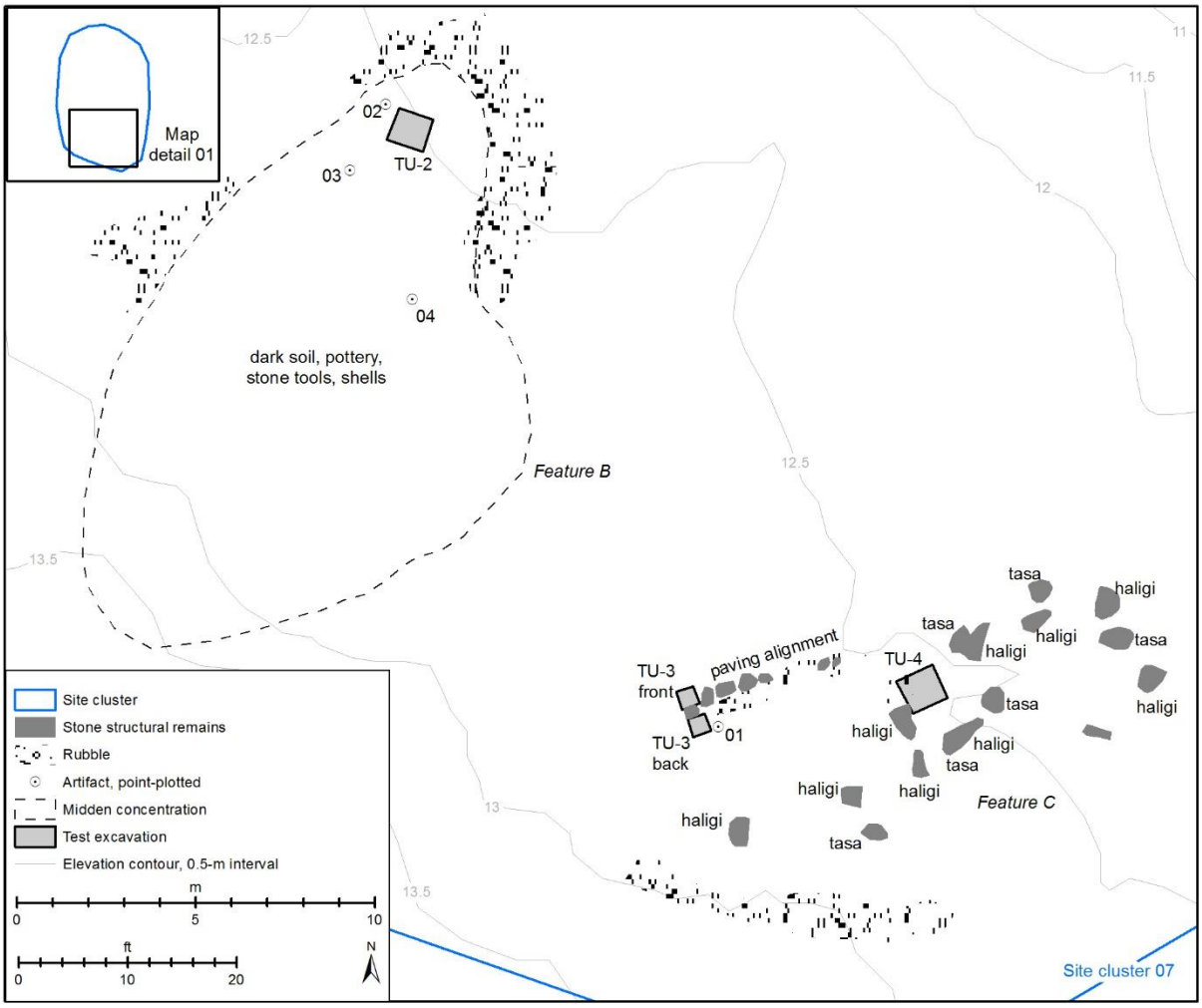

FIGURE 168. DETAIL OF FEATURES B AND C OF "SITE CLUSTER 07" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

The purpose of the exterior combing has been unclear. If the markings were visibly different from one another, such as distinguishing between fine and coarse lines, then they may have signified about the differential contents, ownership, or other information about the specific pot in question. The instances of broad and coarse lines perhaps affected the physical properties of those pots, for instance as related to the ability of heat to pass from one side to the other of a pottery wall.

Stone and shell artefacts mostly were general-utility tools, but some were special-purpose items. The most frequent findings were stone and shell adzes and chisels, pounding tools, abraders, and assorted flaked or chipped pieces of stone (Figures 183 through 186). Fishing gear was evident in mostly broken fragments of shell hooks, one unfinished piece of a v-shaped gorge, and a modified *Cypraea* sp. shell component of a possible octopus lure (Figures 187 and 188). The most narrow-use artefacts were the rarest findings, including slingstones and carved bone spear tips (Figures 189 and 190).

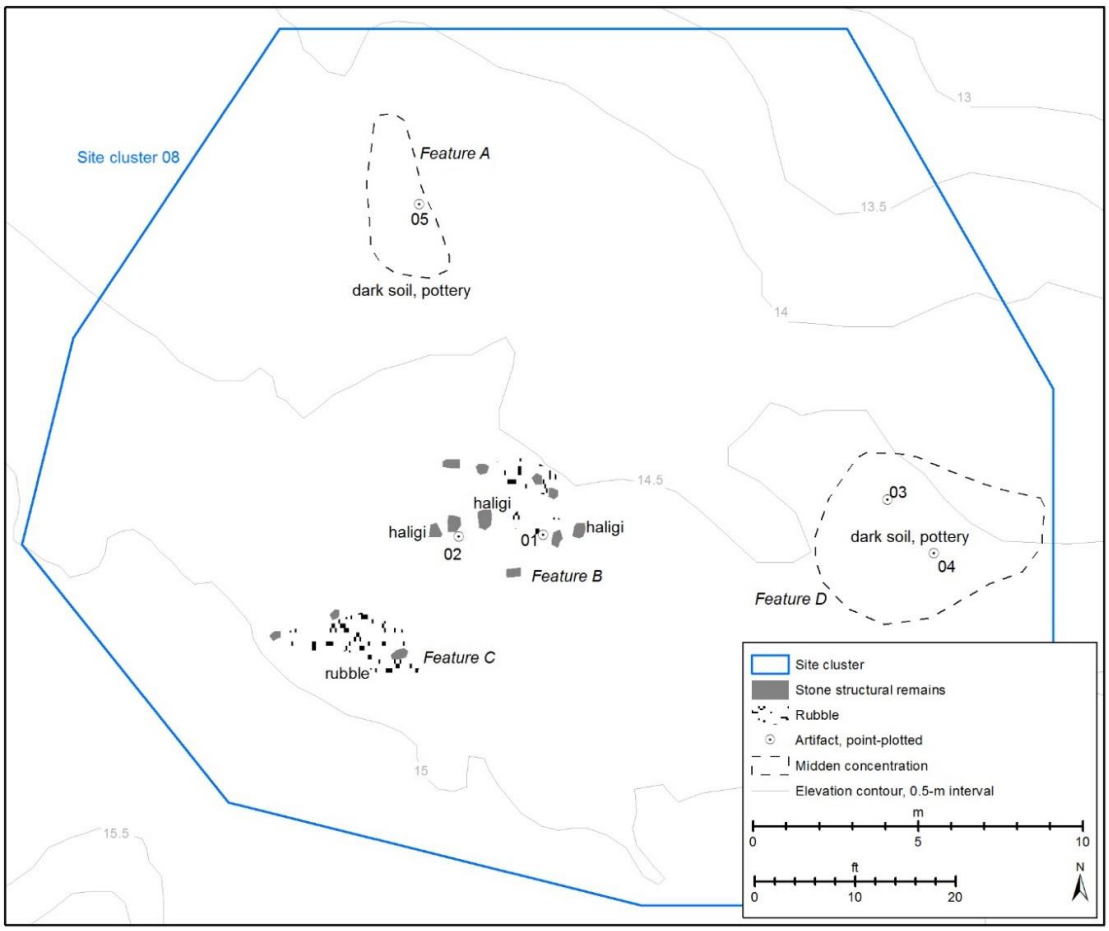

FIGURE 169. MAP OF "SITE CLUSTER 08" IN THE EAST *LATTE* VILLAGE COMPLEX. MAP FROM CARSON ET AL. (2015).

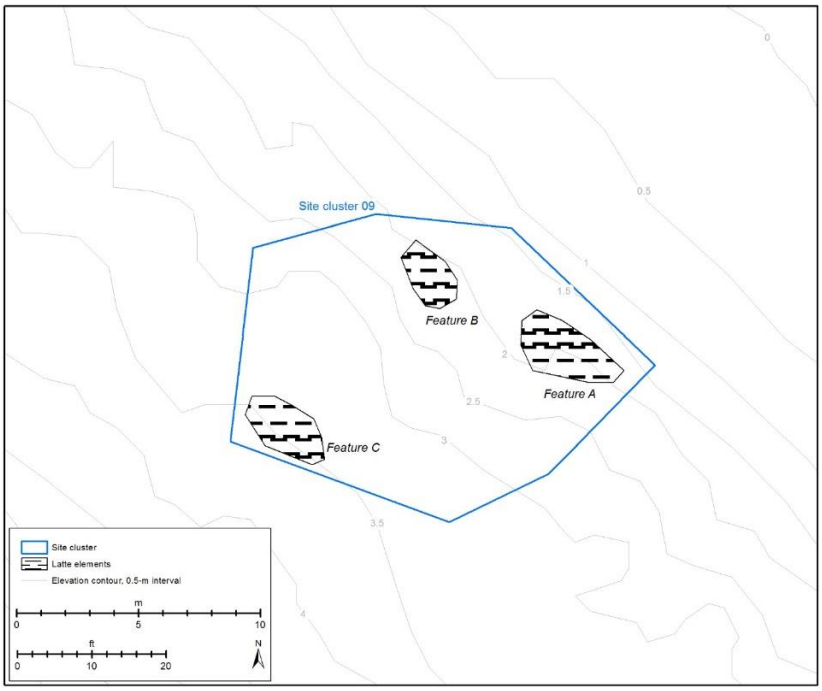

FIGURE 170. MAP OF "SITE CLUSTER 09" IN THE EAST *LATTE* VILLAGE COMPLEX. THE STONE ELEMENTS OF *LATTE* HERE HAD BEEN PARTIALLY WORKED, POSSIBLY RELATED TO A WORKSHOP STATION. MAP FROM CARSON ET AL. (2015).

FIGURE 171. FINELY SHAPED *LATTE* AT FEATURE B OF SITE CLUSTER 02, ALONG GUIDED-ACCESS HIKING TRAIL, VIEW TO EAST-SOUTHEAST, APRIL 2015. SCALE BARS RE IN 20-CM INCREMENTS.

FIGURE 172. *LATTE* RUINS AT FEATURE E OF SITE CLUSTER 05, VIEW TO EAST, ALONG GUIDED-ACCESS HIKING TRAIL, JUNE 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 173. DETAIL OF NOTCHED BASE OF *HALIGI*, FALLEN FORWARD FROM UPRIGHT POSITION WITH BRACING STONES STILL VISIBLE, AT FEATURE E OF SITE CLUSTER 05, ALONG GUIDED-ACCESS HIKING TRAIL, VIEW TO SOUTHEAST, JUNE 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 174. EXAMPLE OF *TASA* WITH APPARENT SOCKET FOR FITTING ATOP A PAIRED *HALIGI*, AT FEATURE D OF SITE CLUSTER 02 IN THE EAST *LATTE* VILLAGE COMPLEX, ALONG GUIDED-ACCESS HIKING TRAIL, MARCH 2017, VIEW TO SOUTH. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 175. STONE LINING AT FRONT SIDE OF *LATTE*, RESEMBLING THE BORDER OF A PATIO-LIKE AREA, AT FEATURE B OF SITE CLUSTER 02, VIEW TO SOUTHWEST, JUNE 2015, ALONG GUIDED-ACCESS HIKING TRAIL. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 176. ARRANGEMENT OF BOULDERS IN FOREGROUND, MARKING THE END OF A *LATTE* SET, AT FEATURE C OF SITE CLUSTER 02, ALONG GUIDED-ACCESS HIKING TRAIL, VIEW TO WEST-NORTHWEST, MARCH 2016. SCALE BARS ARE IN 20-CM INCREMENTS.

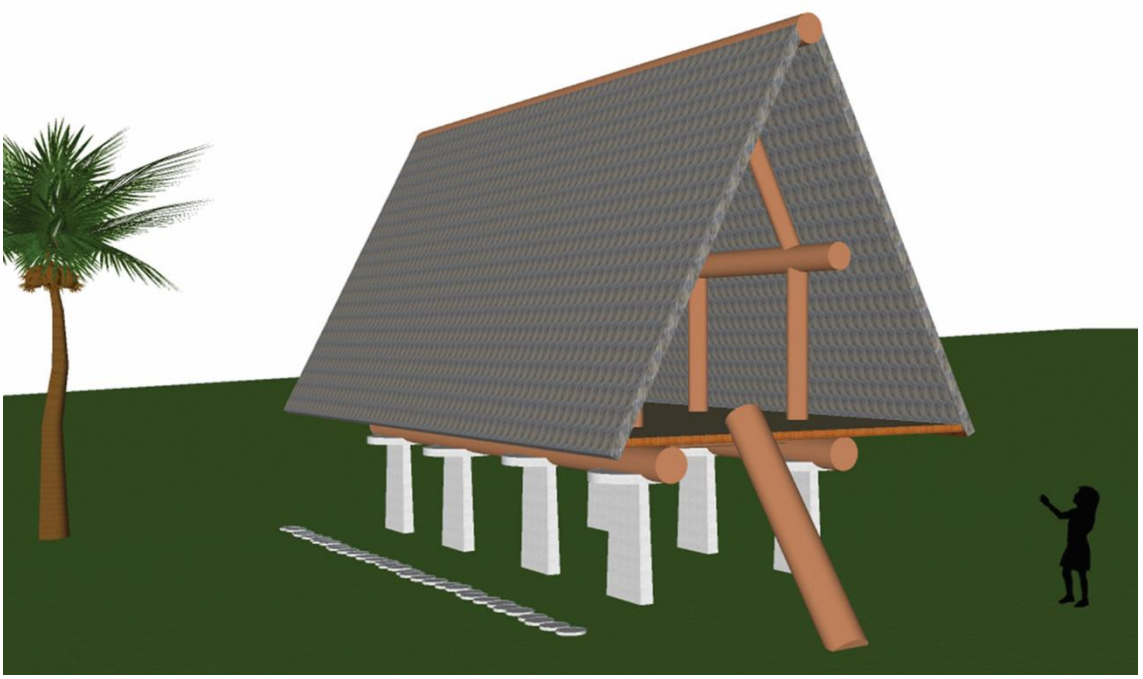

FIGURE 177. COMPUTER-GENERATED MODEL OF *LATTE* HOUSE, BASED ON ARCHAEOLOGICAL FINDINGS AT FEATURE B OF SITE CLUSTER 05 IN THE EAST *LATTE* VILLAGE COMPLEX.

FIGURE 178. EXAMPLE OF DISMANTLED, BURNED, AND CLEARED *LATTE* AREA, AT FEATURE J OF SITE CLUSTER 02, ALONG GUIDED-ACCESS HIKING TRAIL, VIEW TO EAST, MARCH 2017. CLEARED RUBBLE IS VISIBLE ON THE DOWNSLOPE (NORTH) SIDE TO THE LEFT OF THE IMAGE. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 179. POTTERY TYPICAL OF A.D. 1000–1700, RECOVERED FROM EXCAVATIONS AT THE EASTERN *LATTE* VILLAGE COMPLEX. LOWER LEFT ITEM WITH WHITE LIME PLASTER COATING WAS EXCAVATED FROM TU-6 AT FEATURE I OF SITE CLUSTER 02. ALL OTHER ITEMS WERE FROM SURFACE COLLECTION 15 AT FEATURE C OF SITE CLUSTER 05.

FIGURE 180. TYPICAL AREA OF SURFACE-VISIBLE POTTERY FRAGMENTS, AT FEATURE A OF SITE CLUSTER 01, NEAR SURFACE COLLECTION 04, ALONG GUIDED-ACCESS HIKING TRAIL, VIEW DOWN TO EAST, APRIL 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 181. RE-JOINABLE POTTERY FRAGMENTS ON THE SURFACE OF BURNED AND CLEARED AREA OF FEATURE I OF SITE CLUSTER 02, ALONG GUIDED-ACCESS HIKING TRAIL, VIEW DOWN TO NORTH, SEPTEMBER 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

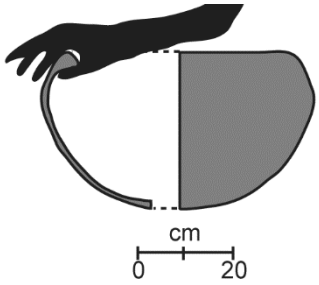

FIGURE 182. POSSIBLE PROCEDURE FOR CREATING THICKENED RIM WITH WET CLAY PRIOR TO FIRING, USING THUMB POSITIONED IN THE INTERIOR, WITH HAND OVER THE RIM AND FINGERS AT THE EXTERIOR OF THE POT.

FIGURE 183. EXAMPLES OF *TRIDACNA* SP. SHELL ADZES AND CHISELS, FROM CONTEXTS OF THE A.D. 1600S. A = SURFACE COLLECTION 28 AT FEATURE F OF SITE CLUSTER 05. B = RECOVERED FROM SURFACE COLLECTION 19 AT FEATURE E OF SITE CLUSTER 05. C = RECOVERED FROM SURFACE BY JOEY FLORES IN THE AREA OF THE FORMER JESUIT MISSIONARY OUTPOST.

FIGURE 184. EXAMPLES OF VOLCANIC STONE ADZES, RECOVERED FROM THE SURFACE OF A *LATTE* SET IN THE EASTERN *LATTE* VILLAGE COMPLEX. LEFT = SURFACE COLLECTION 04 AT FEATURE A OF SITE CLUSTER 01. CENTRE = SURFACE COLLECTION 20 AT FEATURE E OF SITE CLUSTER 05. RIGHT = SURFACE COLLECTION 02 AT FEATURE A OF SITE CLUSTER 05.

FIGURE 185. VOLCANIC SCORIA ABRADER FRAGMENT RECORDED AS SURFACE COLLECTION 17 AT FEATURE E OF SITE CLUSTER 03 IN THE EASTERN *LATTE* VILLAGE COMPLEX.

FIGURE 186. LIMESTONE POUNDER FRAGMENT, RECORDED AS SURFACE COLLECTION 09 AT FEATURE B OF SITE CLUSTER 03 IN THE EASTERN *LATTE* VILLAGE COMPLEX.

FIGURE 187. V-SHAPED FISHING GORGE IN PROCESS, SHAPED BUT NOT YET FULLY POLISHED, RECORDED AS SURFACE COLLECTION 03 AT FEATURE B OF SITE CLUSTER 03 IN THE EASTERN *LATTE* VILLAGE COMPLEX.

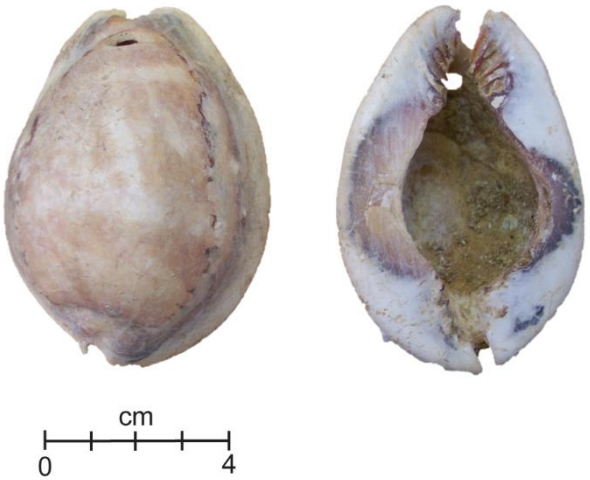

FIGURE 188. *CYPRAEA* SP. SHELL COMPONENT OF A POSSIBLE OCTOPUS LURE, SHOWN IN TWO VIEWS, EXCAVATED FROM 80 CM DEPTH IN EMERGENCY RECOVERY PIT 2, WESTERN VILLAGE AREA, APPROXIMATELY A.D. 1400–1600.

FIGURE 189. SLINGSTONE MADE OF WORKED LIMESTONE, RECOVERED BY BRIAN LEON GUERRERO FROM THE SURFACE OF FEATURE B OF SITE CLUSTER 02 IN THE EAST *LATTE* VILLAGE COMPLEX.

FIGURE 190. FRAGMENT OF BONE SPEAR POINT, MADE OF PROBABLE HUMAN BONE, RECOVERED FROM EXCAVATION LAYER AT THE JESUIT MISSIONARY OUTPOST.

Stone grinding mortars (*lusong*) were made in two formats, including semi-portable boulders at *latte* houses and others that were carved indelibly into the limestone bedrock shelves outside caves. At one *latte* structure in the eastern side of Ritidian, three semi-portable *lusong* had been recycled to use as the *haligi* pillars of the *latte* house (Figure 191). The permanent *lusong* outside caves most likely were related to the ritual events at those caves, and two such *lusong* included especially numerous mortar depressions outside Upper Cave and West End Cave, indicative of intensive use and perhaps over a long period (Figures 192 and 193). The immoveable *lusong* cannot be dated conclusively to the *latte* period or to any other specific period, and the possibility must be recognised that at least some of them were carved into the limestone shelves or large boulders prior to the tradition of using the semi-portable *lusong* directly at residential sites during the *latte* period.

While people resided at the formal *latte* villages, several caves were used for specialised ritual events, as represented in the apparently unusual findings in both the cave floors and their nearby exterior areas. The cave layers of this period consisted of dense ash and charcoal, although the pottery fragments and other artefacts tended to be extremely sparse or else completely absent (Figure 194). The most abundant

materials were shells of *Codakia* sp. and *Tellina* sp., yet these shell taxa were rather uncommon at the habitation middens. More clearly referring to specialised ritual activity, white-pigment human figures were the most popular rock art expressions. Furthermore, some but not all of the cave sites at this time contained formal burial features, clearly different from the tradition of at-house burial seen in the *latte* residences.

An apparently unique structural feature in the eastern *latte* village was made of stacked limestone cobbles in the shape of a rectangular platform with a slightly mounded top surface (Figures 195 and 196). The structure may have been a place of offerings, as it was surrounded by especially dense concentrations of broken pottery, *Tridacna* sp. shells, and fragments of volcanic stone abraders that all curiously were absent from the surface and interior of the platform. Whether or not those items were offerings per se, their spatial distribution revealed a strict avoidance of the interior of the structure.

The habitation food middens of this period were comprised mostly of *Strombus* sp. shells and fish bones. Bird, bat, and turtle bones typically were absent, but they were found in small numbers in a few instances. *Strombus* sp. shellfish dominated in the middens, but *Trochus* spp. and *Turbo* spp. shells were fairly common. Operculae of *Turbo* spp. (the "doors" sealing the shells) were far more numerous than their counterpart shells, possibly reflecting a practice of keeping or collecting the operculae for a purpose currently unknown.

FIGURE 191. EXAMPLE OF PORTABLE *LUSONG* GRINDING BASIN STONE, RECYCLED FOR USE IN A *LATTE* STRUCTURE, NOW FALLEN AT FEATURE B OF SITE CLUSTER 05, ALONG GUIDED-ACCESS HIKING TRAIL, VIEW TO SOUTHEAST, JUNE 2015. SCALE BARS IN BACKGROUND ARE IN 20-CM INCREMENTS.

FIGURE 192. MULTIPLE *LUSONG* GRINDING DEPRESSIONS IN A LIMESTONE SHELF OUTSIDE UPPER CAVE, VIEW DOWN TO NORTH, MARCH 2017. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 193. MULTIPLE *LUSONG* GRINDING DEPRESSIONS IN A LIMESTONE BOULDER OUTSIDE WEST END CAVE, VIEW TO WEST, JULY 2012. THE BOULDER VARIES 80–140 CM HIGH, AND THE INDIVIDUAL DEPRESSIONS VARY 8–21 CM DIAMETER.

FIGURE 194. HILITAI CAVE (FEATURE A OF SITE CLUSTER 3), VIEW TO NORTH-NORTHWEST, NOVEMBER 2013. A SINGLE *LUSONG* GRINDING BASIN IS VISIBLE AT THE EDGE OF THE CAVE OPENING. THE BLACK SEDIMENT IN THE CAVE REVEALED CONCENTRATIONS OF BIVALVE SHELLS BUT NO POTTERY OR ARTEFACTS. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 195. STACKED-ROCK MOUNDED PLATFORM AT FEATURE I OF SITE CLUSTER 02, VIEW TO EAST, JUNE 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 196. STACKED-ROCK MOUNDED PLATFORM AT FEATURE I OF SITE CLUSTER 02, VIEW TO WEST, JUNE 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 197. EXPOSURES OF LIMESTONE FROM THE FORMER MID-HOLOCENE CORAL REEF, POTENTIALLY USED AS THE RAW MATERIAL SOURCE FOR *LATTE*. THIS EXAMPLE WAS RECORDED AS "AREA OF INTEREST B" AT THE EAST *LATTE* VILLAGE COMPLEX, SHOWN HERE DURING A GUIDED-ACCESS TOUR OF NOVEMBER 2015, VIEW TO NORTHWEST. OTHER EXPOSURES OF THE SAME GEOLOGICAL FORMATION ARE VISIBLE SPORADICALLY ALONG THE SHORELINE AT RITIDIAN.

In closing this presentation of the *latte* period material findings, the raw material sources can be considered for making the *haligi* pillars and *tasa* capitals. The natural source apparently was along the coastline that was quite stable by A.D. 1000 and visible today, specifically referring to the exposures of ancient coral reef that had lived during a much older period of higher sea level (Figure 197). While definitive quarrying marks have not been confirmed in the natural source exposures, the material characteristics match with the colour, texture, density, and composition of the *haligi* and *tasa*. Additionally, sets of partially worked limestone blocks have been documented along the coastline, representing unfinished stages of *haligi* and *tasa* (Figure 198 and 199).

Larger View

The *latte* village and landscape system emerged not only at Ritidian but also throughout Guam and the Mariana Islands after A.D. 1000. By the time of foreign imperial transformations of the late 1600s, Ritidian was regarded as one of many population centres, where missionaries and militants concentrated their initial efforts and then expanded their reach. The historically known Jesuit missionary outpost at Ritidian signified the perception of this place as one of the key residential villages during the decades that would become the end of the *latte* period.

FIGURE 198. PORTION OF *LATTE* WORKSHOP AT SITE CLUSTER 09, VIEW TO NORTHWEST, NOVEMBER 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

FIGURE 199. PORTION OF *LATTE* WORKSHOP AT SITE CLUSTER 09, VIEW TO SOUTH-SOUTHWEST, NOVEMBER 2015. SCALE BARS ARE IN 20-CM INCREMENTS.

While Ritidian supported at least two *latte* village complexes as documented here, the adjacent lands of the upper limestone plateau inside Andersen Air Force Base (AAFB) have shown signs of repeated temporary habitations or shelters, horticultural gardens, and broad-spectrum forest management. Scattered concentrations of broken thickened-rim pottery were typical of the *latte* period, found on the surface of exposed rough limestone terrain or sometimes on thin clay silt pockets of possible ancient gardening spots (Dixon and Schaefer 2014; Dixon et al. 2012). Occasionally, the soil pockets contained the remnants of heated-rock hearths or ovens, and further research may yet discover more about the past cultural use of the upper plateau.

The findings at the coast and at the upper plateau together illustrate the spatial extensiveness of apparently low-impact land-use systems during the *latte* period. The obvious and permanent village sites can be recorded and mapped in definable footprints or polygons as shown at Ritidian, but the larger surrounding terrain, forests, and ocean all functioned as components of the culturally inhabited landscape. The low-impact strategies of informal gardens and managed forests, however, resulted in either no durable archaeological evidence or else the enigmatic scattered pottery and occasional hearths as seen in the upper plateau.

The low-impact land-use strategies had extended all throughout the Mariana Islands during the *latte* period, possibly approaching the practical limits of sustaining this mode of inhabiting the landscape. Numerous villages were supported by large spaces of lands that were reserved for gardens and forest resources. Eventually with increasing population densities, these low-impact practices would need to be intensified in order to supply enough food for the resident communities. Such an intensification did not occur here, but the *latte* period communities definitely had developed formalised villages with permanence of place in their definable territories.

The archaeological record of the *latte* period may be viewed as a local expression in the Mariana Islands simultaneous with a Pacific-wide pattern of formalised stonework sites and monuments after A.D. 1000. In the Mariana Islands, the *latte* period signified a major growth of population and installation of communities with a greater sense of permanence of place in formally defined territories than ever had been attested previously, while equally formalised material signatures emerged in all other inhabited areas of Pacific Oceania all at once after A.D. 1000. The precise expressions of course varied from one island group to another, but each of those localised expressions potentially resulted from a cross-regionally shared effort to formalise social identity in the landscape.

While *latte* structures and villages defined the social landscapes and settings of the Mariana Islands, other stonework expressions emerged in other areas after A.D. 1000. Stone-filled house foundations, pathways, and other features replaced older traditions in Palau, Yap, Pohnpei, Kosrae, Samoa, and throughout the region. In many cases, best illustrated in Micronesia, the individual houses still were built on raised posts, now raised over stonework foundations instead of earthen terraces or other surfaces (Carson 2013). A major difference emerged in West Polynesia, however, with a new tradition of ground-level housing directly on the stone-filled foundations, and the practice of post-raised housing diminished along with the decline of pottery-making traditions (Carson 2014d).

As seen in the *latte* sites of the Marianas, the new formalised settlement structures cross-regionally coincided with at-house burial. Older burial sites prior to A.D. 1000 have been discovered only rarely and in specially designated locations of caves or cemeteries that were separated from the residential precincts. After A.D. 1000, at-house burial became the expected pattern in most places, while burial in a cave or other specially designated place persisted in clearly differentiated contexts.

In addition to the use of stonework for making residential complexes, a number of constructions became known as monuments for religious ceremonies, status-justifying events, burial markers, or other specially designated associations apart from daily residence. Some of the more famous monuments have been the "stone city" of Nan Madol in Pohnpei (Athens 2007) and at the Lelu ruins and similar sites in Kosrae

(Cordy 1993). Other forms of monumental investment may be seen in the large pigeon-snaring mounds of Samoa and Tonga (Burley 1996; Herdrich 1991). Perhaps more dramatically, religious sites in Polynesia became increasingly formalised, especially in East Polynesia with large stonework temples, arrangements of upright stones, and sometimes carved statues of human figures (Emory 1970; Hunt and Lipo 2011).

The formalisation of society in the landscape after A.D. 1000 corresponded with major population growth and expansion, observable within the Mariana Islands as well as at a much larger scale encompassing all of Pacific Oceania. People created *latte* villages throughout the Mariana Islands, and thereby they became increasingly dependent on fixed units of land and resources within the scope of access from their recognised villages. Claims to specified territories may have been linked with family lineages, and at-house burials likely strengthened these links. Similar social fixing in the landscape occurred elsewhere as noted, at the same time of the last major population expansion in the Pacific.

The post-A.D. 1000 period witnessed a fully inhabited "sea of islands" across Pacific Oceania (Figure 200), referring to the ocean as an essential part of the inhabited world (Hau'ofa 1994). Populations had expanded to live in the vast expanse of East Polynesia, concurrent with movement back westwards into the enclaves now regarded as the Polynesian Outliers amidst predominantly Melanesian or Micronesian cultural areas (Carson 2012c). The final major population movement apparently was related to the settlement of New Zealand and its nearby islands by A.D. 1300 (Kirch 2010).

After people had reached the limits of population expansion into new territories, then the only next remaining options after further population pressure would involve one radical shift or another. No such outcomes have been observed in the Mariana Islands, but they characterised other places. One strategy involved the development of high-yield intensified agricultural field systems, seen in many parts of East Polynesia after A.D. 1400 (Carson 2006). Another development involved warfare, as implied in the hillforts of Fiji and Samoa (Best 1993).

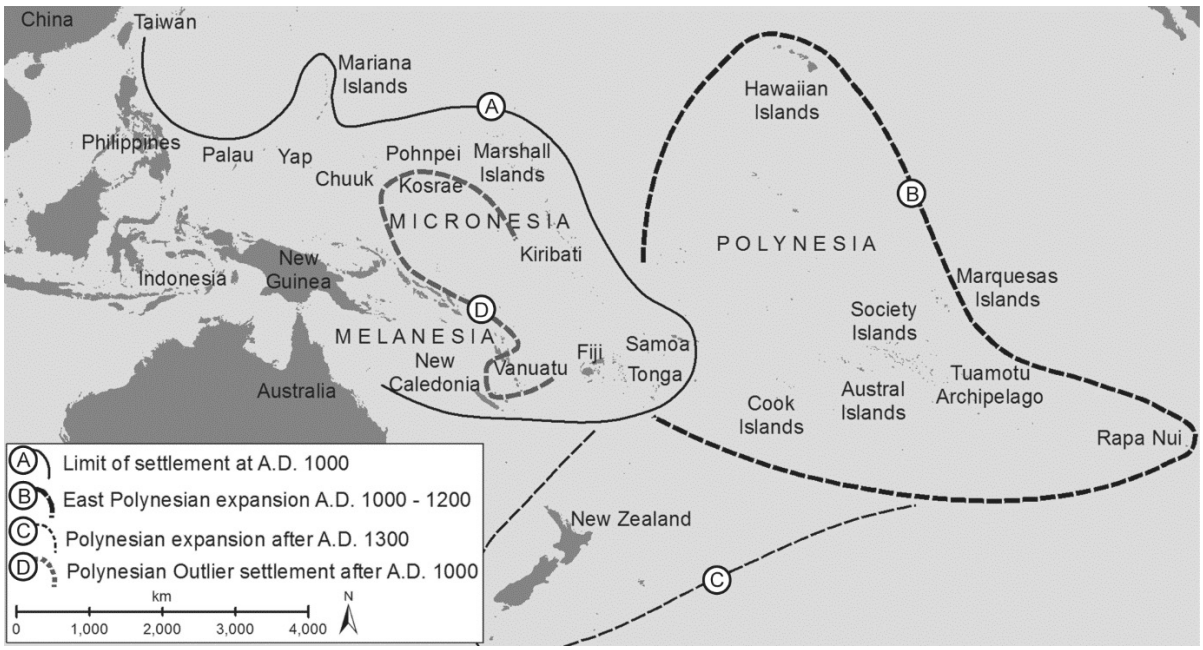

FIGURE 200. INHABITED AREAS OF PACIFIC OCEANIA AT A.D. 1000–1700.

The formalised *latte* landscapes of the Marianas reflected a maximal expansion of populations into marginal ecological zones, such as into the rough limestone terrain at the east side of Ritidian during the 1600s. These land-use systems were composed of residential villages and designated resource zones for fishing, shellfish collection, water access, gardens, and forests. They did not include the kinds of permanent agricultural field systems that developed in other areas of the Pacific, such as seen in formal investments in border walls, irrigation channels, mound complexes, or other constructions of permanent land-use economy. Rather, the broad-spectrum land-use patterns at Ritidian and throughout the Marianas were sustained less rigidly and instead with a certain amount of flexibility for long-term management.

Although people had been living in the Mariana Islands for a longer span of time than in any other area of Remote Oceania, the material records never involved the outcomes of intensified field systems, politically justified warfare, or imposing temples that characterised other areas. Perhaps the more radical shifts in other areas were triggered by population densities surpassing certain thresholds that were not yet approached in the Marianas. In any case, the circumstances in the Marianas have portrayed successful long-term management of land and natural resources, and importantly the complete chronological sequence has been preserved at the Ritidian Site. These issues, among others, are worthy of further investigation.

Chapter 12

Living Legacy

The foregoing chapters opened doors and windows for revealing the past, yet much more still can be explored about the last several centuries of ancient life and landscape at Ritidian. Since 1500 B.C. if not earlier, multi-layered heritage has shaped the meaning of Ritidian or Litekyan for all of the people who have experienced this place. These ongoing processes will continue into the future, although right now the exact course of the future may seem uncertain with unresolved issues of land ownership, proposed military use of the area, and unanswered research questions.

As illustrated here, the long-term records of natural and cultural history at Ritidian have composed a coherent landscape heritage. This example has shown how the landscape itself functions as a living heritage resource that anyone can experience and appreciate, especially important when realising that landscapes are fundamental to the human experience. We all live in landscapes that shape our lives while we shape them as well, but we may not always be aware of those relationships.

For all people visiting at Ritidian today, they directly encounter a landscape that embodies the results of several centuries of evolving or co-evolving natural and cultural history. For anyone wishing to know more about how these unique outcomes came to exist, they can learn from the numerous components of archaeological findings and other lines of evidence encoded in the landscape, accessible through guided site tours, and summarised in this book and elsewhere. These connections with the landscape, however, could not have been possible without first opening the place for access, furthermore related with issues of how to manage the landscape resources and how to pursue new knowledge.

Responsibilities and Creativity

The preserved and publicly accessible landscape at Ritidian has conveyed immeasurable benefits, but meanwhile the land ownership, management, and access have been problematic over some decades. The last known land-owning families have not been in control of these specific parcels since the post-World War II construction of U.S. Navy Facilities and then the transfer of management to the U.S. Fish and Wildlife Service in 1993. Agreements about access have changed over these years, and the issues of legal ownership and compensation have been debatable.

As part of Guam National Wildlife Refuge, Ritidian or Litekyan has become a vital refuge not only for natural wildlife but also for many people seeking new knowledge and experience in this unique place. Visitors every day admire the beach and forest that have thrived outside the effects of modern urban developments. Within an official Marine Protected Area, Ritidian's lagoon and reef are remarkably healthy. Meanwhile, efforts have been successful for rehabilitation of native forest and revitalisation of endangered species.

The protected environment now is sustained due to the continual work of several people and the support of the public in maintaining respectful protocols. For instance, caves were vandalised in the 1970s, but no further incidents have occurred since the implementation of controlled access and monitoring of the sensitive areas. Likewise, Guam's numerous invasive vines, thorny bushes, and other plants very quickly can overtake the forest within just a few weeks, unless the area can be maintained on a regular basis. These efforts are by necessity ongoing with continual maintenance and progress milestones, and they should not be mistaken as individual projects with discrete beginnings and conclusions. Instead, the progress is measured continually, and any major interruption can negate the progress that had been made up to that point.

The natural habitat at Ritidian is a safe home for diverse plants and animals. The *Serianthes nelsonii* tree (known as *hayun lagu* in Guam or *trongkon guafi* in Rota) at one time had only a single living specimen in Guam, but now several young trees have been nurtured at the Refuge (Figure 201). The forest growth has been most successful after some sustained years of eradication of invasive plants, brown tree snakes, and other harmful species. Gradually, the natural habitat has transitioned into mostly native species. In addition to the resurgence of native forest, coconut crabs and monitor lizards continue to live here (Figures 202 and 203). Marine life is abundant, including numerous fish, crabs and eels (Figures 204 and 205). Sea turtles nest on the protected beach (Figure 206).

Several programs allow for responsible and permitted use of Ritidian's many rich resources. The western portion of the beach is open for public access, and loops of hiking trails guide visitors through the forest for direct in-person experience (Figure 207). Other activities include hand-line fishing from the shore, seasonal harvesting of breadfruit and other edible foods, and collection of medicinal plants. Additionally, the U.S. Fish and Wildlife Service has initiated guided tours into some of the sensitive areas, now possible at least twice per month by appointment in advance, with options for observing the caves and the remains of a *latte* village as elements of a "living museum."

In the context of a preserved ecosystem, Ritidian or Litekyan has become a spiritual retreat and a place for people to connect with Chamorro heritage and traditions (Figures 208 and 209). The unique setting brings people into contact with an environment that they cannot find anywhere else, with a flourishing native forest and a connection with ancestral Chamorro habitation extending more than 3500 years. Several of the plants here are known for their special therapeutic properties, necessary as ingredients in healing, prayers, and ceremonies. Meanwhile, the ancient Chamorro habitation sites and caves provide tangible links with the entire scope of Chamorro cultural history, and accordingly Ritidian or Litekyan fulfils a vital role in honouring ancestors, learning from the deep past, and strengthening Chamorro traditions today.

FIGURE 201. REHABILITATION AREA FOR *SERIANTHES* SP. TREE, FEBRUARY 2017.

FIGURE 202. COCONUT CRAB AT THE LIMESTONE SHELF OF GATE CAVE, OCTOBER 2007.

FIGURE 203. MONITOR LIZARD, CLIMBING A TREE NEAR FEATURE B OF SITE CLUSTER 02 IN THE EAST *LATTE* VILLAGE COMPLEX, DURING GUIDED-ACCESS TOUR, MARCH 2017.

FIGURE 204. CRAB AT THE BEACH, AUGUST 2016.

FIGURE 205. EEL IN SHALLOW NEARSHORE WATER, AUGUST 2016.

FIGURE 206. SEA TURTLE NEST, PROTECTED LOCATION, JUNE 2017.

FIGURE 207. STARTING POINT OF THE PUBLIC-ACCESS "*LATTE* LOOP TRAIL", JULY 2013.

FIGURE 208. BLESSING CEREMONY AT FIRST CAVE, LED BY JEREMEY CEPEDA (LEFT) AND ACCOMPANIED BY THE AUTHOR AND MEMBERS OF I FANALAI'AN, MAY 2016. THIS EVENT WAS ORGANISED DURING THE 12TH FESTIVAL OF PACIFIC ARTS (FESTPAC), HOSTED IN GUAM, SPECIFICALLY WHILE PREPARING A SITE VISIT FOR THE INTERNATIONAL DELEGATES OF THE ART, CULTURE, AND SUSTAINABLE DEVELOPMENT IN THE PACIFIC FORUM. PHOTOGRAPH BY HSIAO-CHUN HUNG.

FIGURE 209. BELETNUT OFFERING FOR ANCESTORS AT FIRST CAVE, PREPARED BY JEREMEY CEPEDA, MAY 2016. PHOTOGRAPH BY HSIAO-CHUN HUNG.

Continuing Questions

This book was intended as a translation guide of how ancient life and landscape evolved since 1500 B.C. or earlier at Ritidian. The preceding chapters revealed the site contexts, landscapes, and artefacts in chronological order and situated in a larger regional view. This approach afforded some but not all of the aspects of visiting a museum exhibit, following a narrative of natural and cultural history.

Numerous questions can be asked about Ritidian's complex past, about how and why its unique landscape heritage evolved as it did, and about how the evident patterns and trends may compare with findings at other sites and geographic regions. The current book has not answered all of those questions, but rather it has provided a means to pursue a generous scope of thoughts and ideas. This starting point ideally can encourage new ways of learning about the past and potentially applying those lessons toward other goals.

Analogous with a museum exhibit, the pieces of information from each time period can be examined individually, in comparison to each other, or in relation to larger issues or themes. The individual artefacts or points of information can be appreciated in their own right and presented as in a catalogue or inventory, but perhaps more importantly the factual baseline datasets can substantiate further studies. The possibilities are open for further studies, and many questions so far have been unanswered.

As was introduced at the beginning of this book (Chapter 1), the site-specific findings may be regarded as particularistic expressions (sometimes called *emic*), representing definite real aspects within a larger range of potentially existing traits (sometimes called *etic*). The particularistic site findings at Ritidian have been presented in detail here, fulfilling appreciable value in their own right, but this body of information furthermore can be applied toward addressing larger general topics. This book has been concerned mostly with sharing the major findings from the primary datasets that are necessarily particularistic in their nature, as a means to substantiate larger research programs as hinted throughout the foregoing presentation.

The individual archaeological findings at Ritidian can be contextualised within their original time periods, and then those holistic time periods can be considered on their own or in a continuous chronological sequence. In this format, the presentation can support at least three ways of formulating further research questions. First, questions may be posed about the functionality and operations within single time periods or contexts, such as how people inhabited their landscapes during a specified time interval, how they obtained their food within those given circumstances, or how they overcame whatever challenges they had faced during that time. Second, questions may be posed about change through time, such as how people developed different technologies or artistic expressions under their changing circumstances, how they coped with challenges of population growth and density, and how they shaped their landscapes or were shaped by their landscapes. Third, the site-specific findings can be compared with knowledge from other sites and even from other geographic regions, for example toward seeking explanations of what was locally unique versus what was shared cross-regionally.

The site-specific material findings most immediately can address questions of how those materials came to exist in a proximate sense. For instance, fragments of pottery can be examined toward learning how each identifiable form or style was made through different combinations of technical, artistic, and other choices. Similar studies could apply to collections of stone tools, shell ornaments, or food middens. These lines of inquiry revolve around describing how certain outcomes have occurred, and therefore they need to begin with the basic datasets as the known outcomes that are being studied.

Descriptive research can clarify the proximate factors of *how* something happened, both within a measured time interval and over a sequence of time periods. When considering how pottery was made and used in the past, the answer can differ for whatever time period or context is being studied. The thickened-rim pottery of the *latte* period was remarkably different from the red-slipped pottery of the first settlement period, as may be expected for these traditions that were separated from one another by more than 2000 years. If all of the time periods are linked together, however, then a different picture can emerge about

how the individual pottery traditions changed over the centuries in terms of vessel shape, size, decoration, material composition, and other characteristics.

With a solid grounding in describing how the archaeological record was composed and how the inhabited landscape has evolved at Ritidian, new research can attempt to explain fundamentally *why* those outcomes occurred. The questions of *why* are seeking the ultimate causal explanations for the observed results, such as when explaining Ritidian's complex landscape chronology through principles of evolutionary theory. Basic data-focused research can describe how Ritidian's landscape was composed differently over a series of time intervals, and then another operation can attempt to explain why the landscapes of the world in a general sense have changed through time. Other approaches could use optimisation behaviour theory or cultural materialism to explain the technological and economic aspects of the archaeological record, or perhaps a Marxist dialectic could attempt to explain patterns and trends in political or ideological structure. Numerous explanatory theories may be considered, but these exercises all must rely on the existence of primary datasets as shown here for the Ritidian Site.

Without indulging too deeply in abstract theory and philosophy of science, the descriptive *how* refers to a proximate practical cause of data-specific observations, and the explanatory *why* refers to an ultimate theoretical cause of a generality. This book has not been concerned with supplying an ultimate answer or truth, but instead it was designed to reveal the factual datasets from Ritidian. As mentioned already, this book offers a starting point for further studies. The facts will not change, but variable methodologies and theoretical constructs can make use of the facts in different ways.

Ritidian or Litekyan offers an extraordinary opportunity to learn about the long-term evolving natural and cultural history of an inhabited landscape ever since the time of first settlement around 1500 B.C. or perhaps even earlier. These material records from the past can support lessons about how we today can cope with changing sea level, environmental impacts, population growth, and other challenges of worldwide relevance currently and into the future. The site records have revealed how the landscape at any given point in time has embodied the results of prior centuries of evolving circumstances, such that the actions during each period have created long-lasting effects. Accordingly, our actions today will shape the future, and we can act more responsibly if we can learn from examples as chronicled in Ritidian's inhabited landscape.

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