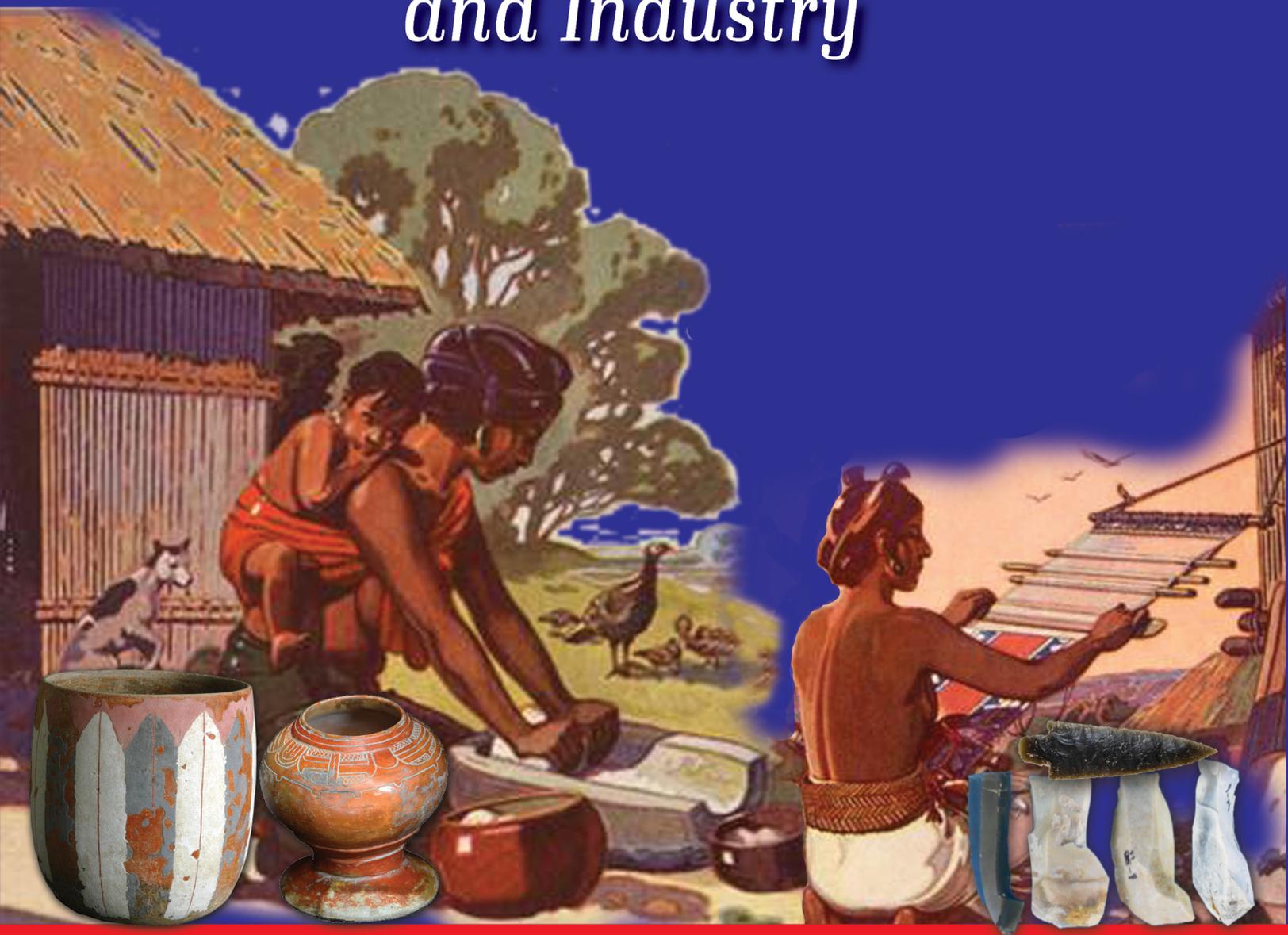


Research Reports in Belizean Archaeology

Papers of the 2014 Belize Archaeology Symposium

***Ancient Maya Domestic
Economy:
Subsistence, Commerce
and Industry***



Edited by

John Morris, Melissa Badillo

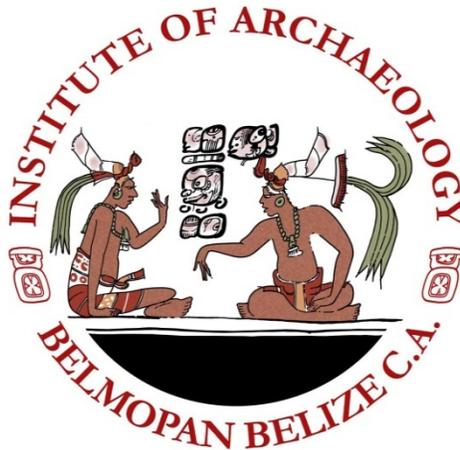
Sylvia Batty and George Thompson

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Edited by John Morris, Melissa Badillo, Sylvia Batty and George Thompson



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1 **THIRTY YEARS OF ARCHAEOLOGY AT CARACOL, BELIZE: RETROSPECTIVE AND PROSPECTIVE**

Diane Z. Chase and Arlen F. Chase

The Caracol Archaeological Project concluded its 30th consecutive field season in March 2014. While the site was noted as early as 1937, at the start of the Caracol Archaeological Project in 1985, Caracol was barely mentioned in literature dealing with Maya research; its archaeology, urban scale, and influence in the Maya region were largely unknown. In 2014, any comprehensive statement about the Classic Period in the Southern Maya lowlands includes reference to both the site and its impact. The longevity of the Caracol Archaeological Project is unusual for the Maya area and the contribution of the Caracol archaeological data to our understanding of the ancient Maya has been substantial. This paper presents an overview of the Caracol Archaeological Project and its results within the broader context of Maya archaeology. It shows how the additive long-term research at Caracol has permitted interpretations that would not be possible within a short time-frame. It demonstrates the significance of Caracol archaeological data on the field of Maya studies, including many of the once controversial interpretations that were derived from the site's archaeological data. With thirty continuous years of research at Caracol, it is appropriate both to look at the past retrospectively and to consider the collected data prospectively for what remains to be accomplished within the field of Maya studies.

Introduction

"... it's hard to reconstruct how a society fell if we can't even agree on what kind of society it was"
(Marcus 1983:477)

Maya archaeology as carried out in 2014 is somewhat different from Maya archaeology as carried out in 1983, the year in which we initially conceived of a long-term project at Caracol, Belize. Not only has our conceptualization of Caracol the site changed but so too has our perception about the nature of ancient Maya society. And, our own personal views about the ancient Maya have also evolved – as has the central place of Belize within changing interpretations of the field. In the late 1970s when we first conducted research in Belize, very few projects were actively excavating within the country. “British Honduras,” as Belize was then called, was viewed as being largely peripheral to the archaeology of the Maya heartland to its west.

When we formally initiated excavations at Caracol in the Spring of 1985, we brought with us a research design that incorporated a direct historic approach. We hoped to systematically move from the Historic Period back into earlier time periods. Both of us had undertaken active research on the Postclassic Period for our Ph.D. dissertations – at Tayasal, Guatemala and at Santa Rita Corozal, Belize. The archaeological investigations at both sites involved working

from the Historic Period back into the recent past to compare and contrast with the Postclassic Period material record. Our project at Santa Rita Corozal ran from 1979 through 1985 and was able to link the Historic Period Maya with their Postclassic material remains through the use of ethnohistory and archaeology. To most effectively move back in time to the Classic Period, we felt that we needed to work at a site that manifested its own historical record and to similarly use the material remains in conjunction with the hieroglyphic record to define linkages and patterns. Thus, archaeological work at Caracol was seen by us as being a logical next step in our understanding the ancient Maya.

Accordingly, in 1983 we began discussion with the Belize Department of Archaeology (now the IOA) about which site we would be the most appropriate for a long-term excavation project. Then archaeological commissioner Harriot Topsey brought us to Caracol, managing to drive all the way to the site epicenter in the early Fall of 1983, something we could not accomplish on our own for many years to come because of the condition of what was deemed to be a “road.” We would note, however, that, as we were leaving the site, Harriot paid a little too much attention to a rum bottle in the back of the Landrover and we ended up in a deep mud-hole, which we fought with for more than 4 hours before digging ourselves out. A second trip to Caracol with a young John Morris as our guide



Figure 1. Preliminary working visit to Caracol in January 1984: Mary Miller, Nancy Houston, Robert Schyberg, Stephen Houston, John Morris, Arlen Chase, and Diane Chase (from left to right).

was carried out in early January 1984 to undertake a brief reconnaissance and to secure new mapped data for a grant proposal (Figure 1). Our first field season at Caracol occurred a year later in January 1985, immediately followed by the last field season of the Corozal Postclassic Project in the Summer of 1985. Thus, the recently completed Spring 2014 represented our 30th consecutive season of excavation at Caracol.

The Ancient Maya through the lens of 1983

When we started at Caracol, there were major debates over how complex the ancient Maya were – debates that continue today. Positions in many of these debates were rooted in graduate training and archaeological heritage, something we colloquially referred to as the “Harvard” as opposed to the “Penn” traditions. The Harvard tradition was parodied (at least at Penn) as viewing the Maya as a two-level society of priests and peasants occupying sites that were still sometimes considered to be vacant ceremonial centers. The Penn (University of Pennsylvania) tradition characterized ancient Maya society as more nuanced and complex with the major sites viewed as fully occupied ancient cities. These different viewpoints were

enabled by a relative lack of collected archaeological data that could fully support or dispute either position and because of the research efforts and scholars situated at these two institutions.

In 1983 the social realm of the Maya was poorly understood. Not only were we arguing over whether or not the Maya were urban and had cities, but we were also debating whether stone palaces were actually used for residential purposes (Thompson 1950:8). We were unsure about how big a Maya site was or how a Maya site was organized. The relationships between the individuals on the stone monuments and the rest of the population were also not well understood. Whereas Thompson and his generation had seen the Maya as possibly governed by priests, the epigraphic breakthroughs of Proskouriakoff (1960, 1963, 1964) gave rise to ideas about dynasties and successive rulers who documented important events within their lives having to do with birth, accession, and the capture of captives through warfare. But, how many levels were believed to have existed in ancient Maya society not only depended on one’s background, but on interpretations of ethnohistory. Those with primary adherence to ethnohistory saw nobles and commoners (Marcus 1992), much like the then coeval European societies that existed at the time of contact. Those approaching the topic predominantly from excavation at larger sites suggested that the situation was more complex (D. Chase 1992).

In spite of attempts to determine ritual elements in the archaeological record (Marcus 1978), religion was considered to be one of the most difficult areas to address through the use of archaeological data (Hawkes 1954). Some scholars believed that Maya farmers and peasants engaged in a very basic form of ritual based on subsistence needs and that state-level institutional religion was restricted to the elite (Borhegyi 1956). Thompson (1970:163) suggested “that the ‘state’ religion of the ceremonial center had little appeal for the Maya peasant, whose interest lay in the simple agricultural ceremonies of his own small outlying community” revolving around “his own gods of the soil, of the hunt, and of the village under village prayer-makers – a purely folk

religion.” How widespread participation in institutional religion was in Maya society remained a matter of debate. Some scholars believed that the Maya had a general pantheon of gods like the Greeks and Romans (Taube 1992:7-9); others did not (Marcus 1978; Proskouriakoff 1980). However, once the existence of rulers was recognized in hieroglyphic texts, other scholars argued that religion was centered on a “cult of the king” (Freidel and Schele 1988). Ritual objects such as modeled ceramic incensarios were specifically linked to the celebration of ruling dynasties by some analysts (Rice 1999).

Defining the economic realm for the Classic Period proved exceedingly problematic in 1983. While there were early arguments for the presence of markets at Tikal (W. Coe 1967), their existence was not firmly demonstrated in the archaeological record. Thus, it was unclear how goods were distributed throughout Maya society; there was an assumption of self-sufficiency by the bulk of the population with only limited trade in necessary items (e.g., Rathje 1971). Non-local materials like obsidian were assumed to have been in the purview of the elite and not generally available to the general public. However, some researchers argued that obsidian may have functioned as currency (Freidel 1986, Freidel and Reilly 2010). While jadeite and spondylus were also mentioned as potential items of currency based on historic texts, at the same time there was an assumption that these “prestige items” were only available to the elite (e.g., Inomata 2001; Rice 1987). Polychrome ceramics – and specifically polychrome cylinders (Figure 2) – were believed to have been restricted to the elite with the concomitant assumption that they were not used by general Maya society (A. Chase 1985; Coggins 1975:499). To some extent the remnants of this model continue in the Maya area with the emphasis that some researchers place on status-based “gifting” (Callahan 2014; Foias 2013).

The nature of Maya subsistence systems was also evolving. While most agreed that slash-and-burn or milpa agriculture solely revolving around maize could not have supported the populations that were inferred for sites like Tikal (Harrison 1977:479, 484), the

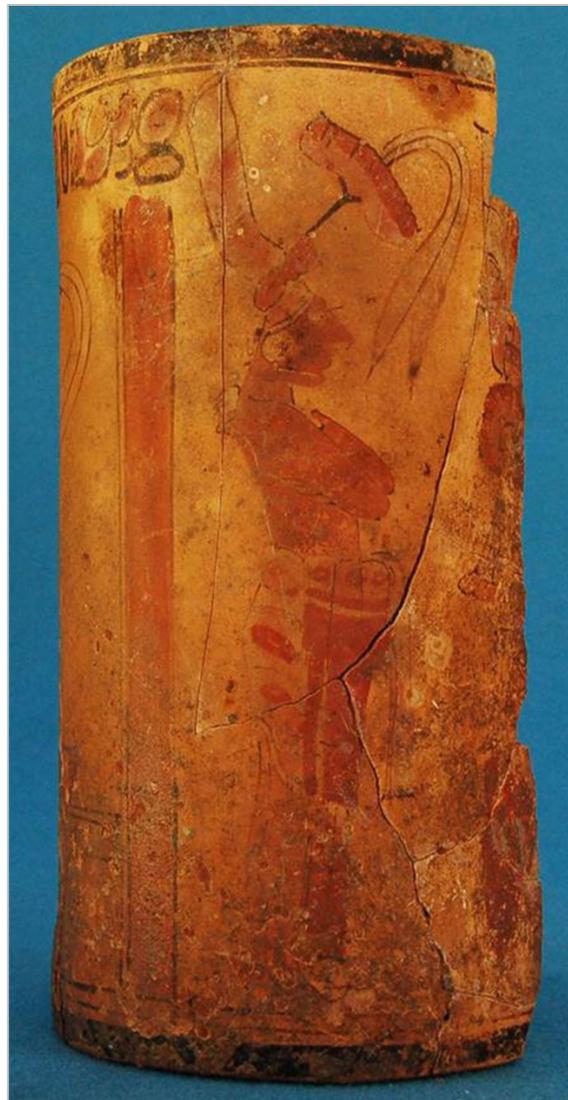


Figure 2. Polychrome figure cylinder recovered from a crypt interment in a Caracol residential group.

exact mechanisms that governed ancient Maya subsistence were unclear. Most Mayanists assumed that intensive agriculture and multi-cropping were employed to support the Classic Period Maya population (Harrison and Turner 1978). However, it was unclear to what extent individual centers were self-sufficient or whether agricultural products were differentially produced and traded. A broader argument raged over raised fields and whether these could be used to supply surplus bulk food at some distance from where it was produced (e.g., Drennan 1984). While agricultural terracing had long been noted, how widespread and extensive it was in some parts of the Maya area was not



Figure 3. Caracol Archaeological Project season photo for the 1989 field season.

fully recognized (e.g., Chase and Chase 1998; Chase et al. 2011; Turner 1983).

A full understanding of the ancient Maya political landscape was constrained by the limited mapping that had been undertaken. The number of sites mapped and the extent of mapping at individual sites was far less than today. While transects had been driven between Tikal and Uaxactun and Tikal and Yaxha, how these centers interacted with each other was difficult to define. Theissen polygons were applied in an attempt to determine how much area a given site controlled (Hammond 1974). Sites were ranked based on the presence or absence of ballcourts and other architectural features (e.g., Hammond 1975). Site hierarchies were built using the numbers of public plazas that existed (Adams and Jones 1981), even though these interpretations were skewed by a limited sample of incompletely mapped sites. Maya hieroglyphs provided additional information, but analyses suggested varied interpretations. One of the initial publications to tackle the subject used Maya hieroglyphic distributions of emblem glyphs to suggest the

existence of 4 primary centers that formed the major capitals for a broader Maya realm (Marcus 1976). Other researchers proposed that each emblem glyph represented its own capital and that the Maya region was dotted with over a hundred independent polities (Mathews 1991). Some investigators (Adams and Smith 1977) proffered the idea that the Maya area as organized into feudal domains with personal obligations binding various centers. Warfare was viewed as a ritual practice significant primarily for the upper levels of Maya society and not as having been carried out for territorial gain (Freidel 1986), a potential holdover from earlier views of a peaceful Maya focused on time and knowledge.

Finally, much Maya research focused either on the earliest Maya, following Hammond's (1977) discovery of Swasey levels in northern Belize or, alternatively, on issues related to the Maya collapse, following Culbert's (1973) masterful tome on the subject. The emphasis on early remains included efforts to encounter Archaic populations in northern Belize (MacNeish et al. 1980). This focus on

early populations led to greater recognition of the complexity involved in the development of Preclassic Maya society (Dahlin 1984; Hammond 1986). Like the interest in the earliest Maya, investigations and questions concerning the Maya collapse also continue today. But, in 1983, there were serious questions over: the temporal linkages between the Northern and Southern Lowlands (D. Chase and A. Chase 1982); the relationship between Classic and Postclassic populations and whether there was physical migration of people from the south to the north (Cowgill 1964); whether the Southern lowlands had been devastated by a marauding military force from elsewhere (Adams 1977); and, whether there had been environmental and political instability (Willey and Shimkin 1973). In short, the causes of the well-studied Maya collapse were even murkier than they are today.

Investigations at Caracol

From the very first seasons of work, investigations at Caracol have had an impact on how we view the Maya world. Our contextual approach, incorporating history and archaeology with large scale settlement study and a long-term excavation program (Figure 3) has sometimes led us to different and/or controversial interpretations of the past – some, but not all of which have, over time, become more mainstream. These include:

- Maya urbanism at Caracol (A. Chase and D. Chase 1996; A. Chase et al. 2011),
- recognition that tombs were not limited to the elite (A. Chase 1992; A. Chase and D. Chase 1992),
- documentation of the existence of prominent middle status levels rather than solely elites and commoners (A. Chase and D. Chase 1996; D. Chase and A. Chase 1992),
- identification of the built spaces as a model green city with sustainable agriculture, road systems, and markets (A. Chase 1998; A. Chase and D. Chase 1998, 2001; D. Chase and A. Chase 2014),
- acknowledgement of the utility of using ceramics and other material indicators to

identify co-existing status linked assemblages (A. Chase and D. Chase 2004),

- discovery that the success of the city was directly related to shared prosperity based in shared economic and ritual practice (A. Chase and D. Chase 2009; D. Chase and A. Chase 2004a),
- and, the recognition of the role of cyclical time in the deposition of caches and burials (A. Chase and D. Chase 2013; D. Chase and A. Chase 2004b, 2011).

Settlement work started with the initial visits to Caracol, but began in earnest in 1987 and maintained a series of phases and discoveries. The mapped extent of the settlement area grew over time as work continued. Initial efforts identified the extent of causeways through ground survey and the use of Landsat data (Chase and Chase 2001). Effort was spent documenting the density of household settlement throughout the site as well as the nature of built agricultural fields, first by studying sectors between causeways and then by expanding in block areas (Chase and Chase 1987, 2001, 2003; Jaeger 1994; Murtha 2009). We used funding from private donors and foundations (Ahau Foundation; Alphawood Foundation; FAMSI, Harry Frank Guggenheim, NSF). From these efforts we learned that the site grew in size and prosperity following a series of successful wars with the neighboring sites of Tikal and Naranjo that were described in the hieroglyphic record. By 2001, the epicentral portions of Caracol had been largely stabilized (Figure 4) both by our own efforts and by the efforts of the Belizean Tourism Development Project; 23 square kilometers of Caracol also had been mapped with causeways and settlement noted as extending up to 10 km from the site epicenter (A. Chase and D. Chase 2001).

The documented scale of Caracol's settlement drastically changed in 2009 with the advent of LiDAR (Chase et al. 2011, 2014). Two different LiDAR campaigns made clear the continuity of settlement within an area of over 200 sq km. This work definitively established the enormity of the ancient landscape modification efforts - road systems, agricultural



Figure 4. Caana, or “Sky Place,” the tallest ancient Maya construction in Belize and the epicentral palace complex comprising the center of urban Caracol.



Figure 5. Excavations being undertaken in a typical Caracol residential group.

terracing, reservoirs, household plazuela units, and civic-ceremonial space.

Excavations conjoined the settlement survey efforts (Figure 5) and documented the changing nature of social, ritual, and economic relationships among the various parts of the site over time that, combined with hieroglyphic texts, provided a nuanced picture of the ancient landscape and people. Early on it became evident that household specialization in production was taking place (Pope 1994); later, it became clear that households were producing items independently of elite control but exchanging materials within elite constructed and likely administered market locations (D. Chase and A. Chase 2014). Shared identity and prosperity - as marked by household tombs, caches, and the presence of external trade items - marked the height of site population during the



Figure 6. A royal tomb from within Caracol Structure B20 that dates to A.D. 537 and likely contains the remains of an important Maya woman.

Late Classic Period (D. Chase and A. Chase 2004a). Limited elite-dominated prosperity characterized both earliest and latest remains at the site (A. Chase and D. Chase 2009).

Not only were tombs associated with non-elite households, but multiple individual interments characterized all status levels (D. Chase and A. Chase 1996), and the remains of women were found prominently located in royal chambers (Figure 6). Careful study of the contexts of burials and caches ultimately showed that these deposits were generally placed in concert with key temporal transitions - such as katuns - rather than to commemorate the construction of buildings per se or the death of a specific individual (D. Chase and A. Chase 2011). Also, as was the case in Postclassic Period Santa Rita Corozal (D. Chase and A. Chase 2008), incense burners were often found paired, potentially reflecting calendric ritual (A.

Chase and D. Chase 2013). Building complexes themselves were sometimes temporally focused as well - as was the case of eastern structure of the A plaza E Group - where the major building and caching efforts (Figure 7) coincided with the onset of the 8th baktun (Chase and Chase 2013).

Our current efforts are focused on analyzing expanded LiDAR data which has already revealed new settlement and causeways and helped suggest an initial economic driver for the site. Our recent investigations have also been localized to provide more detail on the similarity and variations evident "neighborhoods" at the site in order to better understand the integration of the ancient city and polity as a whole.

The Ancient Maya Through the Lens of Caracol in 2014

If one looks at the field of Maya archaeology in 2014, one would discover that there have been some significant changes in our understanding of the social realm of the Maya. Hieroglyphs have now yielded a series of titles that were applied to individuals other than the ruler (e.g., Biro 2012; Jackson 2013), indicating a diversity of social levels within Classic Maya society. While initially thought to have been relevant to a European-style "royal" court (Inomata and Houston 2000), the archaeological data that have been collected indicate that these diverse social levels likely permeated the entire society. We now recognize that Classic Maya were organized in different ways throughout the Southern and Northern Lowlands; there was no single social and political organization, just as there was no single Maya language (e.g., Chase and Scarborough 2014). Some sites are small and independent. Some sites are small and focused on resource production, dependent on other larger centers (e.g. Colha; Shafer and Hester 1986). We now know that some of the larger Maya sites, like Caracol are consistent with a tropical phenomenon known for other early low-density cities (A. Chase et al. 2011, 2014; Fletcher 2009).

Institutional religion can also be recognized as penetrating all levels of Maya society. Commoners were just as likely to be engaged in religious practice related to ancestor worship and cyclical time as elites. Again,



Figure 7. The interior of a cache placed within a geode deep in the core of Structure A6-1st.

exactly what was practiced varies by region and even site. Temporally-based ceremonies clearly formed an important part of religion. The focus on the celebration of temporal cycles can be seen in the archaeological records of both the Classic and Postclassic Periods (D. Chase and A. Chase 2009). From the standpoint of Caracol, the focus on time by the ancient Maya can be seen in the A Group buildings (A. Chase and D. Chase 2006) and in the archaeological record of the site's residential groups where the ancient Maya placed special ceramic containers (Figure 8) associated with rituals having to do with 20-year katun counts (A. Chase and D. Chase 2013).

Some of the biggest changes in our perception of Maya society have occurred in the economic realm. We have moved from seeing the ancient Maya through a Polyani-style lens (Feinman and Garraty 2010) to a recognition of the complexity of their systems and their reliance on markets (D. Chase and A. Chase



Figure 8. A typical face cache from a Caracol residential group; these caches were deposited in various residential groups in association with katun ceremonies.

2014; Dahlin et al. 2007, 2010). We also have recognized that this complexity extended to their subsistence base, not only in terms of the wide variety of crops that they cultivated but also in terms of the extent to which they modified their landscape. No longer do we view their agricultural terracing as crude attempts at soil retention; rather, we recognize that these features were actually engineered so as to control the flow of water over the landscape (A.S.Z. Chase, personal communication, 2013). The extent of environmental modification by the Maya in support of basic subsistence needs is truly impressive.

Our political models for the ancient Maya have also changed – and are in the process of being transformed again. Over the past 30 years the field has been dominated by epigraphic paradigms that portrayed the Maya in terms of familial dynasties ruled by divine kings with little infrastructural support and control (e.g., Martin and Grube 2000). Archaeological data have begun to modify this view. Maya polities were initially viewed as secondary developments based on direct intervention from Teotihuacan (Sanders and Price 1967; Stuart 2000). The

archaeology now shows that the Maya maintained trade relationships throughout Mesoamerica that included Teotihuacan far earlier, and probably more impactfully, than the hieroglyphic story indicates (A. Chase and D. Chase 2011). Warfare is recognized as having been for political, economic, and territorial control, bringing the Maya into line with other civilizations (Webster 2000). Short-lived empires that combined more than one state are also indicated in the hieroglyphic record. Importantly, the archaeological record also signals that the all-powerful divine king may not have been politically important at some sites during the Late Classic Period (A. Chase et al. 2009), indicating that alternative forms of governance existed for some Maya groups.

Finally, the Classic Maya collapse still remains a topic of investigation, although again the complexity of the social and political situations in the Maya lowlands are recognized as being complicit in what is also now recognized as being a transitional era (Turner and Sabloff 2012). While drought and other environmental factors are pointed to in the popular literature (Diamond 2005), the archaeologically researched questions for the collapse are now focused on the process involved in this transition and not on a single impact point.

Conclusion

As in many disciplines, Maya archaeology has gone through growing pains over the last 3 decades in the search for knowledge and elusive “truth.” Various models and paradigms have been tried by various researchers and, while perhaps not always successful *in toto*, parts of each have become incorporated into our current worldviews. This interplay between archaeological data and broader interpretive theory has a helical motion in which views shift back and forth, often with some turmoil, but always with progress. We have immersed ourselves in research at a single Maya site for the past 30 years, trying to define and operationalize strategies to be tested in the archaeological record in order to answer broad questions and help to move our discipline forward. We would hope that our meager efforts on the part of this once great city have been

successful and that the archaeology of Caracol, the “3 Stone Place,” slowly gathered over some 3 decades have helped to advance an overall understanding of the ancient Maya.

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2 ***THE DOMESTIC ECONOMY OF CARACOL, BELIZE: ARTICULATING WITH THE INSTITUTIONAL ECONOMY IN AN ANCIENT MAYA URBAN SETTING***

Arlen F. Chase and Diane Z. Chase

Ancient Maya households at Caracol were both linked to elaborate trade networks and were largely self-sufficient during the Late Classic Period (C.E. 550-790). The inhabitants of the site's plazuela groups were able to produce products and food stuffs that could be marketed and traded for other needed household and ritual items. The archaeology makes it clear that a wide variety of manufactured items and materials were available to Caracol's residential units and that the inhabitants of these living areas shared in the general prosperity of the site during the Late Classic Period. These residential groups were further embedded in a site-wide system of agricultural terraces that enabled the residents to grow various crops in close proximity to their households, possibly even multi-cropping on the enriched local soils. Each household group also appears to have focused on one or more different kinds of craft production that was beyond the needs of their own unit. The resulting crafts were used in trade for other items available at Caracol's markets. The domestic economy of Caracol's Late Classic residential groups provided the tools for a high standard of living that was likely fostered through purposeful administrative policy. Changes to Caracol's domestic economy in the Terminal Classic Period (C.E. 790-900), resulting from a changed political order, signaled the collapse of a successful system that had functioned well for over 250 years.

Introduction

Past discussions over the nature of ancient Maya economies have been fraught with disagreements over their level of complexity. For a variety of reasons, many scholars viewed ancient Maya economies as being relatively weak (Demarest 2004:24). However, with increased archaeological work that focused on recognizing past economic systems in the archaeological record (Chase 1998; Hirth 1998; Masson and Freidel 2002) and with additional theoretical sophistication in the field of archaeology at large (e.g., Smith 2004:76; Feinman and Garraty 2010), the complexity involved in ancient state economies like those of the ancient Maya are now being realized (D. Chase and A. Chase 2014a; Masson and Freidel 2012). Markets and commercialized behaviors, once only inferred (Coe 1967; Fry and Cox 1974), now are viewed as having existed at many ancient Maya sites (Dahlin et al. 2010; Shaw 2012) and we are beginning to reconstruct ancient production and distribution patterns through the analysis of specific artifact classes (e.g., obsidian: Golitko et al. 2012) as well as through spatial analysis and artifactual distributions (A. Chase and D. Chase 2012; D. Chase and A. Chase 2014a; see also Fry and Cox 1974).

The archaeology clearly demonstrates that the household was “the primary unit of

production, consumption, and reproduction” (Smith 2004:85) and was key to Maya domestic economy. The domestic economy may be viewed in contrast to the more formalized “institutional economy” in which people and superstructure come together to form a market. According to Hirth (lecture January 2013 Chicago), the “domestic economy” consists of land, labor, and capital that is accessed through non-market means. This builds upon an 1862 *Scientific American* article that defined the domestic economy as “how to live well and comfortably, and yet cheaply...”- thus focusing the topic largely on comestibles and their acquisition.

There are, however, very real questions over what constitutes the domestic economy. Earle (2002; Johnson and Earle 2000:22-27) contrasted the “domestic economy” with the “political economy,” something that Michael Smith (2004:78) suggests “only causes confusion” in any consideration of ancient economics. The QFinance Online Dictionary defines domestic economy as “the production, consumption, and distribution of wealth within a specific country.” This materialist definition is adaptable for archaeological inspection, especially as the distribution of “wealth” can be inferred from Maya household archaeology. Hirth’s distinction between market and non-market is also useful in terms of the analyzing

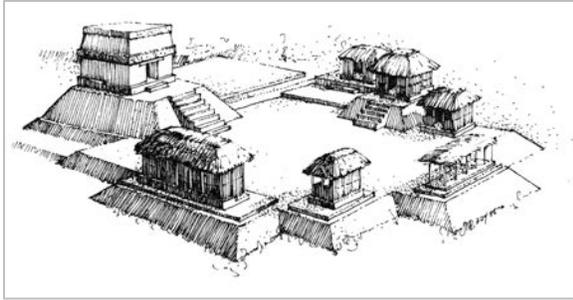


Figure 1. Reconstruction drawing of the Monterey residential group at Caracol (by Joseph Ballay for the Caracol Archaeological Project; after A. Chase and D. Chase 1996:96).

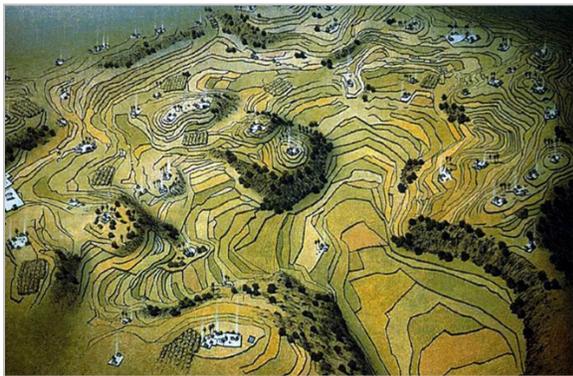


Figure 2. Reconstruction painting of the agricultural terracing and settlement in the vicinity of the Monterey residential group (by Terry Rutledge and David Morgan for the Caracol Archaeological Project; after A. Chase and D. Chase 1996:96).

ancient Maya economics at Caracol. Caracol's markets were part of the formalized institutional economy through which the site's elite controlled the distribution of quotidian, ritual, and prestige goods. Yet, at the same time, individual households could exchange their products in these venues for needed household items; given comparable Mesoamerican models, they were likely taxed in some way by the site bureaucracy (contra Foias 2013) for either goods transferred or for the use of the space itself.

Caracol's Domestic Economy

Because of 30 years of active research at the site of Caracol and the investigation of both the superstructure of the urban environment as well as the site's residential groups (A. Chase and D. Chase 2014; D. Chase and A. Chase 2002), we are in an advantageous position to examine exactly what constituted the site's domestic economy. It is possible to position

each residential unit (Figure 1) in terms of subsistence and diet, in terms of the consumption of items that were introduced into the residential groups, and in terms of craft production by residents in the groups. It is also possible to relate the domestic economy to the institutional economy.

The growth of the ancient city of Caracol was accompanied by an infrastructure that increased in complexity (D. Chase and A. Chase 2014b). As the city's residential groups grew in number and density and as the continually constructed and maintained terraced agricultural fields infilled the landscape, it became imperative that a broad distribution system be developed for Caracol's landscape to facilitate the access of the city's residents to administrative services and economic distribution locales. By the early part of the Late Classic Period, the framework for this superstructure had been established through the construction of public plazas throughout the site that formed the nodes for governance and commerce (A. Chase and D. Chase 2001; D. Chase and A. Chase 2014a). The system expanded throughout the Late Classic Period until political change in the Terminal Classic Period resulted in the exclusion of many residential groups from commercial access to ritual and imported goods (something they had previously enjoyed).

To better understand Caracol's domestic economy we will briefly review several of its component parts: subsistence; commerce and industry; garbage; and, exports and surplus.

Subsistence

Over time most of the landscape of metropolitan Caracol became covered with carefully constructed agricultural terracing (A. Chase and D. Chase 1998; A. Chase et al. 2014: fig. 6). Initially, agricultural terracing was built in the fertile valley bottoms between the many karst hills of the site; as population increased and as demand for agricultural products increased over time, however, the slopes of most hills within central Caracol became covered with constructed terracing (Figure 2); ultimately, as population pressure continued over time, areas further from the site center were placed into agricultural service. While initially probably

used for out-field, extensive agriculture, these areas were eventually converted through the construction of agricultural terraces into spatially regulated areas for more intensive cultivation. Yet, each residential group at Caracol had access to land for agricultural purposes and most of these agricultural fields were immediately adjacent to the residential households.

A strong case can be made that each family unit was self-sufficient in terms of its basic subsistence needs with each residential group having sufficient field space in which to grow crops. Each household controlled approximately 2.2 hectares of in-field land in the immediate vicinity of the residential unit (A. Chase and D. Chase 2014; D. Chase and A. Chase 2004). This in-field agricultural area was usually filled with agricultural terracing and should have been able to produce more than the necessary food for a normal family, especially in combination with out-field agriculture. This household field area is consistent with agricultural-to-household ratios found elsewhere in the Maya area. For the Rio Bec zone of Mexico, Lemonnier and Vanniere (2013:409) note that most residential units controlled between 0.25 and 2.5 hectares of land directly adjacent to these households, seeing this as providing sufficient agricultural support for the dependent families; only elite households controlled more adjacent in-field land, ranging from 2 to 4 hectares. Multi-cropping on the Caracol's agricultural terraces, combined with the use of night-soil, would have further augmented the productivity of these terraces. In addition to the plots of land directly associated with the residential groups, out-field extensive agriculture was likely undertaken. Certainly, by the Late Classic Period areas well beyond the urban limits of the site must have been exploited for kindling and firewood as well as for thatch and game. Caracol's road system would have facilitated the rapid movement of such resources.

With the growth of population through the Late Classic Period, there was increased need to both maintain and expand terraced agricultural fields to augment their productivity (Murtha 2009), leading to a situation of agricultural involution (Geertz 1963). Intensive labor, craft

specialization, and the conversion of new land to terraced fields may have led to the availability of surplus agricultural products that could be tithed or traded to other residential units. Contra Dahlin's (Dahlin et al. 2007) model of ancient Maya markets as resembling modern ones in Guatemala, we suspect that internal metropolitan trade in basic agricultural and food products was probably very limited, especially as each family had the ability to derive the majority of their food from their own subsistence labor.

Commerce and Industry

Commerce was the mechanism by which the Maya residential groups at Caracol were able to obtain products that they did not physically manufacture. These products included both quotidian items employed in everyday subsistence uses and wealth items that could be used for ritual or to express social prestige. Industry was the mechanism through which the people in Caracol's residential groups were able to manufacture items that they could then use to obtain both quotidian and wealth items. Almost all of Caracol's residential groups engaged in some version of industry (D. Chase and A. Chase 2004, 2014a; Pope 1994; Martindale Johnson 2014). Ken Hirth (2009:23) has characterized household craft production of the kind being discussed here as being subsumed within some version of either intermittent crafting or multi-crafting.

Based on the lack of evidence for the manufacture of pottery within the spatial limits of Caracol, the pottery that was being used by the residential groups was most likely being manufactured outside the city and imported into the site. Elements found in the pastes of many of Caracol's ceramic vessels support this assessment. Both quotidian vessels and more elaborate service wares show evidence of not only being imported from some distance but also in relatively large numbers. Specifically, the Late Classic pottery type Belize Red populated the serving vessels at most of Caracol's residential groups and was likely manufactured over 60 km away in the Belize Valley (A. Chase and D. Chase 2012). Other pottery finewares, many presumably deriving from the Peten of Guatemala - or further afield - were similarly made available to these households. Domestic

cooking and storage pottery was also presumably manufactured at some distance from the site. Pottery production requires appropriate clays and usually abundant water, both of which are in short supply in the vicinity of Caracol. Pottery also needs to be fired and the firing of pottery vessels was traditionally done on the outskirts of communities by ceramic producers in traditional communities (Reina and Hill 1978). Thus, it is likely that almost all of the abundant pottery found at Caracol had an origin external to the city, implying inter-regional trade as well as the need for both easy access and ready availability of these items for the city's inhabitants.

Researchers at Tikal could identify a central market in the East Plaza area of the epicenter (W. Coe 1967:73), but they could not locate any regional distribution centers on the ground - even though they were sure they existed (e.g., Fry and Cox 1974). As Fry (1979:510) noted in 1979: "The study of serving vessel exchange at Tikal supports the position that ceramic exchange was primarily channeled through a complex marketing system, with both a central market and regional exchange centers." In an earlier publication, we identified the minor centers of Bobal, Chikin Tikal, Mixta Xuc, and Tinal - all located in the Tikal landscape - as likely being part of the regional market system for the site (A. Chase and D. Chase 2003:114). Thus, the situation at Tikal was very similar to that at Caracol except that at Caracol we can literally see the regional exchange system on the ground because of the site's causeways. Pottery came into both sites from specialized producers who would have been located at a distance from those centers.

Apart from ceramics, many other products were manufactured within Caracol's residential groups. For some of these industries we have direct evidence of their existence in the archaeological record in the form of final products and for others we have only indirect evidence in the tools used to produce them and resultant debris. Chert appears in every household at Caracol that has been excavated (Figure 3) - and obsidian is almost as ubiquitous (D. Chase and A. Chase 2014a; Martindale Johnson 2016). At least 8 households engaged in the intensive production of specialized chert



Figure 3. Lithic debris recovered from a Caracol residential group, representative of craft production.

tools and another 9 households would probably yield similar evidence with more intensive excavation. And, the presence of large numbers of chert drills in many other households is representative of both shell and wood working (Martindale 2014; Pope 1994). Bone was worked in at least 10 residential groups at Caracol (Figure 4) and at least three households produced prodigious amounts of conch shell artifacts (Cobos 1994). The distribution of stone spindle whorls (Figure 5) and bone needles at the site suggests that at least 20% of Caracol's residential groups were engaged in some kind of textile work (A. Chase et al. 2007). Limestone bars (Figure 6) are found widely distributed at the site were utilized both for ritual purposes and probably as spacers for making net bags out of perishable fibers and plants (A. Chase et al. 2007).

Thus, while the majority of Caracol's residential groups were clearly involved in the production of basic subsistence items, most also



Figure 4. Deer bone debris recovered from a Caracol residential group, representative of craft production.

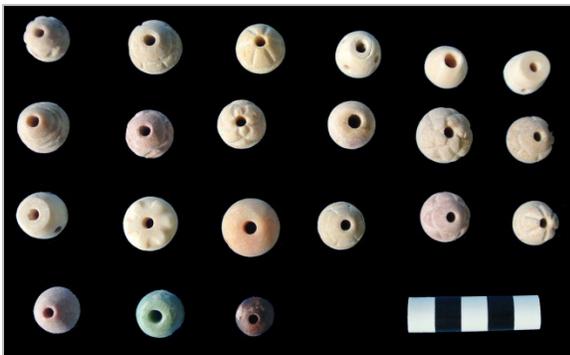


Figure 5. Stone spindle whorls, including one of hematite and one of jadeite, recovered as a unit in a Caracol residential group, representative of textile production.

engaged in production that focused on one specific artifact or industry – and some households engaged in multiple industries. Surplus crafting was how the various residential groups could gain access to imported ceramics, imported ground stone objects, and other items that were necessary for the household. Thus, Caracol’s domestic economy was focused both on agricultural self-sufficiency and indirectly on commercialization.

Garbage

Trash deposition also formed a part of the ancient Maya domestic economy. Although some contrary archaeological data exists (Freidel and Scarborough 1982:148), standard archaeological belief in the Maya area has traditionally associated garbage as having been located directly off living platforms (Fry 1969, Haviland 1963; Johnson and Gonlin 1998:161;



Figure 6. Typical limestone bars recovered from a Caracol residential group, used in both ancient household ritual as well as for spacers in fiber bag production.

Puleston 1973); elsewhere in Mesoamerica, refuse disposal is similarly seen as being concentrically located about the residential compound except in urban situations (Santley and Kneebone 1993:45-46). We specifically tested more than a dozen residential groups at Caracol to see if such “midden” materials were deposited behind buildings and platforms. While we found limited examples of single-deposition “sheet refuse” (Schiffer 1996) on floors associated with structures that were awaiting collection and redeposition as well as the usual collapsed and washed-out construction fill material, we did not find evidence that the ancient Maya at Caracol dumped their garbage at the edges of their households. Rather, garbage appears to have been useful fill material that was continually recycled at the site and used for construction projects and for landscape

infilling. Garbage did not build up around the residential groups.

The residues of crafting activities were similarly recycled and are therefore sometimes difficult to locate in the archaeological record. Crafting residues were usually not piled up in or around an occupied residential group. Rather, the resultant debris was redeposited by the ancient Maya into construction fills and, sometimes, special deposits (see also Martindale Johnson 2014 and Moholy-Nagy 1997). Debris from jadeite and spondylus working was usually incorporated into a thin layer within the bottoms of many caches, indicating its ritual value; previously, we have referred to these residues colloquially as “cache dirt.” Similarly, obsidian crafting debris was often deposited over tombs and sometimes as cache material (A. Chase and D. Chase 1987; Martindale 2016). Debris resultant from shell-working and from lithic crafting was often placed within the cores of platforms and buildings, being purposefully buried within new or ongoing construction efforts (Cobos 1994; Martindale Johnson 2014). Further, some products were perishable, meaning that only the tools used to create these products remain in the archaeological record. Thus, the products of crafting activities – even if created in a given residential group – are often difficult, if not impossible to discern from surface remains or even from surface horizontal clearing. That crafting activity has been recovered at Caracol is a matter of luck in sampling strategies relative to residential groups. This strongly suggests that the amount of craft production inferred for a complex situation like Caracol is proportional to the amount of intensive excavation that is undertaken at a given site.

Exports and Surplus

The domestic economy of the ancient Maya could also have involved the production of surplus crafts and subsistence items beyond those that would have supported the immediate commercial needs of a given household. Large households would have commanded the labor to have been able to grow excess crops and to produce surplus crafts. How far afield such items would have been able to go is a relatively open question. There is substantial debate over

the distance that subsistence crops could have been traded (Dahlin and Chase 2014). While the bajo systems of the northern Peten were likely conducive to the long-distance transport of bulk items and other goods by canoes at certain times of year, Caracol transportation would have been by foot. Because Caracol is land-locked without access to nearby water routes, it is unlikely that perishable organics would have been traded – or carried – very far. Yet, there is evidence that live sea fish reached the site (Cunningham-Smith et al. 2014), so it is also probable that other perishable resources – crops and animals – were also similarly imported, presumably some with great effort being expended. Non-perishable items, however, such as the smaller commercial items that were being manufactured in the households, would have been easier to transport. Some non-organic items could have entered into long-distance trade networks. However, the mechanisms and processes behind this level of commercialization are not known beyond speculation.

Implications for the Development of Caracol

As the population of Caracol increased over the course of the Classic Period, the economy of the city became more structured. Caracol solved the site’s accessibility problems through the construction of a dendritic road system that stretched ever greater distances into the surrounding settlement (A. Chase et al. 2014b). In conjunction with these roads, large plazas were also established that served both administrative and economic functions either along or at the ends of the roads. These plazas were fairly evenly distributed throughout the landscape and would have served as points for commercial trade as well as for the distribution of items that were made outside of Caracol (D. Chase and A. Chase 2014a). The way in which all goods and traffic flowed into the epicenter also was reflective of the central organization of the system. What this implies is that the site’s economy was not only structured but also highly managed.

The archaeology has provided data on how the superstructure was established over time and in what order. The earliest connection appears to have been the construction of the roads connecting Caracol proper with Cahal

Pichik and Hatzcap Ceel. It is suspected that Ceiba and Retiro were next added to the system. Following the successful warfare with Tikal in A.D. 562, three new plazas were then embedded in the landscape at a distance of roughly 3 km from the epicenter, purposefully excluding some previously elite families from this system of accessibility and possibly establishing other families in control of the market locales. In the late Late Classic Period, the roads were expanded even further into the landscape, probably in an attempt to obtain wood and other forest resources as well as gain new areas for out-field agriculture. Each expansion was also accompanied by the infilling of the landscape with residential groups and with terraced agricultural fields, meaning that Caracol's households were literally locked into this economic system and completely reliant on both the institutional economy of the city and their own domestic economies.

In the Terminal Classic Period, the long-established economic system appears to have been purposefully dismantled by the site's elite, who apparently emphasized the increasing social distance between themselves and the rest of Caracol's population (A. Chase and D. Chase 2004). No longer were all ritual and prestige goods available to all of the inhabitants of the site. While the domestic economies of Caracol's residential groups may have been left largely intact, the institutional economy was severely modified, likely leading to discontent among the population and the inability to obtain some of the traditionally commercialized items. More than environment and climate, we see these social changes as among the primary reasons for the eventual abandonment of Caracol.

Conclusion

It is only recently that Maya archaeology has gained a relatively realistic view of Classic Period economic situations. Part of this is because of the increase in archaeological data and part of this is because of the rejection of inappropriate economic models and theory. It is clear that the domestic economy of the ancient Maya at Caracol played a major role in the way that their society was structured. Archaeological data from other Classic Period sites also make it evident that not all Maya societies were

similarly structured and that different governing models were pursued in different parts of the ancient Maya world. However, Classic Period Caracol appears to have had more economic accessibility than other centers. The infrastructure provided to both the institutional and the domestic economy at Caracol provided a long-term foundation for the city's stable and continual development. Yet, when traditional economic expectations were modified late in Caracol's history, the fate of the city was sealed by this broken domestic contract.

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3 *SHOPPING FOR HOUSEHOLD GOODS AT THE BUENAVISTA DEL CAYO MARKETPLACE*

Bernadette Cap, Meaghan Peuramaki-Brown, and Jason Yaeger

Classic Maya civilization was characterized by a complex economy in which exchanges at centralized marketplaces were one way that people obtained the goods they needed and wanted, both for daily activities and less frequent events and practices. Archaeologists often infer marketplace exchange indirectly using a distributional approach that examines the degree of homogeneity in the consumption of utilitarian goods among households of differing statuses. Less frequently, scholars have studied marketplace venues themselves. In this paper, we present data from both a marketplace and consuming households to reconstruct the economies centered at the site of Buenavista del Cayo. We present evidence that indicates marketplace exchange, including household consumption and production practices, and identification of a marketplace venue. Based on these analyses, we propose that Buenavista householders obtained local and non-local domestic goods such as chert and limestone bifaces, obsidian blades, and organic goods through marketplace exchange, while other goods, in particular polychrome painted pottery, circulated through vertical exchange systems such as gifting. These findings demonstrate a complex economic network of a Classic Maya polity.

Introduction

How did Classic Maya householders obtain the goods they consumed? To what degree were they self-sufficient? What was the nature of extra-household exchange among the Classic Maya? Twenty years ago, in answer to these questions, Daniel Potter and Eleanor King (1995:29) suggested that the domestic economy was “self-ordering and *self-triggering*” (emphasis original). While acknowledging that the exchange of utilitarian goods—i.e., the bulk of the goods consumed—was poorly understood, they suggested utilitarian exchange might have been focused around kin groups (see also Sanders 1989). Since their paper, Mayanists have developed a more detailed understanding of household economies in part due to growth in Maya household archaeology, particularly over the past two decades (e.g., Blackmore 2008; Cook 1997; Gonlin 1993; Hoggarth 2012; Hutson 2010; Jaeger 1991; Kovacevich 2006; Levi 1993; Lohse and Valdez 2004; Masson and Freidel 2012; Peuramaki-Brown 2012; Robin 1999; Sheets 2000; Wilk and Ashmore 1988; Willey et al. 1965; Yaeger 2000). In addition, an important breakthrough for analyzing household data was Kenneth Hirth’s (1998, 2009) distributional approach, which infers exchange mechanisms (such as market exchange) from household consumption patterns across status groups, conducted in combination with analysis of household production practices (Feinman and Nicholas 2010; Garraty and Stark 2010). This new approach allows us to discuss

in greater detail the degree of household self-sufficiency and the organization of extra-household exchange.

Hirth’s (1998, 2009) distributional approach emphasized the identification of marketplace exchange, which is evidenced by a high degree of homogeneity in the types of goods consumed by households across economic and social statuses, due primarily to household purchasing power. Where marketplace exchange is practiced, specialized production of goods exchanged through a marketplace is expected (Feinman and Nicholas 2010; Garraty and Stark 2010). In comparison, reciprocal exchange, centralized redistribution, or itinerant peddling are more likely to produce heterogeneous consumption patterns that are due to differences in household social status and social networks (Hirth 1998), and significant redundancy in household production of goods is expected (Feinman and Nicholas 2010).

Maya scholars have applied the distributional approach to household assemblages at several sites, such as Actuncan (Garcia 2008), Ceren (Sheets 2000), Caracol (Chase and Chase 2014), Motul de San José (Halperin et al. 2009), and Tikal (Masson and Freidel 2012), and have found household consumption and production patterns indicative of marketplace exchange of ceramic vessels and figurines, obsidian blades, marine shell, and possibly even jade. These findings are significant because, in contrast to the perspective offered by Potter and King on the domestic

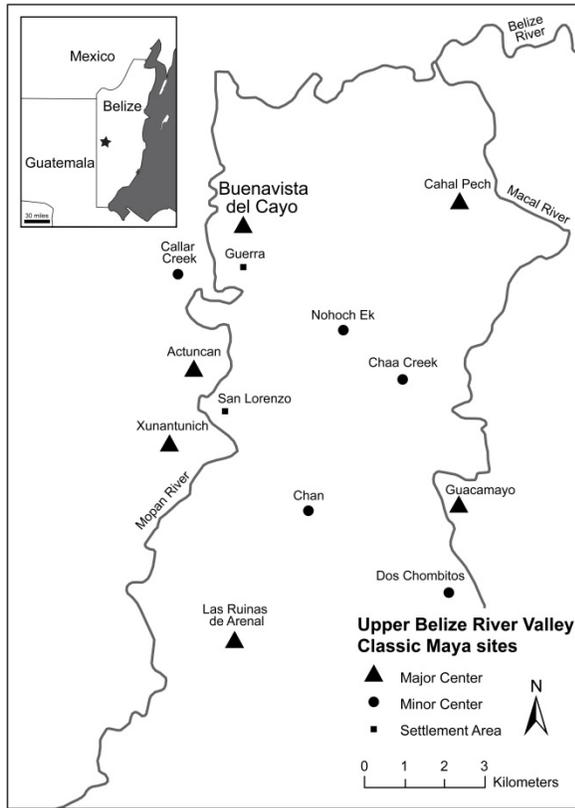


Figure 1. Location of Buenavista del Cayo in the upper Belize River valley.

economy (1995; see also Sanders 1989), they suggest that the exchange and production of household goods was highly organized, likely involved exchange among non-kin members, and required marketplace administrators of the exchange network.

Because the distributional approach focuses on the identification of marketplace exchange indirectly, it does not require identifying the physical marketplace itself; however, the identification of such locales is important because they provide more robust evidence for marketplace exchange, and directly identify some of the goods exchanged in the marketplace. Establishing the location of marketplaces is also important in order to build inferences about why they were created and who might have been the primary participants and organizers.

Due to the lack of direct and uncontested evidence of marketplaces from the Classic Maya textual or pictorial corpus, Mayanists have relied on archaeological investigation to identify physical marketplaces at sites such as

Chunchucmil (Dahlin et al. 2010), El Ceibal (Bair 2010), Ma'ax Na (Shaw 2012), Sayil (Wurtzburg 1991), and Xunantunich (Keller 2006). At each of these sites, the posited marketplace is located in a plaza in the center of the site, which would suggest that elites played some kind of role in the marketplace exchange network (Cap 2015). Excavations were conducted at most of these posited marketplaces, but typically involved limited shovel or test pitting, with the notable exception of Chunchucmil where over 300 m² was excavated (Dahlin et al. 2010). Consequently, arguments that these plazas were in fact marketplaces are based on few lines of empirical evidence, which leaves them open to dispute (Cap 2012, 2015; Feinman and Garraty 2010). Nevertheless, these studies provide information regarding the potential characteristics of Maya marketplaces, such as the activities that occurred within, including chert biface and obsidian blade manufacture (Keller 2006; Shaw 2012), and the arrangement of vendor areas, as evidenced by stone structures and linear soil chemical signatures (Bair 2010; Dahlin et al. 2010; Wurtzburg 1991).

In this paper, we argue that the study of domestic economies requires a multiscalar approach that combines information about household consumption and production and data from exchange venues, such as marketplaces. Our case study is Classic-period Buenavista del Cayo, where we have excavated a number of residential groups surrounding the epicenter (Peuramaki-Brown 2012) and the site's East Plaza, interpreted as a marketplace (Cap 2015). Our combined research provides evidence to suggest that marketplace exchange and gifting were two important types of economic practices conducted at the site during the Late Classic period.

Research at Buenavista del Cayo

Buenavista del Cayo is located in the upper Belize River valley (UBRV) along the eastern bank of the Mopan River (Figure 1). The site was occupied as early as the Middle Preclassic (c. 950-650 BC) and as late as the Terminal Classic (c. AD 800-950), and it was a major center in the Early and Late Classic periods (c. AD 250-800), the time periods on

which we focus this study (Ball and Taschek 2004; Peuramaki-Brown 2012). During this time, the site core covered an area of approximately 0.18 km² and settlement densities in survey zones within 500 m of the site core ranged from 32 to 124 structures/km² (Yaeger et al. 2011).

Household research at Buenavista del Cayo began with the Mopan-Macal Triangle (MMT) Project, directed by Joseph Ball and Jennifer Taschek in the 1980s (Ball and Taschek 1991, 2004). Among other zones, MMT investigated the Guerra settlement located roughly 1 km from the site core (Blankenship-Sefczek 2011; Taschek and Ball 1986; Tritt 1997) (Figure 2), residences in the site core (Clowery 2005; Gilmer 1999; Lumsden 1994; Sandoval 2008; Tritt 1997), and the site's East Plaza (Rieth 2003). In 2007, the Mopan Valley Archaeology Project (MVAP), directed by Jason Yaeger, began research at Buenavista in order to understand the political dynamics of major centers in the UBRV and their interrelationships with the social and economic organization of hinterland households and communities (Yaeger 2007). As part of MVAP, Meaghan Peuramaki-Brown (2012) investigated two settlement clusters immediately south of the site core in the Buenavista South (BVS) settlement zone (Figure 2). She focused her investigations on one settlement cluster of 15 groups, testing 22 structures and conducting extensive excavations of 10 structures in 5 groups¹. Because MMT and MVAP have investigated only a small number of the residential units in Buenavista's hinterland, we do not yet possess a representative sample of households that would permit a formal analysis using the distributional approach; however, it does allow us to offer preliminary interpretations of household economic practices that can be tested with further research.

As part of MVAP's investigations in Buenavista's site core, Bernadette Cap (2015) studied the East Plaza to evaluate her hypothesis that this location was a marketplace. Her research entailed extensive excavation of the plaza and collection of multiple types of evidence. The resulting suite of empirical evidence demonstrates that the northern sector of the plaza was a marketplace during the Late and

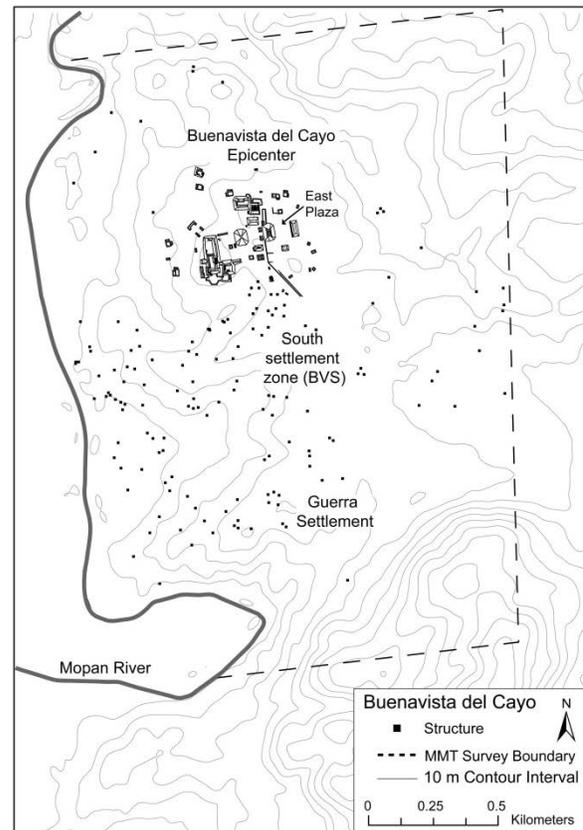


Figure 2. Surveyed area in the Buenavista settlement zone.

Terminal Classic periods (Cap 2015). In this marketplace goods were sold in zones divided by raw material type, and in some cases individual selling spaces were demarcated by daub-covered walls. Goods exchanged in this marketplace included chert and limestone bifaces, obsidian blades, organics, and perhaps ceramics.

The identification of a marketplace at Buenavista establishes that marketplace exchange was one way in which householders likely obtained goods, but it is only through combined analysis of the marketplace and household consumption and production practices that the organization of the broader marketplace exchange system and the identification of other kinds of exchange practices can be understood. Below, we bring together the findings of the research at Buenavista to build a picture of the organization of domestic economies and the variations in householder practices. In order to narrow down our discussion we focus on the production, exchange, and consumption of three

Table 1. Evidence for chert biface consumption and production at Buenavista.

Location	Type	Chert Biface (count)	Chert Biface Debitage (count/m ³)	Source
Buenavista site core	Palace complex (n=1)	16	NA	Gilmer 1999
Buenavista site core	Multifunctional patio group (n=4)	24	NA	Sandoval 2008
Buenavista South settlement zone (BVS Cluster 1)	Household (n=4)	34 (at least 2 per structure)	9	Peuramaki-Brown 2012
Guerra settlement	Household (n=NA)	NA (at least 1 per structure)	NA	Taschek and Ball 1986
East Plaza--large production zone	Marketplace	1	211,437	Heindel 2010
East Plaza--small production zone	Marketplace	5	5,146	Cap 2015

specific types of goods: chert bifaces, obsidian blades, and polychrome painted vessels.

Chert Bifaces

Chert bifaces come in various sizes and styles, and here we discuss common forms like thick and thin general utility bifaces, projectile points, and gouges/chisels. These forms represent multipurpose tools that most people living a preindustrial agrarian civilization like the Classic Maya would have found necessary for working fields, tending crops, harvesting forest products, hunting game, and carrying out daily tasks in their fields and around the house.

Limestone and chert are the two most abundant types of stone in the UBRV, and raw chert was available both as cobbles found in alluvial deposits and as nodules and veins within the limestone bedrock. The Callar Creek chert quarry, located 2 km west of Buenavista (Horowitz 2014), was likely one important source of this stone for the people of Buenavista. Thedebitage recovered at the Callar Creek quarry represents early-stage core reduction (Horowitz 2014) which suggests that later stages of reduction occurred elsewhere. Given the distribution of known chert sources in the UBRV, it is likely that other as yet to be identified quarries provided chert for Buenavista's knappers.

The household studies conducted around Buenavista thus far reveal that most, if not all, households consumed chert bifaces (Table 1), suggesting these tools can be considered a staple item that would have been found in any home. Despite the ubiquity of these final products in household assemblages, there is no evidence for biface production in the residential groups in the site core, and very little indication that it occurred in the BVS settlement zone. Peuramaki-Brown's (2012) investigations revealed that two of the four extensively excavated groups (BVS-004 and BVS-006) had very low counts of biface reduction flakes ($n = 14.5$ flakes/m³ of matrix and 6 flakes/m³ of matrix, respectively). The low density could represent reduction of preforms or resharpening of bifaces, but at a scale that would only meet the needs of these individual households. It has yet to be determined if residents of the Guerra settlement engaged in biface production (Taschek and Ball 1986).

Given that knapping chert is one of the oldest crafting activities known to the human species (Fagan 2004), we assume that most Classic-period householders had the knowledge and skill to knap stone, if only crudely; this assumption seems to be borne out in the reduction debris recovered from almost all household contexts (Peuramaki-Brown 2012).

Table 2. Evidence for obsidian consumption and production at Buenavista.

Name	Type	Total count	Blade Count (%)	Debitage Count (%)	Source
Buenavista site core	Household (n=NA)	333	326 (97.9)	22 (2.1)	Tritt 1997
Buenavista South settlement zone	Household (n=4)	23	22 (96.0)	1 (4)	Peuramaki-Brown 2012
Guerra Settlement	Household (n=NA)	580	558 (96.2)	22 (3.8)	Tritt 1997
East Plaza	Marketplace	360	257 (71.4)	103 (28.6)	Cap 2015

Although many people may have been able to make expedient flake tools, the production of formal stone tools such as bifaces requires a higher level of skill, one likely possessed only by specialized producers. This inference is also supported by our data, specifically the lack of evidence for the production of chert bifaces in most hinterland households. Thus it appears that most chert bifaces were made by specialized producers, and consequently, most people acquired bifaces via extra-household exchange mechanisms.

Evidence for specialized chert biface production and resharpening was recovered in the Buenavista East Plaza marketplace (Cap 2015; Heindel 2010; cf Rieth 2003), indicating that marketplace was one way in which householders obtained these tools. Investigations by MVAP revealed two zones of end-stage chert biface production debitage where over 80 percent of the debitage was under 4 cm in length, lacked cortex, and had formal attributes of biface thinning flakes (Cap 2015; Heindel 2010). The density of chert debitage was extremely high, ranging from 5,146 flakes/m³ in the smaller production locus to 211,437 flakes/m³ in the larger production locus (Cap 2015; Heindel 2011; Rieth 2003), which are from two to four orders of magnitude greater than the densities found in the BVS residential groups. We also found a small number (< 1 percent) of flakes with worn arises, indicative of resharpening flakes, in both East Plaza chert production zones. If making bifaces was a specialized skill, then resharpening them also likely required an experienced hand.

Because the marketplace knappers produced and sharpened bifaces on-site,

householders could directly assess the quality of production versus their cost, potentially custom-order specific tools, and have worn bifacial tools resharpened. Furthermore, we can state with considerable confidence that the producers were also the vendors of their wares; there is no indication of any middlemen. Since bifacial tools were finished in the East Plaza, but not started there—there is almost no early-stage debitage—we infer that the knappers carried out most of their production elsewhere, likely at their homes in the Buenavista hinterland.

Obsidian Blades

Obsidian is not found in the lowlands, and the most common sources for obsidian artifacts in the UBRV are in the highlands of southern Guatemala and Central Mexico, lying some 300 km and 1,000 km away, respectively. The acquisition of non-local raw materials like obsidian could have required more complex exchange networks, thus providing the potential for more restricted consumption due to social status or economic means. Although obsidian was used to make formal tools like bifaces, the most commonly recovered obsidian artifacts in Classic Maya lowland sites are prismatic blade fragments, which served many purposes as an extremely fine-edged cutting implement. This quotidian function and the near ubiquity of obsidian in Classic-period domestic contexts has led many Mayanists to argue that obsidian is best considered a utilitarian good (Rice 1987).

All tested house groups at Buenavista contained obsidian blades (Table 2), suggesting there was a high degree of access to this item. In household assemblages at Buenavista, and more broadly the UBRV, obsidian blades typically

Table 3. Comparison of obsidian blade sources identified through XRF at Buenavista.

	East Plaza Marketplace ^a	Buenavista Site Core Residential Structures ^b	Buenavista South settlement zone Residential Structures ^c	Guerra Residential Structures ^b
Guatemalan Sources				
El Chayal	313	40	35	27
Ixtepeque	23	1	9	2
Media Cuesta	0	1	0	0
San Martin Jilotopeque	4	0	2	0
San Bartolome Milpas Altas	0	0	2	0
Mexican Sources				
Pachuca	0	2	4	1
Unassigned	1	1	6	1
Total Count	341	45	58	31

a. Cap (2015)

b. Tritt (1997)

c. Peuramaki-Brown (2012)

make up anywhere from 95 to 97 percent of obsidian objects recovered (Table 2; see also Robin 1999; Yaeger 2000). The other 3 to 5 percent of obsidian assemblages is typically production debitage. There has not been a systematic study addressing the type of debitage recovered and why it is present in these contexts; however, the low proportion of obsidian production debitage recovered seems to be an indication that if any production took place in the house groups, it was very limited in intensity and resulted in few blades.

The only locus of specialized obsidian blade production found to date at Buenavista is in the East Plaza marketplace, where the assemblage consisted of 71 percent blade fragments and 29 percent core reduction debris (Cap 2015). All blade fragments were broken, less than 6 percent had any evidence of cortex, and all were very small with an average length of only 1.17 cm. The core reduction debris consisted of plunging flakes (*outrépassé* termination) that removed the distal end of the core, tablet flakes, isolation flakes, and the base of a core that was pecked off prior to removal. The small size of the blades, the type of reduction debitage present, and the lack of

cortex are indicative of end-stage blade production.

The obsidian assemblage in the East Plaza marketplace consisted of a total of 360 macro-sized fragments (>1/4" length); thus, the scale of tool production is low compared to locations nearest to obsidian sources in Guatemala and Mexico (e.g., Clark and Bryant 1997; Hirth 2009), but it is one of the densest obsidian production zones known to date in the UBRV. The nearest site to Buenavista where specialized Late Classic obsidian production has been documented is the settlement of El Laton in the hinterlands of El Pilar (Hintzman 2000; Olson 1994), which is located 13 km north of Buenavista (see Keller 2006 for a Terminal Classic example). The rarity of obsidian tool production in this region marks the Buenavista East Plaza marketplace as a distinct and likely important source for obsidian blades in the Buenavista zone and broader UBRV during the Late Classic.

Some of the obsidian assemblage collected from the East Plaza marketplace and BVS residential groups has been sourced using X-ray Fluorescence (XRF). The majority of the assemblages from both contexts come from El

Chayal, Ixtepeque, and San Martin Jilotopeque, all in Guatemala (Table 3). This congruence is likely due to the acquisition of obsidian blades by households of different statuses in the East Plaza marketplace. BVS householders also acquired small quantities of obsidian from Media Cuesta (Guatemala), San Bartolome Milpas Altas (Guatemala), and Pachuca (Mexico) (Peuramaki-Brown 2012; Tritt 1997). The absence of these other, much rarer sources in the East Plaza marketplace could be a consequence of a sampling bias against rare items, or a reflection of changing obsidian exchange networks, as the BVS obsidian assemblage spans the Preclassic to Terminal Classic periods, while the East Plaza materials date predominately to the Late Classic. Pachuca obsidian, for example, is most common in the lowlands during the Early Classic period. It is also possible the blades made with the rarer obsidian sources circulated through mechanisms other than the marketplace, such as gifting networks.

Painted Ceramic Vessels

Elaborate painted vessels are generally considered to be high value goods or prestige items because of the time, skill, and knowledge required for their creation (Arnold 1991:91-98; Deal 1998:60; Foias and Emery 2012; Rice 1985), and the fact that at least some were produced by palace schools presumably patronized by royal houses (Ball 1993; Reents-Budet et al. 2000). Because they are frequently found in rich burials and high status residential areas, archaeologists generally associate them with elite social groups and special events, especially feasting (Reents-Budet 1994; Reents-Budet et al. 2012).

At Buenavista, painted vessels have been found in burials and elite residential areas (Ball 1993; Sandoval 2008; Taschek and Ball 1992). The MMT Project also uncovered a midden in the elite residential zone of the site core with many painted sherds, the most common of which were Chinos Black-on-Cream and Cabrito Cream Polychrome types (Ball 1993). Based on the context of recovery, style, and chemical analysis of sherds from the midden, Reents-Budet et al. (2000; also Ball 1993) have argued that Buenavista's elites controlled the production

of some varieties of these painted ceramics. They propose that the more elaborately painted vessels served as social currency, circulating through gift exchanges often in ritual contexts, and serving to forge and reinforce social and political bonds both within the Buenavista polity and beyond (Ball 1993; Reents-Budet et al. 2000).

Peuramaki-Brown (2012) recovered polychrome sherds at low frequencies in the BVS settlement zone, both in the habitation debris of all residential groups excavated and from use-related debris and special deposits at a community ritual-administrative group (BVS-007). Domestic assemblages from each residential compound contained sherds from at least one polychrome vessel, most commonly Benque Viejo polychrome, Chunhuitz Orange polychrome, Dos Arroyos polychrome, or unknown calcite polychromes, suggesting that having a finer set of serving wares was important to Maya householders.

Peuramaki-Brown did not recover any Cabrito Cream polychromes in the BVS settlement residences, and found only two sherds from the ritual and administrative group BVS-007 that are potentially Chinos Black-on-Cream vessels². The lack of Cabrito Cream and Chinos Black-on-Cream Polychromes in the tested residential groups outside the site core is consistent with the interpretations of Ball (1993) and Reents-Budet et al. (2000) that Buenavista's elite residents controlled the production of these vessels and distributed them within a restricted network, likely via gifting. This would have allowed elites to build social networks that would sustain their position in society.

While it is highly likely that the most elaborate polychromes were distributed through gifting networks, Yaeger (2010) has suggested that market exchange could have been another mode for acquiring some painted wares. Peuramaki-Brown (2012) found examples of simpler painted types, especially ash-tempered Benque Viejo polychrome and Chunhuitz Orange polychrome. These types are widely distributed across the UBRV (Gifford 1976; LeCount 1999), and they may have been made at multiple centers, including perhaps the Buenavista palace school (Reents-Budet et al. 2000:116). Given their ubiquity, it is possible

that simpler bichromes and polychromes like these were distributed through networks that were based on supply, demand, and the purchasing power of a household (Yaeger 2010). Hinterland residents with the economic means and desire to obtain polychromes may have been able to acquire them through market exchange, if not through the East Plaza marketplace then through other market exchange methods; however, it is worth noting that these less expensive items could have also served as gifts distributed at a broader social scale (Yaeger 2010; see Landa [Tozzer 1941:27]).

Discussion

In isolation, research on the Buenavista marketplace (Cap 2015) and households (Clowery 2005; Blankenship-Sefczek 2011; Gilmer 1999; Lumsden 1994; Peuramaki-Brown 2012; Sandoval 2008; Taschek and Ball 1986; Tritt 1997) provide valuable information about the organization of economic practices; however, when analyzed in combination we are able to discuss the broader marketplace exchange system and other kinds of exchange practices, particularly gifting. Our analysis shows that there was a complex network of economic interactions conducted at Buenavista that were embedded within the polity's social organization.

The East Plaza marketplace served to create linkages between hinterland households across the settlement and residents of the site core. Administering a marketplace requires a certain level of organizational capacity and, based on the location of the East Plaza marketplace in the center of the site, we infer that the governing elites were involved in its administration to some degree, and that this was one of many centralizing and integrative measures adopted within the urban environment over time (Cap 2015; Peuramaki-Brown 2012). We cannot discern if the establishment of the marketplace was driven by consumers' needs for goods or elites' desire for wealth gained through sponsorship and regulation of a marketplace, but both factors likely contributed to the Buenavista marketplace's generations-long existence.

Although we did not find fragments of painted vessels in the marketplace, their presence in all of the residential groups tested by

the MVAP thus far suggests a distribution mechanism in which households participated regardless of their social status, such as a marketplace. Elaborate painted pottery could have also been obtained through gifting networks. The gift of a painted vessel could have helped to create or reaffirm political relationships, and it would have entailed reciprocity, likely in the form of political support (Hirth 1992; LeCount 1999; Reents-Budet et al. 2000; Schortman et al. 2001).

The findings presented above show that the questions we initially posed do not have simple answers. Our discoveries contrast with Potter and King's (1995) assumption that households were relatively self-sufficient, and their suggestion that the utilitarian economy was self-ordering and self-triggering. Rather, our multiscale research on household economies at Buenavista suggests that households provisioned themselves through a diverse and complex set of economic interactions. Based on our findings, we suggest that the Buenavista economies involved multiple dynamic parts that included centralized exchange at marketplaces, in addition to decentralized, privately organized exchanges, such as gifting. Although not discussed here, it also seems likely that informal and decentralized bartering and trading played a large role in household provisioning strategies.

¹Four of these groups (BVS-004, BVS-006, BVS-060, and BVS-077) have been determined to be residential/domestic in function, while the fifth group (BVS-007) is argued to be a community-oriented integrative group serving ritual and administrative needs (Peuramaki-Brown 2012, 2013, 2014).

²Christophe Helmke identified these two sherds as codex-style sherds attributed to the Zacatel ceramic group (Peuramaki-Brown 2012:613-621). Dorie Reents-Budet (personal communication, 2013) examined images of these sherds and suggested that they might be Chinos Black-on-Cream.

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4 LATE TO TERMINAL CLASSIC HOUSEHOLD PRODUCTION AT XUNANTUNICH'S GROUP E

Thomas Chapman, Catherine Sword and M. Kathryn Brown

The Mopan Valley Preclassic Project (MVPP) has been investigating Group E at Xunantunich since 2008. This particular location has a long occupation history and its function changes dramatically through time. Beginning in the Early Middle Preclassic, this location was a large Preclassic ceremonial center. By the Terminal Preclassic, the ceremonial core was abandoned. The area was not formally reoccupied until the heyday of Late Classic Xunantunich, when several households were constructed within the abandoned Preclassic ceremonial precinct. Our investigations of several zones within this area uncovered evidence of intensive household production. We encountered thousands of small chert tools that we initially interpreted as evidence of craft production. Formal analysis coupled with use-wear analysis and experimental archaeology has suggested two possible functions for these tools, wood engravers or starchy tuber graters. In this paper we synthesize our excavation data from a Late to Terminal Classic household and re-evaluate the potential function of the associated chert tool assemblage.

The Mopan Valley Preclassic Project (MVPP), directed by M. Kathryn Brown, has been investigating the site of Xunantunich since 2008. The project is currently working at a number of locations within the Xunantunich area, including El Castillo, Plaza A, Group D (McCurdy et al. 2014), and the nearby hinterland site of San Lorenzo. Most of MVPP's research, however, has been focused on Xunantunich's Group E (Figure 1). This group was first investigated by the Xunantunich Archaeological Project, and it is composed of two pyramids and a larger northern platform (Robin et al. 1994). The original testing of Group E by Cynthia Robin suggested that it dated predominately to the Middle Preclassic. Recent work by MVPP at Group E has revealed that this location was indeed early. Additionally, the research by MVPP has shown that Group E was actually part of a larger Preclassic ceremonial center composed of an E-Group, large platforms, and several formal plazas (Brown 2013). The Preclassic ceremonial center appears to have been abandoned by the end of the Late Preclassic and was not formally re-occupied until the heyday of Late Classic Xunantunich (Brown 2011; Brown et al. 2011). During the Late Classic period, several households were constructed within the abandoned Preclassic ceremonial precinct, however, the Preclassic monumental buildings do not appear to have been modified or rebuilt. In fact, much of the architectural stone from these early temples was

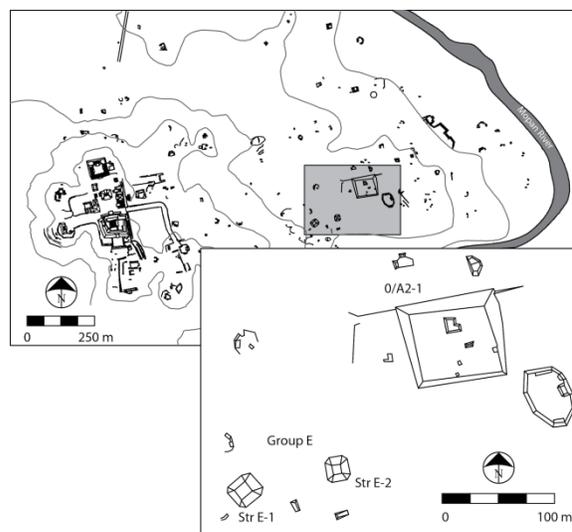


Figure 1. Xunantunich Site Map showing location of Group E.

removed, presumably for use in Classic period constructions elsewhere at Xunantunich.

Our investigations of several zones within the Group E area uncovered evidence of intensive Late to Terminal Classic household production (Figure 2). Thousands of small chert tools were encountered within the upper layers of the Plaza at Group E. The chert tools represent a specialized, unifacial idiosyncratic tool type that led us to interpret them as the remains of implements used in craft production (Brown et al. 2011). Formal analysis, use-wear analysis and experimental archaeology suggested two possible functions for these tools, wood engravers or starchy tuber graters

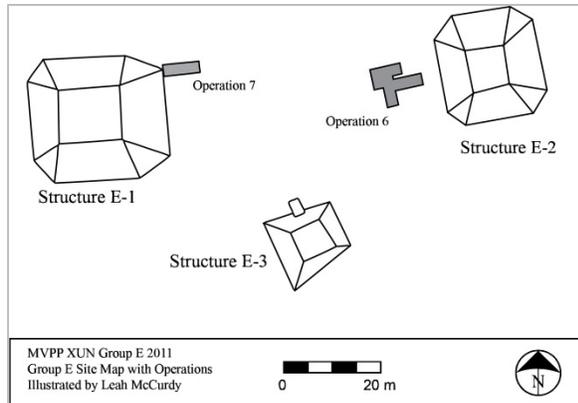


Figure 2. Group E Site Map showing placement of excavation units.

(Chapman 2013). In this paper we synthesize our excavation data from Group E related to the Late to Terminal Classic occupation and re-evaluate the potential function of the associated chert tool assemblage. Our interpretations provide an alternative hypothesis for similar chert tool assemblages found at other Late Classic households including Xunantunich's Group D.

MVPP excavations at Group E began in 2008 focusing on the eastern pyramid, Structure E-2 and the Preclassic occupation of the group. During these initial investigations, we uncovered evidence of an early Postclassic altar and Late to Terminal Classic occupation levels in the plaza (Brown 2011). In 2009 MVPP tested Structure E-3 (see Figure 2). We suspected that this structure did not date to the Preclassic as it was a small mound, oddly placed just south of the center of Plaza E. We determined that this was indeed a Late Classic house mound, indicating domestic resettlement of Group E. It was also during this field season that we uncovered hundreds of worked chert bladelets from the upper levels of a plaza unit in front of the eastern pyramid, Structure E-2 (Figure 2). These tools were not from Preclassic levels and clearly dated much later.

Over the past few years, we continued to investigate the Late Classic house mound (Structure E-3) and determined that it consisted of two structures forming an L-shaped group, situated around an elevated courtyard (Sword 2014). Excavations within the associated courtyard uncovered two Late Classic burials. Preliminary analyses of the burials suggest that

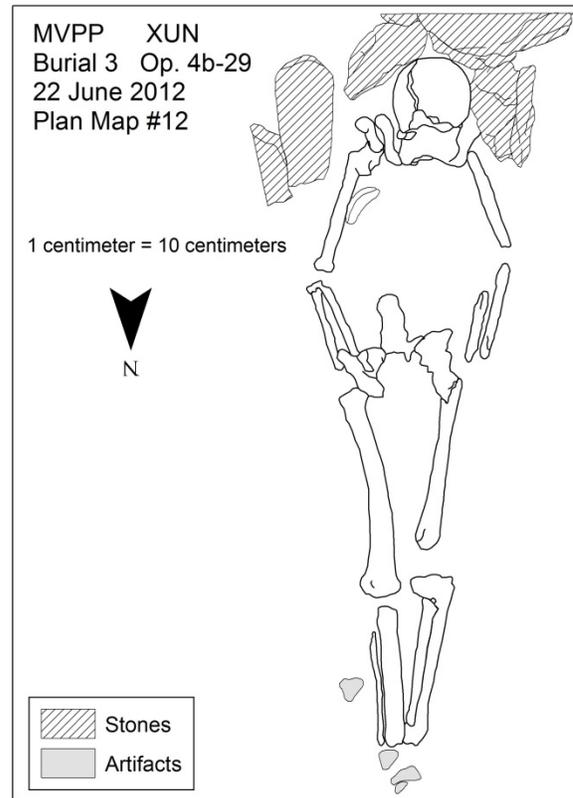


Figure 3. Late to Terminal Classic Burial within Structure E-3 at Xunantunich, Group E.

both individuals were adult males (Carolyn Freiwald personal communication; Sword 2014). Of special interest was the fact that one of the burials (Burial 3; Figure 3) was interred with a worked chert flake and a raw piece of slate, both located near the individual's hand. We also expanded the plaza excavations in front of the eastern Pyramid (Structure E-2) in order to further investigate what we believed were the remains of a possible crafting locale. Thousands of chert flakes and blades were recovered from the plaza excavations and exported to the University of Texas at San Antonio for analysis by the senior author of this chapter. We found these worked implements in every plaza unit, although the highest densities were located in front of the Structure E-2. Initially, we thought the worked bladelets may have been drill-like implements due to the form. In fact, we initially recorded these tools as micro-drills or drill-like implements, as they most closely resembled Preclassic chert drills used for marine shell production. But on closer examination, these Late Classic tools were different and this

prompted us to conduct several lines of analysis to better understand the function of these tools. We discuss this analysis in more detail below.

Although these small unilaterally worked bladelets (Figure 4) have been found at numerous other Maya sites in small quantities, the high frequency of these tools within the Group E lithic assemblage was striking and, presumably, suggestive of some sort of specialized activity. Comparative datasets containing high quantities of these Late Classic chert tools have been found at Group D, a nearby elite residential group at Xunantunich, and the Midway Group at Caracol. In both cases, these similar chert tool assemblages were interpreted as evidence of specialized craft production. At Group D, Jennifer Braswell recovered 1,925 worked implements that she describes as “drills-on-blades” (Braswell 1998). Although she refers to these implements as “drills-on-blades,” she suggests that they may have been used for multiple purposes in the production and engraving of small slate objects. Braswell recovered 276 fragments of slate, of these, 51 showed evidence of modification. Although the high ratio of tools to debitage (1,925 to 276) within the Group D assemblage seems odd, the lower frequency of slate debitage could be explained as a sampling bias problem. Though, it should be noted that marine shell production at the nearby sites of Blackman Eddy and Pachitun resulted in higher quantities of debitage within the overall assemblage (Cochran 2009; Hohmann 2002).

At Caracol similar unifacial tools were recently recovered and analyzed. This analysis was performed with a broad goal of determining function of these tools with regards to their place within Caracol craft production and on their use in the broader Caracol economic system. Using statistical methods, analysis specifically sought to determine whether these tools were used for everyday household tasks or for specialized craft activities. Johnson (2008) concluded that the unifacial tools exhibited standardization and idealized tool types, which indicates specialized tool manufacture and craft specialization. The location of the loci of potential craft activity, just outside the epicenter of Caracol at the Gateway Group, suggested elite oversight of these activities.

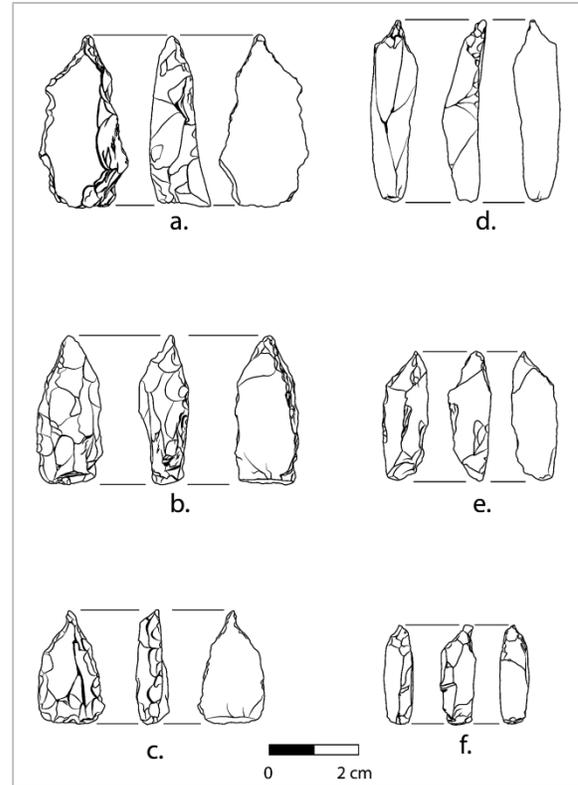


Figure 4. Sampling of unifacially worked bladelets from Group E, Xunantunich.

Our initial interpretation of the Group E chert implements also focused on the use of these tools in crafting activities. Although we did not know what the Late Classic residents of Group E were producing, like Braswell (1998) and Johnson (2008) we were convinced that these tools were clear evidence of craft specialization of some sort. What was striking, however, was the paucity of materials associated with the tools. We did find a small carved jade figure, but only one within 32 square meters of excavation (Figure 2). While investigating jade craft production in the Middle Motagua Valley in Guatemala, Rochette (2006) found that such production resulted in an approximate thirty to one ratio of jadeite production debris per worked tool. At Group E, only 6.35 grams of jadeite fragments were identified in microartifact analysis (Chapman 2013). In fact, the lack of associated raw materials such as stone or shell indicated to Brown et al. (2011) that they may have been working wood or gourds or multiple types of materials. The fact that these implements were found in front of abandoned

sacred buildings was suggestive of producing crafts that might have ritual significance (Brown et al. 2011) as Widmer (2009) has documented at the site of Copan. Furthermore, Dolph Widmer (2009) has argued that the raw materials used in craft production can be difficult to identify as the production often leaves only micro-debitage. With this in mind, we systematically collected sediment from our Group E excavations for flotation to recover micro-artifacts. It was our hope that the micro-artifacts would shed light on the function of the worked bladelets. We expected to find tiny fragments of shell, slate, or other materials that would have gone through a traditional ¼ inch screen. The micro-artifact analysis was one component in our overall study of these tools.

In order to understand the function of these chert implements, Chapman (2013) conducted formal analysis, micro-artifact analysis, use-wear analysis, and experimental analysis of the assemblage from Group E. For the experimental analysis, Chapman fashioned similar chert tools and used these to work marine shell, slate, ceramic, hard and soft woods, and gourds. These materials were engraved at high and low angles and hand drilled. Slate was further experimented upon due to the lack of research available on this material. These tools were also placed in a grater board and used to grate tubers and other soft materials. The grater boards featured a three by three grid of unifacial implements. While manufacturing the tools and conducting the experiments, the size and quantity of debitage produced was documented and compared to the micro-artifact assemblage. Use-wear analysis was then conducted on the modern tools after they were utilized for a specified period of time (as detailed in Chapman 2013).

The analysis was conducted in the same fashion as the Group E assemblage using a high-powered microscope. Each implement was divided into seven zones based on the tool's morphology, and each zone was analyzed separately. Several variables relating to the nature of microchipping, polish, and striations were recorded when present within each zone. Data for the use-wear was compared to the experimental data and comparative data from other Mesoamerican use-wear studies

(Aldenderfer et al. 1989; Aoyama 1995; Beers 2006; Keeley 1980; Odell and Odell-Vereecken 1980; Semenov 1964; Stemp 2000; Tringham et al. 1974; Yerkes 1983; Yerkes 1984; Yerkes 2009). The detailed analysis of the Group E assemblage coupled with the experimental archaeology study produced interesting results, suggesting that our initial craft production interpretation may not be as straightforward as we originally thought.

Chapman's main research goal for the detailed analysis was to determine the function of the worked bladelets. Chapman initially hypothesized three basic functions for the chert tools; drilling, engraving or grating. Based on the unique form of the implements, both drilling and engraving seemed the most plausible.

The third possibility we suggest is that they may have been placed in boards and used as root crop graters. It has been suggested that obsidian flakes may have been used for manioc grating prior to widespread corn agriculture in Mesoamerica, so we should also consider the use of chert implements in a similar fashion (Davis 1975; Lewenstein and Walker 1986). Of the 13,521 lithic materials analyzed by Chapman, 2,650 (19.6 %) were unifacially worked bladelets. Since Chapman's study (Chapman 2013), we have collected more than double this number in additional excavation units.

So in a nutshell what did we learn from the formal, use-wear, and experimental analysis? First, there was no indication that the tools were used for drilling. In fact, only two of the 2,650 tools analyzed showed any microwear indicative of drilling activity. Therefore, we emphasize that these tools should not be categorized as micro-drills or drills-on-blades prior to detailed analysis, as the term drill implies a function.

Engraving activities, however, remained a possible function for the tools due to the morphology of the implements' tip and the presence of a beak-shaped blade subassemblage (see Chapman 2013 for details). A number of scholars have conducted experimental studies with graters (see Barton et al. 1996; Keeley 1980). The patterns of edge rounding, microchipping, and polish formed on the Group E tools were similar to the experimental tools used on materials of soft and medium hardness, like wood, gourds, or tubers. This coupled with the

fact that the micro-artifact analysis did not reveal high percentages of debitage from other harder materials such as shell, slate, limestone, or greenstone, indicates that these tools were used on softer material of a perishable nature.

The third possible function we proposed was grating of tubers such as manioc. The past few decades witnessed the emergence of the manioc-grating hypothesis (Davis 1975; Lewenstein and Walker 1986) in order to explain a shift in lithic technology along the Pacific and Gulf coasts of Mesoamerica. In these regions, the earlier period was characterized by large quantities of obsidian chips, while obsidian prismatic blades characterized the later period. This later time also saw the adoption of maize as a subsistence staple. Using ethnographic comparative data, researchers hypothesized that obsidian flakes were grater chips used to process root crops in this earlier period. Although the unifacial tools at Group E dated later in time and were not obsidian, various studies presented other raw materials preferable to obsidian in use as grater teeth or “feeders” (Lewenstein and Walker 1986; Perry 2005; Walker and Wilk 1989). The tools from Group E feature higher degrees of modification than the obsidian chips discussed above, yet, the majority of them exhibit the same use-wear in terms of function and motion. This indicates that the Group E unifacially worked bladelets may have been used as components in a collective task like grating, where a grater board can feature morphologically similar teeth numbering in the tens and hundreds.

A final hypothesized functional possibility was a relatively new tool form deemed “Raspaditas” or the “little scraper.” Debert and Sherriff (2007) describe a unique tool form that functioned as a general utility grater. The possible relation between this tool type and the tools from Group E is based on form and retouch similarities. Both tools feature unifacial retouch and were produced on bladelet preforms. Unlike the implements from Group E, the distal point of the Raspaditas was the hafted portion with the proximal end exhibiting the main use wear. It’s use-wear is indicative of scraping, whereas other grater flakes are used to slice (Debert and Sherriff 2007). However, other manioc grater observations contradict the slicing versus

scraping nature of the grater flake (Walker and Wilk 1989), while other studies do not mention the orientation of manioc grater flakes (Davis 1975; Perry 2005).

Based on Chapman’s analyses, we are left with two possible hypothesized functions, engraving of wood or gourds, or grating of a softer material like tubers. This is a problem, as these functional categories reflect two very different activities, crafting versus subsistence related activities. Three observations, we believe, give more weight to the interpretation of these tools as graters. First, the high density of unifacially worked tools at Group E may point towards grating activities, as each grater board would incorporate numerous unifacial tools. Second, wood working craft activities would presumably involve other types of chert tools such as choppers, knives, scrapers, and adzes. These other types of tools were not present within this assemblage. In fact, the lithic assemblage analyzed by Chapman (2013) featured a near complete void of other lithic tool types. Third, the consistent size of the tools indicates that they were produced for a specialized purpose such as grating. Hafted engravers would not have needed to be produced with such a small range of maximum length ($\bar{X} = 24.91$ mm, $SD = 5.06$ mm) or blade length ($\bar{X} = 7.78$ mm, $SD = 2.14$ mm) as they would have been presumably used as individual tools. The analysis conducted on both Group E and the Caracol assemblages (Chapman 2013; Johnson 2008) indicated standardization of length of the tools for some sort of specialized activity. Of course, you could always make the argument that intensive crafting activities could result in high numbers of tools, or that the processing of the wood involving other types of chert tools may have occurred outside the collection zone. But with the data at hand, we argue that grating activities seems to be more likely. This was somewhat surprising to us as we were initially predisposed to a crafting interpretation.

We believe that our findings are significant and provide much food for thought, so to speak. If these unifacially worked tools were graters and used in food processing, why have they not been documented at other Late Classic residential locations? There are several possible explanations for this. First, both the

Group E and Group D tools were found off mound and within plazas or courtyard zones. Most excavations of domestic structures occur on the structure itself, so therefore we might have a sampling issue. In fact, only a handful of these tools were found within our excavations of Structure E-3 and the associated courtyard (Sword 2014). Alternatively, these tools may represent some form of intensive food processing not common to every household. It is interesting to note that Angela Keller identified a market place at Xunantunich. Could it be that the inhabitants of Group E and Group D were involved in specialized food production for exchange? Comparative analysis to other groups that have similar assemblages, such as the Gateway Group at Caracol, might be useful in determining the proximity to market places or accessibility of the group itself via formal causeways. At this point, however, in order to further support our new hypothesis that these tools were used in tuber grating activities, we plan to attempt starch grain analysis on unwashed unifacially worked bladelets from both Group E and Group D that were collected during the summer of 2014. We hope that this analysis will successfully contribute another line of evidence on the function of these tools. Additionally, we plan to run chemical analysis on soil samples collected from our plaza excavations to look for phosphate patterns.

In conclusion, although the root-grating hypothesis for this form of specialized tool seems rather mundane in comparison to craft production of ritual items in the shadows of abandoned Preclassic temples, our current data points this direction. But on the flip side, the implication of specialized food production at this scale suggests a complexity in the subsistence economy that has not been previously documented. This study forces us to ask new questions, to re-examine similar assemblages such as those from Group D, and has important implications related to specialized food production.

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5 ***PRODUCTION AT THE SOURCE: LITHIC EXTRACTION AND PRODUCTION AT CALLAR CREEK QUARRY, BELIZE***

Rachel A. Horowitz

Lithic production is an important component of economic studies because its control and access shed light on economic organization. Many lithic production studies tend to focus on the middle to end stages of production and not the raw material acquisition. This paper, however, addresses the extraction and production of lithic raw material at Callar Creek Quarry, a chert quarry in the Mopan Valley of western Belize. Investigations at the site by the Mopan Valley Archaeological Project revealed information concerning small-scale quarrying and production associated with adjacent households. This paper explores the role of the adjacent households in quarry production to elucidate the economic role played by chert resources in the regional economy. We find that, during the Late to Terminal Classic, local residents, rather than elite individuals, controlled the production of lithic materials at Callar Creek Quarry.

Introduction

The lithic production industry is an important, and often understudied, aspect of Maya studies. Raw material extraction and early stage production are particularly critical components of lithic industry, revealing information about the control of toolstone resources and their role in Maya economies. This paper examines the lithic production industry, focusing on access to raw material sources, and the economic impact of that access, through an examination of Callar Creek Quarry, a chert quarry in western Belize (Horowitz 2012, 2013, 2014, n.d.). Callar Creek Quarry provides a unique opportunity to study raw material access and control as it is located adjacent to two household groups involved in the extraction and production of lithic materials. Although Callar Creek Quarry was utilized almost continuously from the Archaic to the Historic period, this paper focuses on control of chert production during the Late/Terminal Classic (A.D. 650-890). Investigations at Callar Creek Quarry elucidated the control of access to lithic resources and the role which residents of adjacent household groups played in accessing these resources. Access to the quarry was investigated through a detailed lithic attribute analysis and analysis of other materials from the quarry and surrounding households.

This paper evaluates three possible scenarios for the control of access to resources at the quarry based on the similarity of the reduction sequences and the contemporaneity of the residences and quarry utilization:

1. Access to the quarry was controlled by local residents; the households were occupied during the time of quarry use and similar methods of lithic production occurred in the quarry and the households.
2. Access to the quarry was controlled from afar; the households were not occupied at the same time as quarry use and differences in the methods of lithic production between the quarry and households existed.
3. Access to the quarry was open to any individual; multiple tool production sequences existed contemporaneously in the quarry and the reduction at the households differed from the quarry.

This paper argues that the first hypothesis is most likely, based on the contemporaneous occupation of the households and quarry and similarities between the reduction sequences and knapper skill in the two areas. Preliminary results show that Callar Creek Quarry was controlled by local residents, rather than elites, and that, in the Mopan Valley, utilitarian resources were not subject to elite economic control during the Late/Terminal Classic.

Callar Creek Quarry

Callar Creek Quarry is a chert quarry located in the Mopan Valley along the Belize-Guatemala border (Figure 1) which was first identified through opportunistic survey of the Callar Creek hinterlands by the Mopan Valley Archaeological Project (MVAP) in 2009

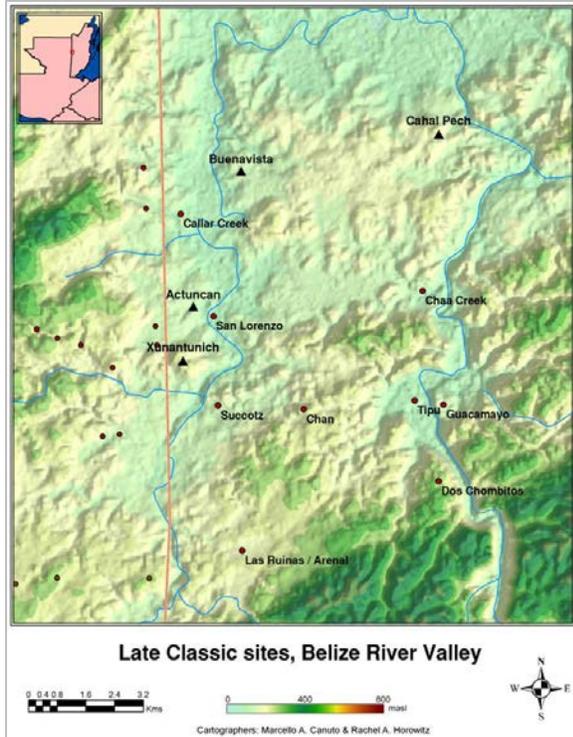


Figure 1. Map showing the location of Callar Creek Quarry.

(Kurnick and Salgado Flores 2011; Kurnick 2013). MVAP has conducted investigations at the site since 2011 focusing on mapping and excavation of the quarry and adjacent households (Horowitz 2012, 2013, 2014, n.d.). Data from these investigations show Callar Creek Quarry was exploited from the Archaic through the Historic Period. Quarries are notoriously difficult to date due to the palimpsest of lithic materials present (Healan 1997; Pastrana 1998, 2002; Pastrana and Dominguez 2009; Purdy 1984) and Callar Creek Quarry did not contain any temporally diagnostic lithic materials, but diagnostic ceramics are present in quarry deposits. A total of 2,724 ceramics were recovered from the quarry of which 129, 4.7%, were temporally diagnostic. The ceramics indicate the most intensive quarry use during the Middle Preclassic and the Late to Terminal Classic, although ceramic evidence indicates use of and occupation near the quarry between those periods (Horowitz 2013). Evidence for Middle Preclassic use and occupation of the area stems from the prevalence of Mars Orange Wares (Gifford 1976); Mars Orange sherds made up

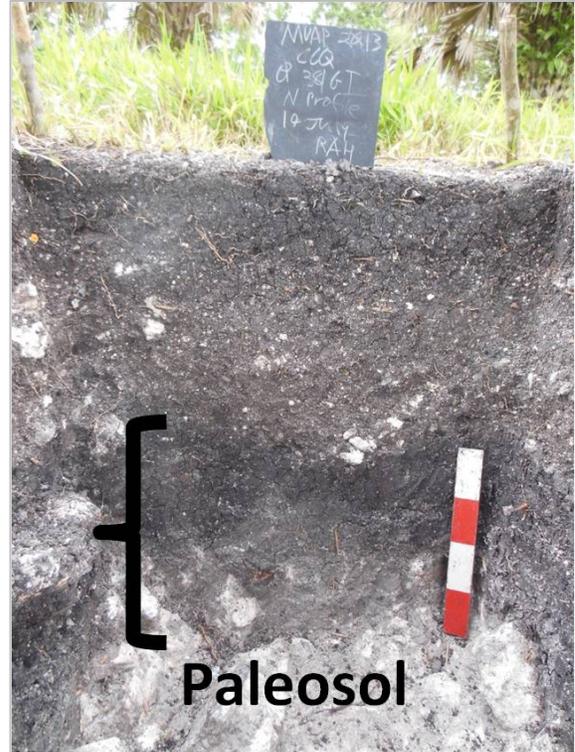


Figure 2. Stratigraphic profile indicating the location of the Paleosol.

57.2% of the diagnostic ceramics from quarry contexts. Late to Terminal Classic ceramics were dominated by ash tempered wares and Mt. Maloney bowls and jars (Gifford 1976; LeCount 1996, 2010; LeCount et al. 2002); Late to Terminal Classic diagnostics made up 43.5 % of the diagnostic sherds from quarry contexts. Indication of the historic use of the quarry was identified by the presence of historic period knapped glass.

A paleosol, a layer of dark, dense sediment, presents evidence for an Archaic occupation at Callar Creek Quarry; the paleosol was found toward the northeastern area of the quarry, near one of the habitation groups. Paleosols are typical of archaic occupations in other areas of Belize (personal communication M. Kathryn Brown 2013; Rosenswig et al. 2014; Rosenswig 2004). The paleosol was a stratigraphically distinct area which contained only lithic materials (Figure 2). Unfortunately there were no diagnostic lithic types, from the Archaic or other periods, nor any materials for radiocarbon dating in the paleosol. Statistical comparisons of the technological attributes of

Table 1. Chi-square statistic for raw material choice from Paleosol and non-Paleosol contexts.

	DF	N	Chi-square statistic	Significance
Raw Material Quality	21	817	44.148	.002
Raw Material Color	9	817	31.061	.000

Table 2. Analysis of Variation (ANOVA) of scalar variables from paleosol and non-paleosol contexts.

Measurement	DF	F	Significance
Length	347	14.292	.000
Width	347	11.729	.000
Thickness	347	6.461	.000
Mass	816	19.114	.000
Platform Width	347	14.824	.000

lithics from the paleosol and preceding stratigraphic levels suggest that these materials are distinct from later time periods. The greatest differences in lithic materials came from the type of chert utilized and the size of the lithic materials (Table 1). Material color shows that, in the paleosol, the use of brown chert, which is generally planar and found in large beds, and is of lower quality, was more frequently used than the white chert, found in rounder nodules and is of higher quality, which was more commonly utilized in the non-paleosol levels. This may suggest selection for specific qualities of the raw material – such as the planar shape and large available size – or might suggest utilization of specific areas of the quarry – as the brown linear bands of chert are found in different areas of the quarry than the white chert. Choice of raw material for specific physical properties implies a difference in the intended end product of the lithic reduction and, as there are no major differences in the aim of production, we would argue that it is more probable that different raw materials within the quarry, and thus different areas, were being exploited in the Archaic than in later time periods.

Scalar variables illustrate the greatest difference between the paleosol and other levels. The paleosol contains statistically significantly larger materials (Table 2). This difference is significant for all scalar variables – length, width, thickness, mass, and platform width. In general, materials from the paleosol are larger

than those from preceding stratigraphic levels. The differences in material choice and size of raw materials indicate subtle changes between the paleosol and other areas, suggesting that the paleosol does in fact represent an Archaic use of the area. We suggest that the differences between the Archaic and later lithics can be explained by changes in mobility strategies; people in the Archaic were generally highly mobile; they would presumably have come to the quarry to retool, that is, to obtain raw material for the production of new tools. In studies of other highly mobile societies a premium is placed on the size of raw materials to reduce the transport costs of lithic materials (e.g. Beck et al. 2002). An emphasis on the reduction of the weight of materials taken away from the production site would lead to the abandonment of larger materials with people carrying tool blanks and flake tools away with them, as those are more economical to transport in a highly mobile society. Such a trend fits into quarry patterns seen elsewhere around the world in mobile societies.

Although Callar Creek Quarry was used and occupied for such a long period of time, the focus of this paper is the Late to Terminal Classic extraction and production of raw materials. Extraction of raw materials occurred over the spatial extent of the quarry but was also concentrated in some areas. The extraction of raw materials occurred in three distinct manners: 1) the utilization of large raw material cobbles

visible on the surface, as evidenced by flake scars and removals visible on some of these cobbles; 2) the extraction of linear beds of chert; as evidenced by their presence in some areas of excavation and their absence, along with large quantities of debitage recognizable as coming from those bedded layers of chert, in other areas; and 3) the extraction of lithic materials from digging into the hillside, which created a scalloped quarry cut (Figure 3).

Evidence for production was found across Callar Creek Quarry. Debitage deposits occur on the surface, in buried deposits, and in a large debitage mound. The variation in debitage distribution indicates that discard mechanisms for production debris varied between dumping debitage in a centralized location, i.e. in the debitage mound, and discarding the debitage near the location of the quarrying activities, a more generalized discard of materials (Horowitz 2012, 2013, 2014, n.d.).

Production within the quarry indicates that raw materials were tested and initial reduction occurred at the quarry. An attribute analysis, performed using standard conventions of lithic analysis (e.g. Andrefsky 2005; Odell 2003; Whittaker 1994), of 35,652 lithics demonstrated that reduction focused on the production of generalized cores and flake tools (see Table 5 for numbers and percentages of core types). Reduction included testing cobbles for raw material quality and the presence of any inclusions, as well as early stage core reduction. The goal of production was to create generalized flake cores and tools. Of the cores present, most were multidirectional cores (77 %, n=114), while the majority of the remainder were tested cobbles, those cores with a few flakes removed to test for raw material quality (16.9 %, n = 25). Only one of the cores from the quarry indicates any kind of formal core preparation, a discoidal core. This single example of a formal core represents just 0.7 % of the cores from the quarry, indicating that generalized reduction was the predominant reduction technique at the quarry.

Further evidence for the predominance of generalized reduction sequences comes from flake analyses. Few flakes demonstrate core preparation, which is visible in platform preparation. Only 0.79 % of flakes (n=84) show



Figure 3. The quarry cut for quarrying chert from Callar Creek Quarry.

evidence of platform preparation, indicating the rarity of platform preparation at the quarry. The low average number of platform facets, 1.05, is also indicative of a lack of core preparation. Higher numbers of platform facets are indicative of core preparation activities and later stages of reduction. The early stage nature of reduction is also indicated by the relatively low number of dorsal flake scars, an average of 1.48 across the assemblage. The production of some flake tools occurred at the quarry, as evidenced by the number of retouched flakes in quarry contexts. In a 1 x 1 meter excavation unit, which contained 647 pieces of debitage, there were 110 retouched flakes, or 17 % of the debitage. In addition to their prevalence in this particular area of the quarry, retouched flakes are found throughout the quarry and are fairly ubiquitous amongst quarry debitage. The prevalence of these tools suggests to us that they were intentionally produced within that context.

Generalized flake cores were transported away from the quarry. Evidence for the transport of cores comes from the large number of flakes relative to the relatively few cores identified in the quarry assemblage. 148 cores were identified in the quarry. These cores make up approximately 0.004 % of the total lithic assemblage from the quarry. The extremely low proportion of cores suggests that cores were transported away from the quarry, presumably for further reduction elsewhere. Unfortunately we cannot trace the distribution of materials away from Callar Creek Quarry with any

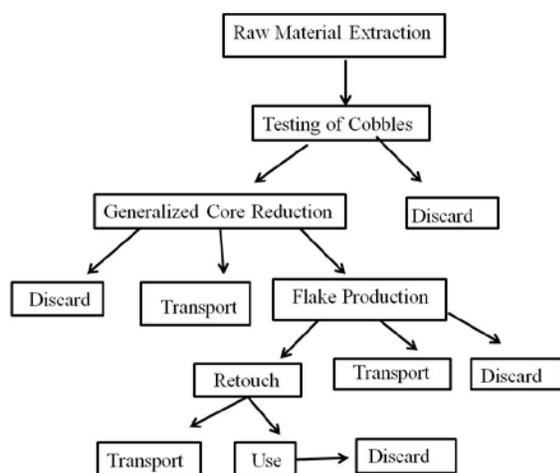


Figure 4. The preliminary reduction sequence for chert from Callar Creek Quarry.

certainly due to the difficulties of sourcing chert materials.

The preliminary analysis of the data collected from Callar Creek Quarry can be summarized in a preliminary production sequence illustrating the generalized sequence of production at the quarry (Figure 4). This preliminary schematic of the reduction at the quarry includes raw material extraction and testing of cobbles followed by the discard of the tested cobbles or the continuation of reduction. Materials were then transported away from the quarry or subject to additional reduction and flake production. Flakes were transported away from the quarry, retouched and utilized, or discarded.

Comparisons with other chert quarries

Investigations at the quarry indicate that Callar Creek Quarry represents what we would call a ‘typical’ chert quarry in the Maya area. Many of our ideas and discussions of the chert production industry come from Colha, in northern Belize (Ausel 2012; Brown et al. 2004; Chiaurulli 2012; Dockall and Shafer 1993; Hester and Shafer 1980, 1984, 1991, 1992; Hester 1982; King 2000, 2012; McAnany 1989; McSwain 1991; Santone 1997; Shafer and Hester 1983; Shafer 1985). Colha, however, is a unique site due to the volume, quantity, and site-level specialization of lithic production at the site. One production area at Colha had a density of approximately 5,000,000 lithics/m³ (Roemer 1991). On the other hand, Callar Creek Quarry

had a density of 2,966.6 lithics/m³. This density only includes lithics collected during excavations, those larger than ¼ inch, so it does not include the information garnered from flotation samples. While including flotation samples would presumably increase the density of materials at Callar Creek Quarry, they would still be much lower than those from Colha. Granted, Colha is a production area, rather than an area of extraction and production like Callar Creek Quarry, but the density comparison demonstrates the difference in scale between Colha and Callar Creek Quarry. Many other quarries in the Maya area, particularly in Belize, have been identified and are more similar in size and scale of production to Callar Creek Quarry than to Colha (Adams 1987; Black 1987; Black and Suhler 1986; Barrett 2004, 2006, 2011; King and Shaw 2006; Lawton 2007; Meadows 2000; Paris 2012). That is, these quarries are located near a few small households and production is focused in the household, rather than on a community level. Some of these small quarries show evidence of the production of formal tools, such as bifaces (e.g. Meadows 2000), while others are focused on the production of generalized tools (e.g. Adams 1987). Not all lithic quarries or production areas are exemplified by the high levels of production at Colha nor are a result of site-level specialization; many operated on a small scale; a scale of extraction and production exemplified by Callar Creek Quarry.

Adjacent Household Groups

Two household groups are located adjacent to Callar Creek Quarry: a plaza group initially occupied in the Middle Preclassic to the northeast and an L-shaped mound group initially constructed in the Late to Terminal Classic to the southwest. Excavations at both residential groups show evidence of involvement in the lithic production industry through the presence of lithic debitage in off-structure deposits. The nature of the relationship with quarrying activities will be discussed here.

Comparisons between households and quarry materials indicate similarities in the reduction sequences from the quarry and the residential areas. The similarities include knapper skill, based on flake terminations and

breakage patterns, and similarities in the technological attributes of flakes, including dorsal flake scars and platform facets (Tables 3, 4). The similarities in percentages of flake termination types and breakage patterns indicate similar levels of skill in lithic reduction between knappers in the quarry and the households; termination types have been demonstrated to have a clear relationship with knapper skill (Table 3) (Andrefsky 2005). ANOVA tests of dorsal flake scars and platform facets illustrate that the lithics from the quarry and households come from the same population, hence indicating that they were produced by the same peoples with the same methods (Table 4). Comparisons also illustrate similar proportions of materials produced by similar methods in the quarry and habitation groups. The majority of lithic materials from both locations were flakes, approximately 99 % in both instances. The majority of flakes from both contexts were produced by hard hammer percussion, 74.8 % from the households and 82.6 % from the quarry. Soft hammer and bifacial thinning flakes were uncommon in both areas. Cores from the quarry and households were predominately multidirectional (Table 5). Multidirectional cores are typically present in the production of utilitarian flake tools as no schematic manner of reduction is necessary. Unidirectional cores were also present, although the majority were tested cobbles. The similarities between the quarry and the associated residential groups, as indicated by ANOVA tests and similarities in material percentages, imply that the residents of the households were producing lithics in the quarry.

Control of Callar Creek Quarry

Since the residents of adjacent household groups were involved in the production of materials at the quarry the question which arises is: were the residents of these households controlling access to the chert source during the Late to Terminal Classic? Although these results should be considered preliminary, we argue that residents controlled and benefited from that access. To return to the three scenarios laid out in the beginning of this paper, it appears as though the first, access to the

Table 3. Analysis of Variation (ANOVA) demonstrating the similarities in reduction technique between the quarry and adjacent households.

	DF	F	P-Value
Flake Scars	1	.087	.768
Platform Facets	1	1.318	.251

Table 4. Percentages of flake terminations demonstrating the similarities in reduction technique between the quarry and adjacent households.

	Feather	Hinge	Step
Residential	70 %	.77 %	9.9 %
Quarry	73.7 %	1.1 %	13.1 %

quarry was controlled by local residents, occurred at Callar Creek Quarry.

The households were occupied during the time of the most intensive quarry utilization, particularly in the Late to Terminal Classic. Comparisons between the technological aspects of reduction, reduction skill, and reduction sequence between the quarry and the households demonstrate similarities in reduction sequences during the Late to Terminal Classic. Given this evidence, we suggest that during the Late to Terminal Classic the residents of the households around Callar Creek Quarry controlled quarry access. Local residents would extract and initially reduce the chert, which was then distributed elsewhere for further reduction and use. The implication of local control of this resource is that, at least in this case, non-elite individuals controlled raw materials for the production of utilitarian tools, indicating non-elite individuals played an important role in the production and distribution of utilitarian chert tools.

Benefits of Control of Chert Resources

Residents of Callar Creek Quarry saw socio-economic benefits from their control over the chert source. Evidence of the socio-economic benefits of the chert resource can be seen in some of the ceramic materials found at the household groups at Callar Creek Quarry. Polychrome sherds, including a sherd with a glyph and two others with pseudo-glyphs, were

Table 5. Table showing the percentages and numbers of types of cores from the quarry and adjacent households.

	Core	Multidirectional Core	Core Fragment	Unidirectional Core
Habitation Groups	7 (.3 %)	5 (71.4 %)	2 (28.6 %)	0 (0 %)
Quarry	148 (.004 %)	114 (77 %)	9 (6.08 %)	25 (16.9 %)

**Figure 5.** Ceramics indicating the relative wealth of occupants of the structures around Callar Creek Quarry.

recovered from excavations (Figure 5). These sherds, while not overwhelming evidence, suggest some level of economic prosperity. As these ceramics were not produced in the immediate vicinity, the presence of these polychromes suggests regional interaction and integration, possibly with the site of Buenavista del Cayo, where evidence indicates some polychrome production occurred (Reents-Budet et al. 2000). As the closest major Late to Terminal Classic center, Buenavista would be an easy point of exchange for Callar Creek Quarry residents. Evidence from the nearby minor center of Callar Creek also points to interactions with Buenavista, indicating these sites may have participated in the Buenavista sphere (Kurnick 2013).

The ceramic materials indicate that Callar Creek Quarry was an important resource to those residents who lived nearby. They participated in the lithic production industry through quarrying and extraction of raw materials and the testing and initial reduction of cores for the production of generalized flake cores, some of which were transported away from the quarry. These productive activities served, presumably through commercial activity, as an integrative mechanism for residents. The production and

distribution of chert materials increased their participation in the regional economy and encouraged regional identities, during the Late to Terminal Classic.

Conclusions

This paper examined chert extraction and production at a chert quarry, Callar Creek Quarry, with the aim of addressing the socio-economic impact of the lithic industry on quarry residents. Through exactions at the quarry and adjacent households we demonstrated that the adjacent households controlled access to chert resources during the Late/Terminal Classic. Local control of this resource indicates non-elite actors had a greater role in the circulation of utilitarian goods than suggested by previous studies.

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6 A TERRACED COMMUNITY IN NORTHWESTERN BELIZE: LANDSCAPE MODIFICATIONS AT MEDICINAL TRAIL AND THEIR ROLE IN THE SOCIO-POLITICAL DYNAMICS

David M. Hyde and Michael Stowe

The Medicinal Trail Community in northwestern Belize is a dispersed hinterland community. Throughout the community is a landscape extensively modified, in part, by a complex and interconnected series of terraces, linear berms, and depressions. These features, in turn, are believed to be related to an intensive subsistence economy likely overseen by the inhabitants of the large formal household designated the Tapir Group (Group B). In this paper we will present the results of preliminary mapping of these features and attempt to provide some discussion as to their function and relation to the socio-political dynamics of the community.

Introduction

The corporate group is a level of social organization between household and community, and is defined by their collective holding of some property or resource (Goodenough 1961). The function of corporate groups is to maintain an administrative and authoritative hierarchy, and direct major decisions for the group (Goodenough 1961). Analysis of the settlement at Medicinal Trail, a terraced community in Northwestern Belize, suggest that the corporate group heads were able to tightly control the processing of the products grown in the community. This paper provides first a description of the settlement hierarchy throughout the community; second, an interpretation of the distribution; and then finally, a plan for testing that interpretation.

Mapping at the Medicinal Trail

The Medicinal Trail Community is located in the Belize portion of the Three Rivers Region on the Rio Bravo Conservation and Management Area property, owned and operated by the Programme for Belize (Figures 1 and 2). The site is situated in the La Lucha uplands approximately 4 to 5 km east of the major site of La Milpa. Groups A and B of the Medicinal Trail Community were identified and mapped via the tape-and-compass method in 2004 (Hyde 2011). These are two relatively large plaza groups about 200 m apart from each other, located on the same ridge top.

Later, a 1.5 km transect line was cut east of Group A with 50 m *bretchas* cut north and south of the line every 50 m creating 50 m

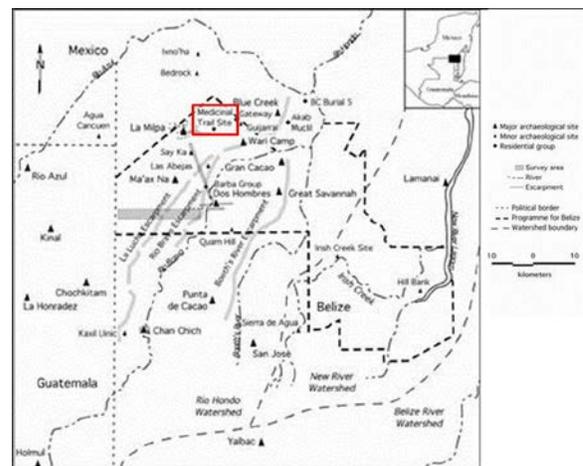


Figure 1. Map of the Programme for Belize with the Medicinal Trail Community highlighted.

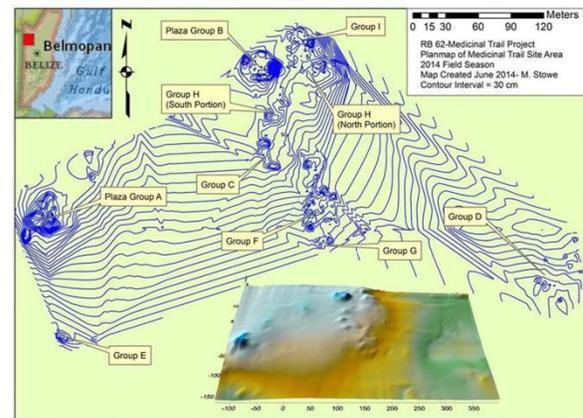


Figure 2. Map of the Medicinal Trail Community.

survey blocks (Hyde and Valdez 2007). Visual reconnaissance along the baseline and the survey blocks indicated a landscape consisting of numerous, mostly informal clusters, of mounds, but also numerous terraces, linear berms, *chich*

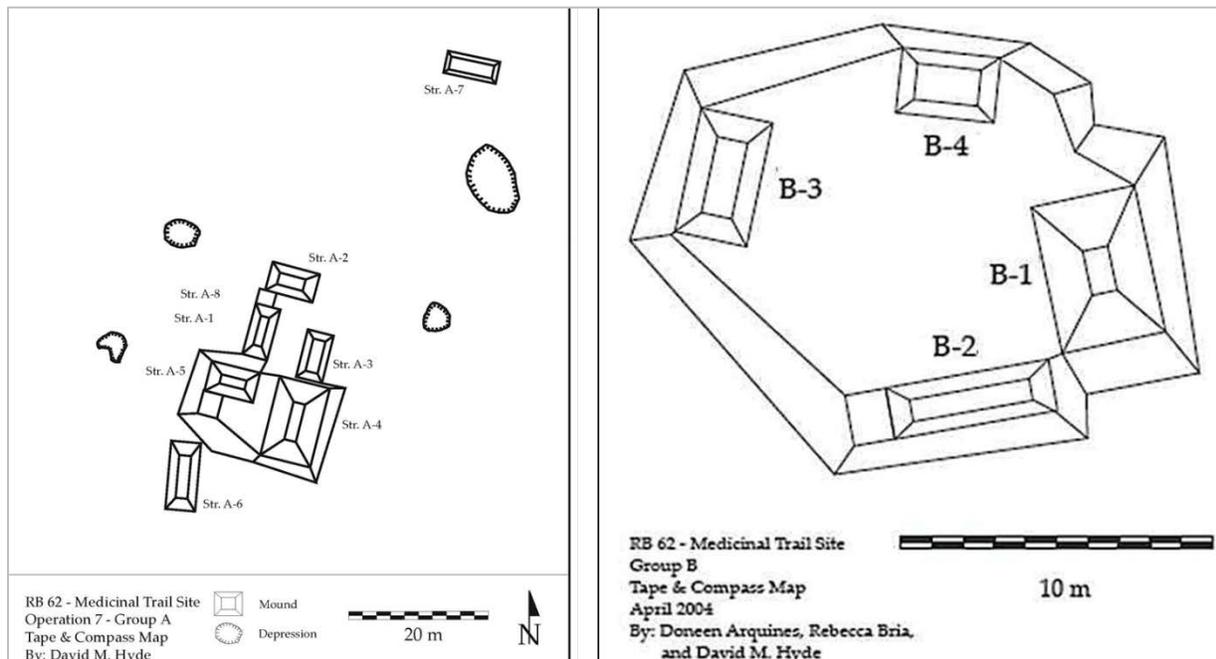


Figure 3. The two large formal groups, Group A (left) and Group B (right).

mounds, and other landscape modifications (Hyde 2011). A tape and compass map was produced of the north side of the transect line (Hyde 2011). The southern half of the transect line, for the most part, has not yet been mapped, but as mentioned, visual reconnaissance indicates a similar pattern of informal settlement and terraces.

In 2013 we began a multi-year plan to map the community using a TDS and after just two short seasons and 3500 shots taken, we have nine groups mapped. We will now briefly summarize the settlement at the community that both the tape and compass and TDS mapping have produced.

The Medicinal Trail Community

Large Formal Groups

The only large formal plaza groups so far identified at the community are Groups A and B, each of which has had multiple seasons of excavation (Figure 3). They are both built on an artificial platform and consist of multiple mounds, surrounding shared central spaces. Groups A and B are not only larger and more formal than all the others, but they can also be conceptualized as “expensive settlements.” As

mentioned, both groups have artificial plaza platforms, but also plastered plaza floors, benches, and corbel vaulted roofs (Figures 4 and 5). At each group there is a large eastern structure, numerous exotic materials, among other attributes that when compared to the other groups, suggests a much higher socio-economic status.

Group A is the largest group so far identified in the community and consists of six mounds organized around three contiguous courtyards, aligned on a northeast-southwest axis. Based on recovered ceramics from this group it has a very long occupation history, being initially occupied in the Middle Preclassic and abandoned at the end of the Terminal Classic. Some of the finds from the group include:

- Three Late Preclassic and four Late Classic burials
- An extensive Late Preclassic ceremonial below the Northern Courtyard
- Evidence for corbel vaulted roofs from at least two of the structures
- Five caches

Group B is nearly as large as Group A and is located approximately 200 meters to the



Figure 4. Features and artifacts from Group A.



Figure 5. Features and artifacts from Group B.



Figure 6. Maps, features and artifacts from Group C.

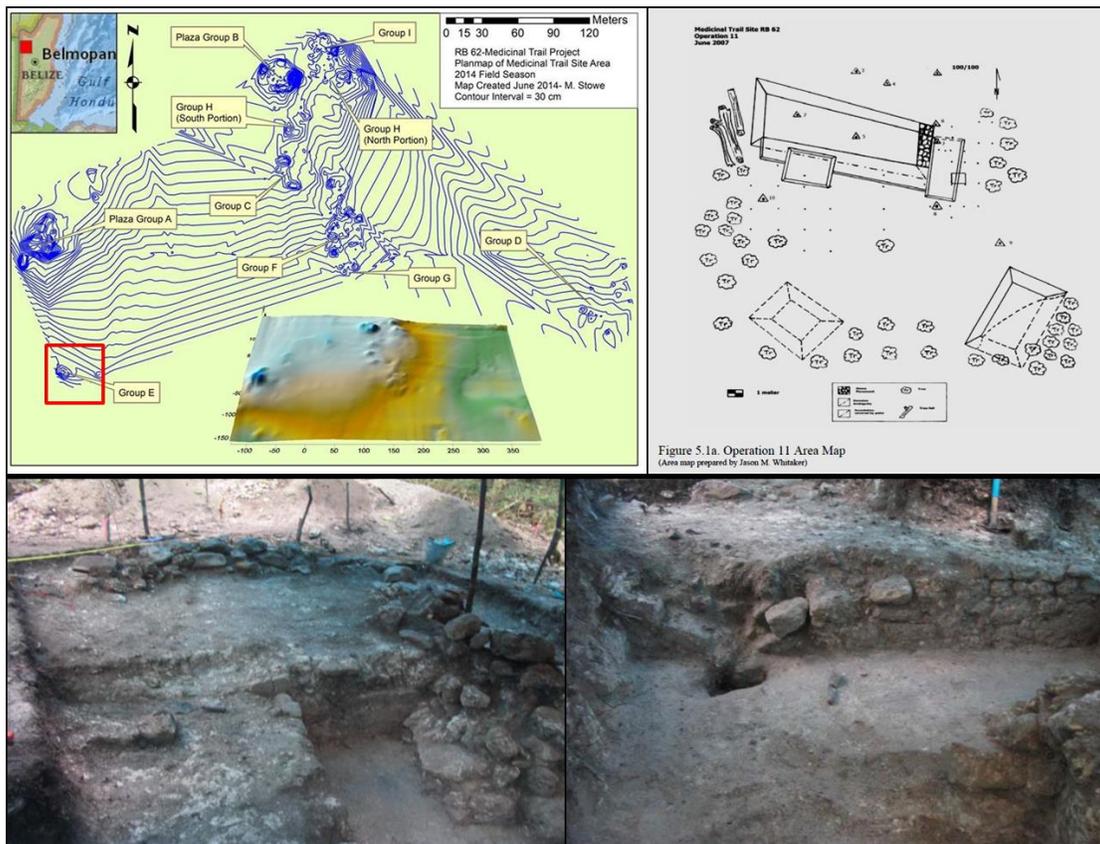


Figure 7. Maps and features from Group E.

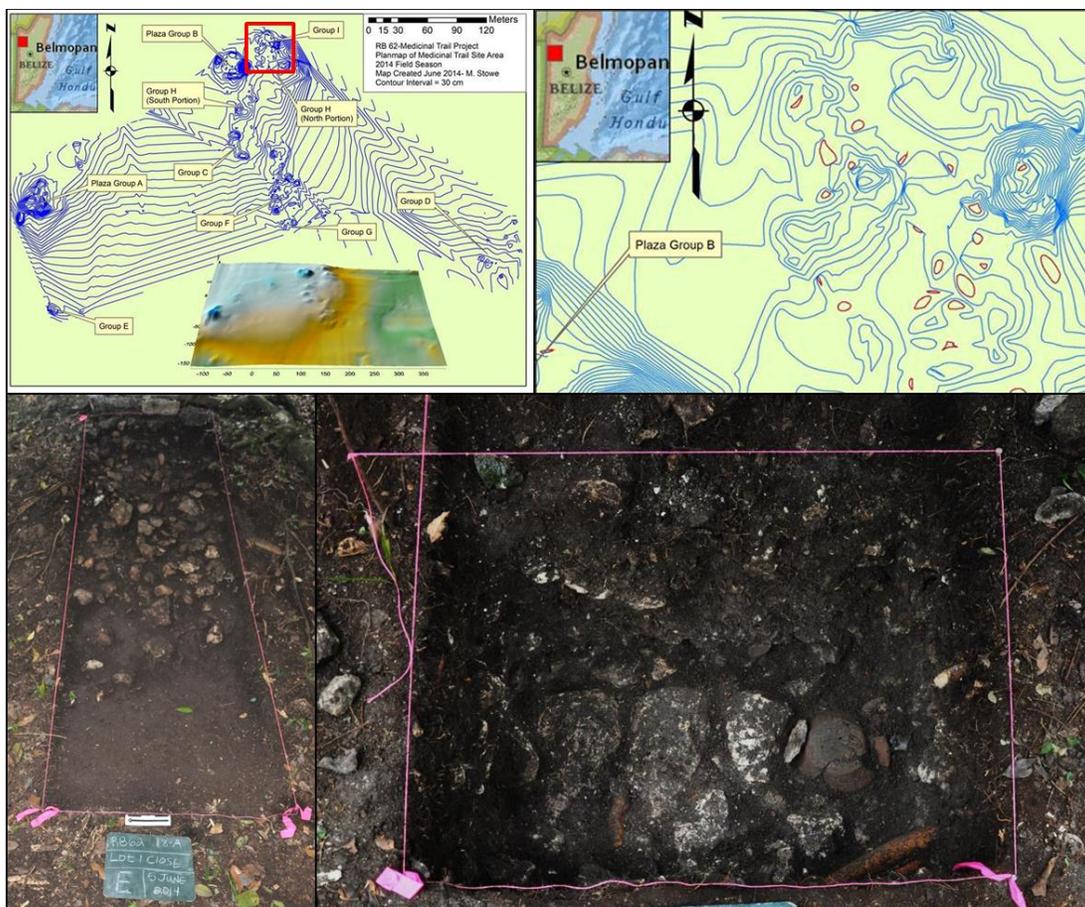


Figure 8. Maps and features from Group I.

north-northeast. Group B occupies the same ridge as Group A and consists of four structures organized around a relatively large courtyard space. Like Group A, there is cutstone architecture, plaster floors in the structures and across the plaza, and there was a corbel vaulted roof on Structure B-2. Some of the finds from the group include:

- Three burials
- Evidence for a corbel vaulted roof on Structure B-2
- A problematic deposit consisting of over 1000 artifacts

At both Groups A and B, the largest structures are on the east side, and for Group B in particular it is a large pyramidal structure that conforms to Becker's (1971, 1991, 1999, 2003) Plaza Plan 2 (PP2), characterized by the presence of relatively tall, square structures on the east side of the courtyard. These structures

consistently contain multiple burials and are considered shrines. The eastern structure at Group B was extensively looted with a centerline trench through its front. Excavations below the looter's trench did, however, uncover two burials, making this structure consistent with other PP2 shrines. Also recovered was evidence for bloodletting in the form of a series of obsidian blades.

Semi-Formal Groups

In contrast, Groups C, E, and I, though formal, are much smaller (Figures 6-8). Two of these smaller semi-formal groups are located near Group B, though they have only been investigated with limited excavations.

About 50 m to the south of Group B is Group C, which was investigated by Maia Detrick (2009), and consists of either two or three structures on a shared platform. The platform was plastered and numerous

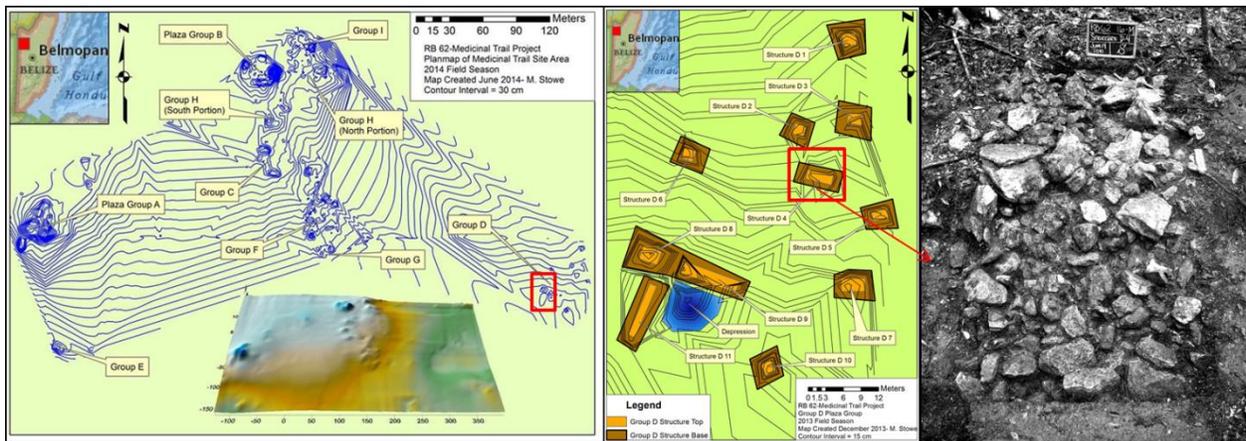


Figure 9. Maps and feature of Group D.

groundstone implements were recovered from the excavations. To the east there is a *chultun*.

Group E is located 90 m southeast of Group A, and is a household group consisting of five mounds, loosely arranged around a courtyard and was investigated by Jason Whitaker (2007). The largest mound of the group, Structure E-1, is likely the principal residence of this group. Two separate mounds, Structures E-2 and E-3, abut Structure E-1, but are not connected. One is on the eastern side, and the other is on the southwest side. These two mounds were no more than 15 cm tall, and are basically low platforms with no apparent superstructure.

The other small semi-formal group is Group I, directly east of Group B. In fact it is a smaller version of Group B in that it has a similar PP2 layout, though it does not appear to be on a plaza platform. It was mapped and investigated very limitedly in the 2014 season. At the base of the staircase of the eastern structure was a lip-to-lip cache with two sea shells inside and a chert biface on the outside (Figure 7).

Informal Clusters

After the large Formal Plaza groups, and the three small semi-formal groups, numerous informal clusters have been identified along the eastern transect, but so far only two have been named – Groups D and G (Figures 9 and 10).

Group D was identified off of the eastern transect and is located 500 m east of Group A. The group consists of at least 11 mounds,

informally distributed around an area of approximately 50 square meters. Some of the structures appear to be constructed on individual platforms, but they are not made of cutstone, nor are they on a shared elevated platform like Groups A, B, and C.

Located south of Groups C and F, Group G is a small informal group of three mounds, likely residential based on their morphology. They are not arranged around a courtyard nor are they situated on a shared platform and therefore informal. The group has been mapped but no excavations have as of yet been conducted at this group.

Non-Residential Groups

Groups F and H are different from all the other groups mentioned in that they are not believed to be residential.

Group F (Figure 11) is located between Groups C and G, and is associated with numerous depressions (or *aguadas*), a channel depression, as well as linear berms. The mounds that make up Group F are located along the top edges of the *aguadas* and are not likely residential.

The large *aguada* at the north end was investigated by Madelyn Percy (2009). The feature measures 10 m x 6.5 m with the long axis running north-south, and has a maximum depth of 1 m. Percy concluded that the depression was carved on the east, south, and west sides creating vertical faces. The presence of a gray layer approximately 10 cm above bedrock, which is also where the highest

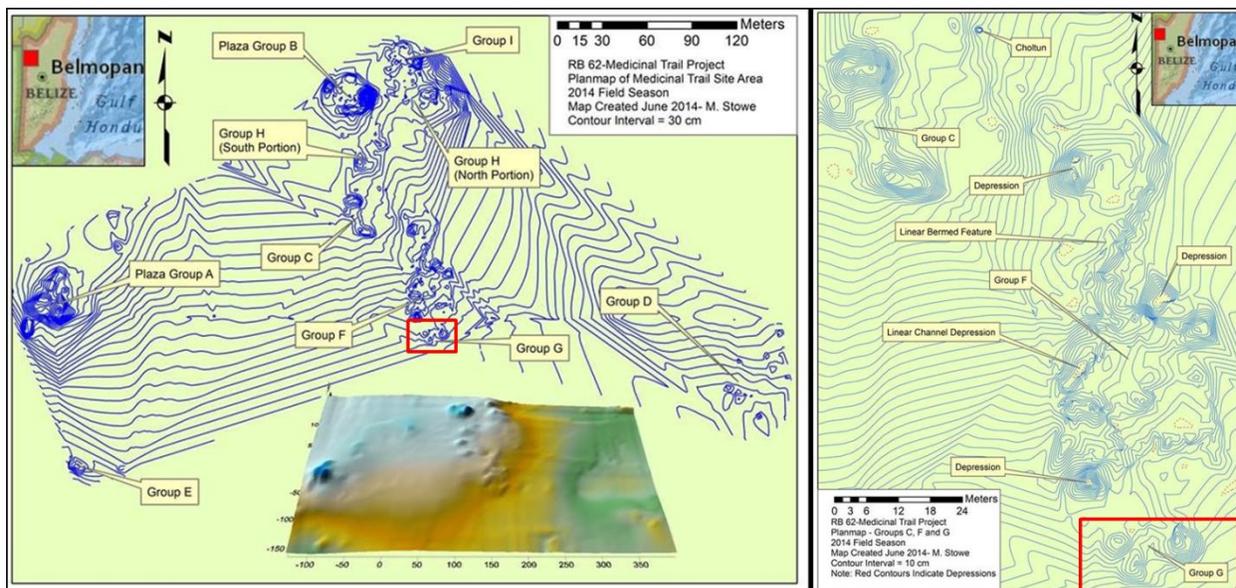


Figure 10. Maps of Group G.

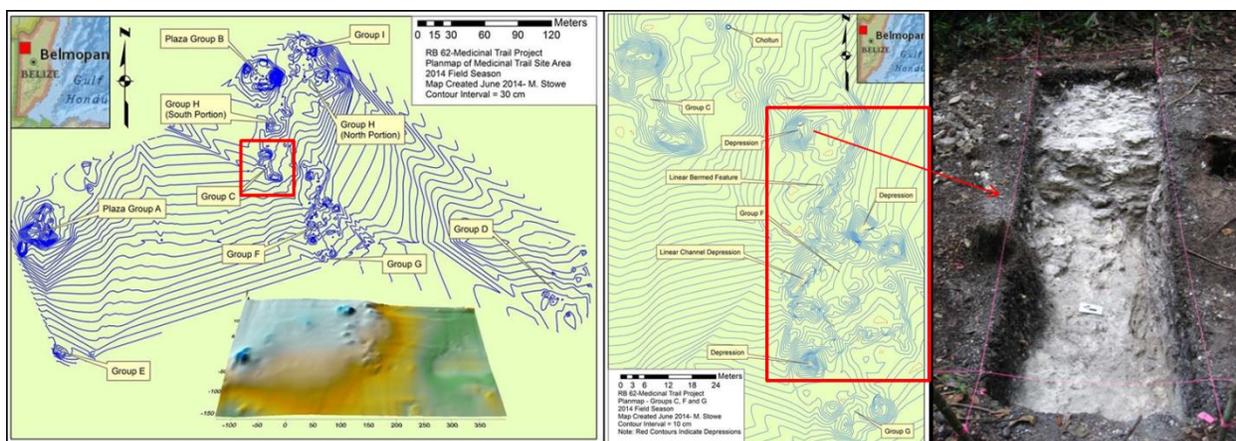


Figure 11. Maps and feature of Group F.

densities of artifacts were recovered, is indicative of the feature having been sealed to facilitate water storage.

Group H consists of four low mounds spread out between Groups B, I, and C, with an escarpment to the east (Figure 12). At least two of these mounds consist of a structure with an extended, open porch. At least one of these, Structure H-1 has postholes on the bedrock that likely supported some form of cover for the porch. The other mounds of this group consist of a couple of low mounds. Also, there are numerous *chultuns* in and around this group.

Along the eastern transect, from Group F, the area of the *aguadas*, to Group D half a

kilometer east, and beyond another half kilometer there are extensive landscape modifications in the form of terraces and linear berms (Figure 13).

Evidence for hierarchy

The settlement then is hierarchal, pyramidal in shape. There are a couple large formal plaza groups, and few small semi-formal groups, and many informal dispersed mounds. Importantly, as settlement moves further away from Groups A and B it is less formal. Near the Plaza Groups are the *aguadas*, and as you move away from them there are more and more terraces.



Figure 12. Map and features of Group H.

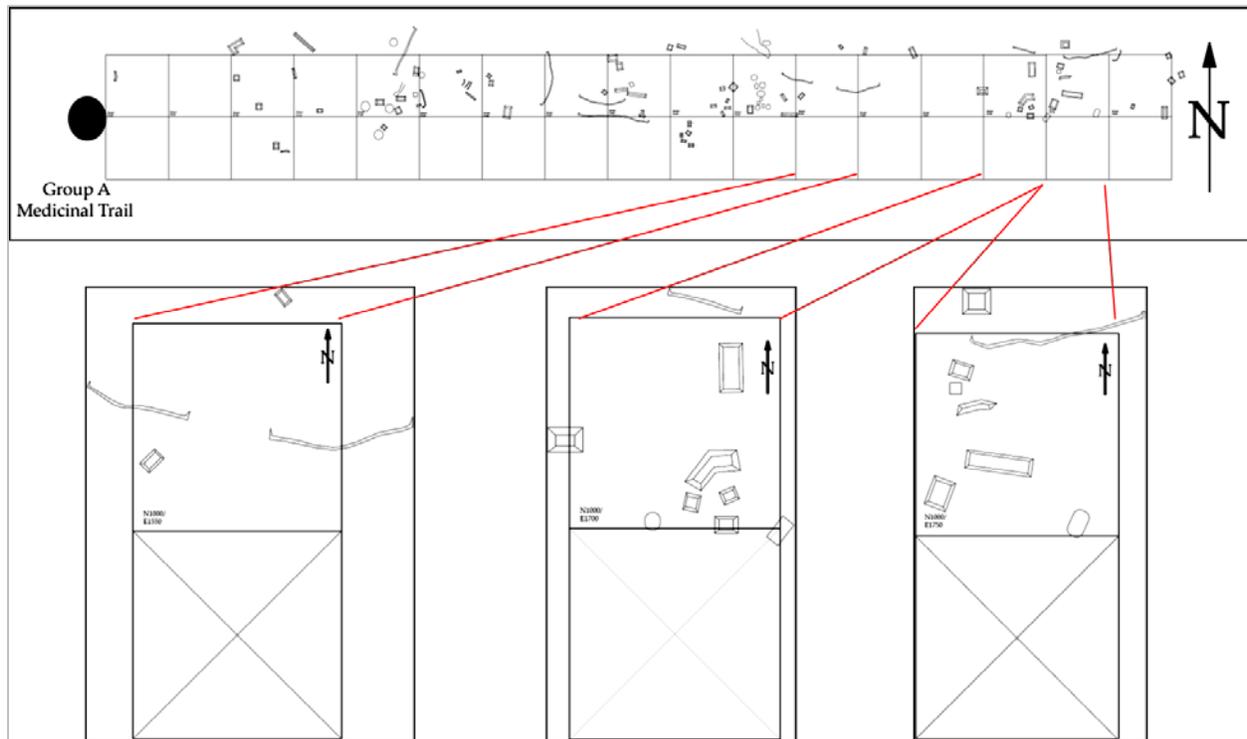


Figure 13. East Transect, and close ups of three survey blocks.

Medicinal Trail Corporate Group

We argue that the settlement data presented here from Medicinal Trail suggests the presence of a corporate group organizational structure and it is related to the control over the many terraces located throughout the community, and more importantly the finished products extracted from them. The corporate group is a level of social organization between household and community and are “property” or

“resource owning entities” that exist above the level of household and whose members need not be related by kinship or descent (Goodenough 1961). Corporate groups are defined, in part, by their collective holding of some property or resource. Corporate groups are more likely to develop in the hinterland and rural areas set apart from the overt control of centralized authorities of major cities (Collier 1975; Fortes 1953; Hageman 2004; Rankin and Escherick

1990; Shipton 1994; Smith 1974; Watson 1982). The function of a corporate group is to maintain an administrative and authoritative hierarchy and direct major decisions for the group (Hayden and Cannon 1982). Corporate group heads may supervise, sponsor, and/or perform rituals (Hayden and Cannon 1982). However, the most important function of corporate groups is controlling resources, such as social labor, arable land, and agricultural water (Hayden and Cannon 1982).

The largest households within the community are Groups A and B, and these in turn are likely the leaders of the community – and corporate group heads (Figure 2). The settlement associated with the terraces, such as Group D, consists of smaller mounds, are informally arranged, and located some distance from the Plaza Groups (Figure 2). I believe these are the landless residents of the community that worked the fields. In addition to the dense concentration of landscape modifications, Group F is made up of mounds located on, or very near, the edge of the *aguadas* (Figure 2) and do not appear to be residential. The group is located adjacent to Group C, a small semi-formal group.

We believe Group F, with the *aguadas*, is an area for the initial processing of whatever plants were grown on the terraces; the inhabitants of Group C being those that are overseeing this processing. The other non-residential group, Group H includes a couple of larger mounds with extended patios (Figure 2). This area is restricted by Groups B, C, and I, and to the east a steep escarpment. If Group F was an area of initial processing, we think it is possible that the final stage of that processing is occurring here, under the watchful eye and control of the Group I inhabitants. All of this in the shadow of Group B, the corporate group head. Groups A, C, E, I, and maybe G were likely residences for members of the corporate group, which may have been based on kinship, control of critical resources, or (most likely) a combination of both.

The challenge now is to test this interpretation of the settlement data. Future seasons will focus on better elucidating these hypotheses. For one, continued mapping of the landscape modifications and the other groups will be a major focus. Additionally, last season

a number of matrix samples were collected on one of the terraces west of Group A as a preliminary study of the viability for recovering pollen and phytoliths from the terraces. If successful, then more samples will be collected from a number of terraces and the depressions around Groups C and H. Once I have an idea of what the agricultural economy was based on, I can better address how this community was integrated into the larger La Milpa sphere.

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7 CERAMIC STANDARDIZATION AND THE DOMESTIC ECONOMY OF THE ANCIENT MAYA: BELIZE RED TRIPOD PLATES AT CARACOL, BELIZE

Adrian S. Z. Chase and Aubrey M. Z. Chase

Understanding the degree of self-sufficiency in ancient households is essential to understanding the domestic economy of the Maya Late Classic Period (550-900 C.E.). Traditional models of Maya households view each family unit as largely self-sufficient. In contrast, many current models view Maya households as producers and consumers within integrated market and trade systems. Analyzing the degree of standardization among some artifact forms can provide a proxy measurement of production methodology and self-sufficiency. Irregularities in an artifact class indicate independent production, whereas standardization of an artifact indicates workshop production. If households produced their own ceramics, then vessel form should be variable between household groups. If workshops produced ceramics for widespread distribution, then vessel form should be standardized among household groups. Belize Red, a Late Classic ceramic type, is found at archaeological sites throughout central and western Belize, as well as in the southeast Peten of Guatemala. This study analyzes a sample of 39 Belize Red tripod plates from the site of Caracol, Belize that have been recovered from 29 different household groups to view the degree of standardization in their production. These data are then used to provide an insight into the domestic economy, commerce, and industry of the ancient Maya.

Introduction

Ceramic types are widely used as a shorthand to place pottery into typological bins and compare variation over time and space. The distribution of pottery vessels directly relates to their dimensions, production, and uses. While Belize Red ceramics were traded widely, alternative models suggest that they could have been produced at an individual scale for household use or created in a unified style by full time specialists. These two alternatives are explored by looking at the standardization among vessels. While a high degree of standardization often implies full time specialization over household production, standardization can also be related to markets and trade, which can create a standard mental template for how these vessels should appear, regardless of their production contexts. This pilot study looks at the standardization in Belize Red tripod plates from the site of Caracol, Belize in order to gain insight into the domestic economy of the site.

The main debates in ceramics research revolve around the differences between emic and etic ideas of analysis. On the one hand, Spaulding (1953) argued that statistical analyses could identify types that were significant to ancient potters. On the other, Ford (1954) held that types were nothing more than analytic constructs of the investigator and that the mind

of the potter was unknowable. The type-variety-mode analysis by James Gifford (1960, 1976) utilizes phenomenology to study the surface features of pots to categorize vessels in the manner of their users (Gifford 1960:346; 1974:89). Gifford utilized neither petrography nor chemical analyses, despite Anna Shepard having previously demonstrating their importance for ceramic analysis (Shepard 1954). Even so, type-variety-mode has formed the foundation for modern ceramic typologies and analyses in the Maya area (to the chagrin of Adams 2008 and Rice 2013).

While the Belize Red tripod plate vessels used in this analysis have already been the subject of preliminary research centered on standardization (Chase et al. 2005), the current analysis increases the sample size and utilizes additional statistical techniques. New vessels recovered between the 2005 and 2012 Caracol Archaeological Project field seasons augment the original sample. Ron Bishop also undertook neutron activation analysis for chemical composition of paste from some Caracol vessels; these data have not been previously analyzed or published, but are incorporated into this analysis. Thus, this paper investigates the degree of standardization found within Belize Red tripod plates for the site of Caracol, Belize based on statistical and chemical data.

History of the Belize Red Ceramic Type

The Belize Red Ceramic Type was defined by James Gifford (1976: 255-257) in the two decades following the 1953-56 excavation of Barton Ramie, Belize (Willey et al. 1965). Unfortunately, Gifford passed away in 1973 before he could finish his analysis. Various archaeologists worked together to finish the type-variety-mode analysis in his signature style. The results, plus Gifford's Ph.D. dissertation, were published as a single volume under his name in 1976, and this analysis created the foundation for all formal ceramic identification and typology in the Classic Maya area to this day.

Gifford (1960:346; 1976:5-20) was the first ceramicist to look at individual agency in pottery in the Maya area. While modern techniques of ceramic analysis employ petrography and chemical analysis, the ancient potters would have viewed their vessels based on the physical properties they could perceive rather than on microscopic properties (e.g., Dittert and Plog 1980; Trimble 2007). Instead of relying on these geological and chemical techniques, Gifford used visual identifications and measurements that could be made and perceived with the naked eye, including surface features, sizes, shapes, and macroscopic views of paste.

The specific identifying attributes for Belize Red: Belize Variety were "red-slipped dishes (predominantly) and bowls of medium wall thickness and thinner-walled jars with diagnostic ash paste. The type is easily recognized by the very gritty feel of weathered surfaces and the light buff, fine-textured paste. Surfaces are nearly always characteristically weathered, but on the few preserved sherds the red slip has a slight luster although not glossy" (Gifford 1976:255). The broader type was based on the red paste, which had evidence of either limestone or volcanic tempering (Gifford 1976:255-257). Like the Caracol sample, many of the recovered whole Belize Red vessels from Barton Ramie came from burials.

Over thirty percent of all the Late Classic ceramics from Barton Ramie fell into the Belize Red type and, as a result, Gifford asserted that Barton Ramie manufactured this type locally (Gifford 1976:255). Subsequent excavation at



Figure 1. Examples of Belize Red tripod plates recovered from excavations at Caracol, Belize.

other sites has shown that Belize Red is not only a very common type in the Belize Valley, but that it also has been found as far away as Honduras (Sheptak 1987). The Maya traded Belize Red over a wide spatial area and utilized it for over 200 years (Chase 1994; Chase and Chase 2012).

Caracol

The analysis presented here is based on a sample of Belize Red tripod plates (Figure 1) from the site of Caracol, Belize. Caracol was founded by 600 B.C. and abandoned shortly after A.D. 900; in A.D. 650 it had a population of over 100,000 people (Chase and Chase 1994:5). This site exists along an east-west trade route that goes through the Maya Mountains (Chase and Chase 2012). Because Belize Red was known to be traded, the vessels at Caracol could have been produced elsewhere and traded into the site.

Caracol also has an interesting pattern of artifact distribution. The Late Classic elites at Caracol employed a management method that has been termed as "symbolic egalitarianism," meaning that an average individual and an elite

member of society both had access to the same set of goods, but the elite individual might have had more of them (Chase and Chase 2009). It has also been suggested that marketplaces existed at Caracol where items such as pottery were distributed to the populace (Chase and Chase 2014). Thus, the point of this paper is to see whether Belize Red was distributed through these markets or through a different production system.

Methodology: Data

The Belize Red vessels used in this pilot study were recovered from 29 different residential groups at the site of Caracol, Belize, and the chemical data was sampled and processed almost 20 years ago by Ron Bishop. The ceramic vessel measurements were obtained from 1:4 scale scanned drawings of whole vessels found at the site, although the initial analysis (Chase et al. 2005) used 1:1 scale drawings. Measurements for all whole Belize Red tripod plate vessels found *in situ* in interments and on building floors were taken, with the caveat that whole vessels include those that were lacking their feet. The different measurements undertaken are illustrated in Figure 2.

Three sets of data are utilized for this analysis. The first set of data consists of 39 Belize Red vessels of various forms and is utilized only for the chemical analysis. This dataset includes 11 tripod plates and has 34 other Belize Red vessels included to show how close the chemical signature of this subtype is in comparison to the entire assemblage of Belize Red at the site. The second set contains 39 Belize Red tripod plate vessels and includes 'whole' vessels with and without feet that double the size of the initial dataset (Chase et al. 2005:7). This dataset was used for general analysis such as scree plots and includes the sample of Belize Red tripod plates, which lacked feet but still had their chemical signature analyzed. The final data set contains 26 Belize Red tripod plate vessels. This dataset contains only whole vessels with feet. This third set was characterized by k-means clustering, the data for the box-n-whisker plot, and the data for calculations for the coefficient of variation. Together, these statistical datasets allow for an

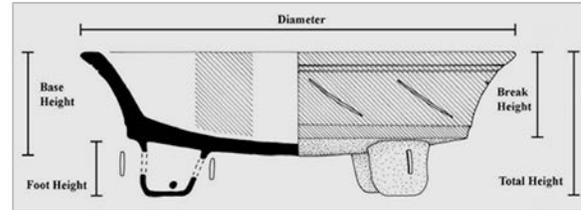


Figure 2. Diagram from showing the measurements used and how they were taken off of the tripod plates (Chase et al. 2005: Figure 2). All measurements were taken off of drawings of vessels.

adequate pilot study to investigate variation in Belize Red tripod plates at Caracol.

Methodology: Statistics

All statistics were analyzed with the R programming languageⁱ (R Development Core Team 2013) using the RStudio IDE (interactive development environment)ⁱⁱ (RStudio Inc. 2013)ⁱⁱⁱ. The language and software are both open source and easily available on Windows, Apple, and Linux based systems. The following statistics, graphs, and calculations were employed during this analysis: principal components analysis, stem and leaf plots, scree plots, Pearson's R, box and whisker plots, coefficients of variation, and k-means clustering.

The most complicated statistical method employed, and the only multivariate statistical method used in this analysis, was principal components analysis (PCA). A detailed summary of this analysis can be found in Shennan (1997:269-300). The goal of PCA is to reduce the complexity of the dataset by reducing the number of variables to the subset of variables that contribute the most to the differences in the dataset^{iv}.

Stem and leaf plots (Shennan 1997:27-29) are useful for doing exploratory data analysis. This type of plot is very easy to create by hand^v. The resulting plot shows a distribution of the data which helps visualize the modes in the dataset.

A scree plot, or scattergram, of each variable against every other variable (Shennan 1997:127-150), was used in data exploration. This analysis can show strongly correlated variables to the naked eye, but it also goes hand in hand with Pearson's R, a calculation of the correlation of any two variables. Pearson's R ranges in value from 0 to 1. A high Person's R

(near 1) shows a strong correlation. This means that an equation can be written to calculate one variable based on the other with a high degree of effectiveness. If there was a standard ratio or equation in the form of $y = ax + b$ for Belize Red tripod plates, then the result would be a very strong Pearson's R.

Box and whisker plots (Shennan 1997:45-46) are very useful for visually showing the mean and variation within a dataset^{vi}. This type of graph works well with the calculation of coefficients of variation (CVs), the standard deviation divided by the mean. It represents the amount of variation in a dataset as a unitless number (Shennan 1997:44). The calculated values range from 0 to 1 with values closer to zero representing low variation within a dataset. In terms of analyzing ceramic data for standardization, values near zero show a strong degree of standardization. A high CV would imply that this ceramic type is not highly standardized, or it could imply that there are multiple sub-types included within this ceramic type.

In order to tease out the last possibility, we can use a cluster analysis such as K-means (Shennan 1997:250-253). K-means calculates the clusters for a given number, hence the k in the name. For example a 3 cluster k-means would divide the dataset into three groups in order to minimize the difference between the center of each cluster and the values assigned to that cluster^{vii}. In order to determine which clustering should be used, multiple clusters are run and the sum of the cluster errors, the differences between the cluster centers and their associated values, are graphed against the number of cluster centers. Ideally this should produce a 'kink' or bend in the graph beyond which additional cluster centers do not greatly reduce the error.

Chemical Data Analysis of Belize Red

The chemical data from the Belize Red vessels was analyzed with PCA and shows a clear distinction between Belize Red tripod plates and other Belize Red vessels (Figure 3). The first four components and their values are located in Table 1. The first component explains 99.27 percent of the variance, and together the first four components explain 99.99 percent of

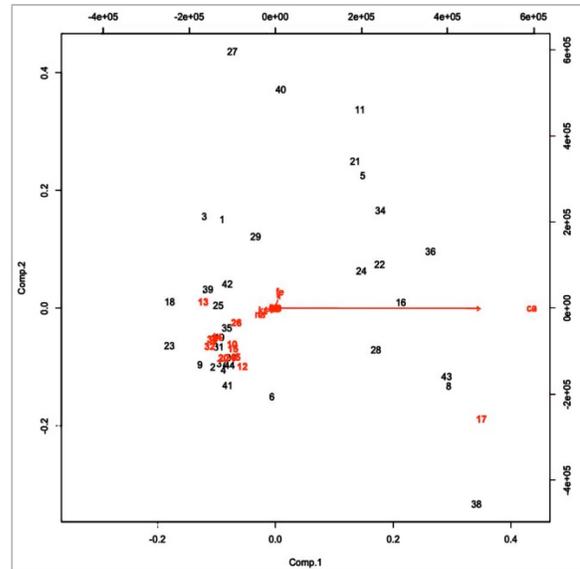


Figure 3. The principal components analysis (PCA) of the Belize Red ceramic data. The first component is calcium and accounts for 99.27 percent of the variance. The red numbers are the tripod plate vessels. Number 17 is the only Belize Red tripod plate from an earlier time period. Table 1 shows the variance explained by and the mineral loadings of the PCA.

the variance (Table 1). The first component's values are based on the calcium levels present in the analysis of the different pastes. That means that the presence or absence of calcium creates the largest source of variation in this data. This seems to fit very well with Gifford's (1976:255-257) description of the type, especially related to the limestone or volcanic tempers used in the Belize red paste; however, without petrographic analysis of the temper, it is impossible to know this for certain.

When looking at the plot (Figure 3), all of the Belize Red tripod plates have their numbers indicated in red. These vessels cluster very closely together except for vessel number 17. This vessel is the only stratigraphically earlier tripod plate included in this chemical analysis. While Gifford (1976:255-257) mentioned the shift in ratios of limestone temper to volcanic temper over time at Barton Ramie, it is impossible to determine if the same change over time occurs at Caracol from the evidence presented by a single vessel.

In terms of the source of the volcanic temper found in Belize Red, Caracol is not located near any volcanoes, but there is evidence of the ancient Maya collecting and hoarding ash

Table 1. This table show the variance explained by each component and its loadings in calcium, iron, sodium, and potassium. No other chemicals had loadings for the first four principal components. These first four principal components explain 99.99 percent of the variance in the chemical data.

Principal Components	Variance Explained	Ca (Calcium)	Fe (Iron)	Na (Sodium)	K (Potassium)
Component 1	99.27 %	0.997	0.000	0.000	0.000
Component 2	0.48 %	0.000	0.915	-0.389	0.000
Component 3	0.20 %	0.000	-0.201	-0.225	-0.951
Component 4	0.04 %	0.000	0.349	0.891	-0.286

Table 2. This is the table of correlations of variables for the entire set of Belize Red tripod plate vessels from Caracol shown in the scree plot in Figure 5.

Pearson's R	Diameter	Break Ht	Base Ht	Foot Ht	Total Ht
Diameter	1.000	0.313	0.021	0.303	0.451
Break Height	0.313	1.000	0.282	-0.170	0.059
Base Height	0.021	0.282	1.000	0.151	-0.035
Foot Height	0.303	-0.170	0.151	1.000	0.425
Total Height	0.451	0.059	-0.035	0.425	1.000

Table 3. This is the table of values for the box and whisker plot in Figure 6.

Box Plot Info	Diameter	Break Ht	Base Ht	Foot Ht	Total Ht
Min.	18.00	4.000	4.800	1.600	7.600
1st Qu.	27.05	4.800	6.100	3.200	8.625
Median	28.10	4.900	7.000	3.750	9.250
Mean	28.26	5.023	6.769	3.900	9.485
3rd Qu.	30.00	5.250	7.500	4.375	10.000
Max.	36.00	7.200	8.400	7.200	14.400
CV	0.131	0.114	0.135	0.337	0.146

fall from volcanic eruptions (Tankersley et al. 2011). More recent eruptions can shed some anecdotal evidence on ash fall. In 1982, El Chichon erupted and covered the Classic Maya site of Palenque with over a foot of ash. El Chichon is located over 100 kilometers away from Palenque. This suggests that volcanic ash can and does fall great distances from the active volcanos. The terraced fields at Caracol are also almost two-thirds smectite (Coultas et al. 1993:200), a soil that is not formed from the underlying limestone bedrock but rather from a decomposed form of volcanic ash (Coultas et al. 1994:27). This means that while there is evidence of ash use in the ceramic paste (Figure

4) and there is evidence of the ancient Maya hoarding ash (Tankersley et al. 2011), it cannot be conclusively confirmed from this study if the ceramic producers of Belize Red were intentionally adding ash to their vessels or simply using the local clay sources which were ash rich.

Analysis of (Scree Plot, Box and Whisker Plot, CVs) all Tripod Plates

One hypothesis for long-distance trade of tripod plate vessels is that they were stacked for transport (Sabloff and Rathje 1975). If this were the case, then we would expect to see modes in the data at separate sizes. In order to quickly

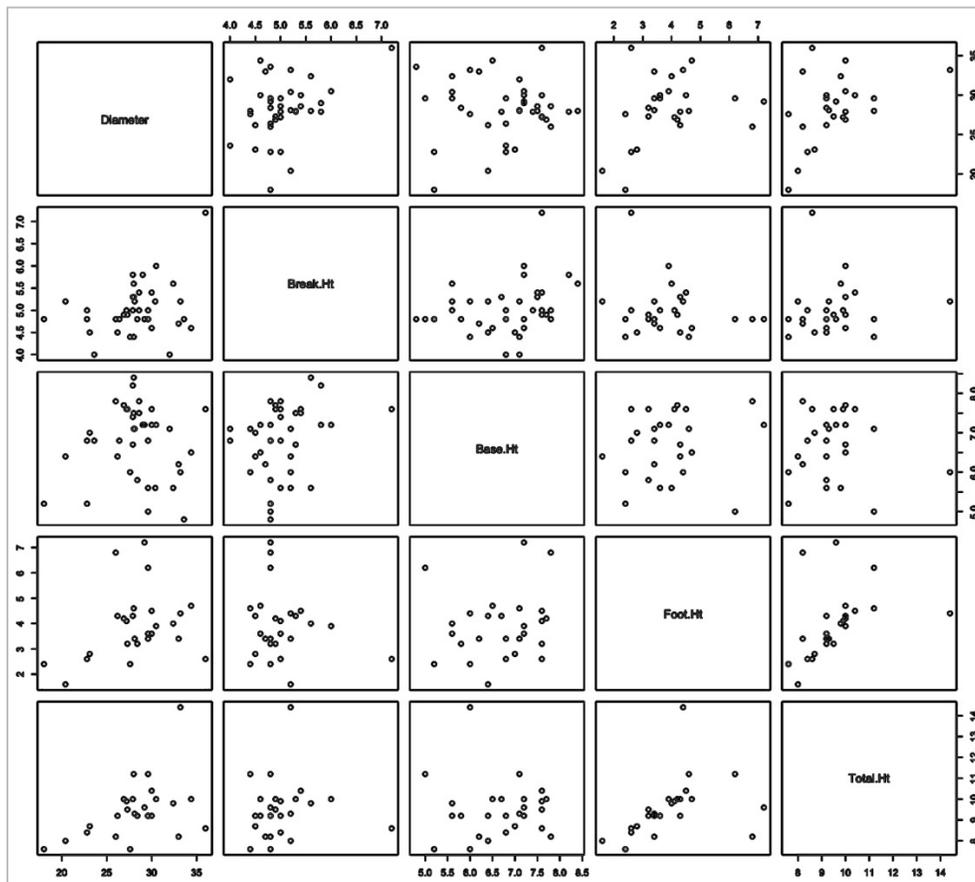


Figure 4. Scree plot of every possible combination of variables from the Belize Red tripod plate measurements. Table 2 shows the correlations values for each pair of variables.

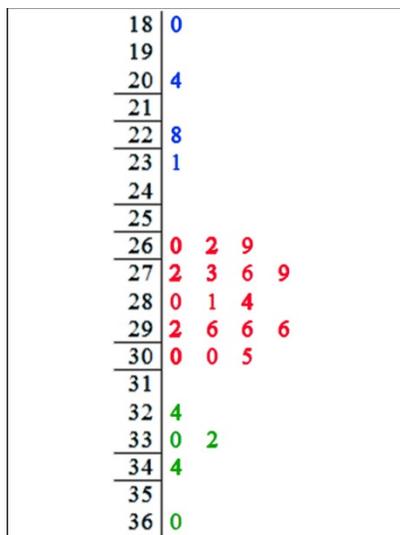


Figure 5. This stem and leaf plot shows the distribution of rim sizes. The data has been color-coded to match the 3 k-means clustering. Blue is the first cluster, red is the second cluster, and green is the third cluster. The reason for choosing the 3 k-means clustering is explained in Figure 7.

examine this, a stem and leaf plot of rim diameters was created (Figure 5). Rim diameters were used because they should be the best-correlated value with vessel function, and visually a smaller vessel rim is easier to see than a smaller vessel foot. The plot shows that the data have a clear median and mean around 28 cm, but the values above 31 cm and below 25 cm could either be separate ranges or the tail ends of the distribution curve of this vessel type. Based on the stem and leaf plot alone multiple modes in the dataset are not supported. Combining this information with data from Barton Ramie, however, makes it clear that different size clusters existed at different sites. While the Caracol vessels cluster around 28 cm, the ones at Barton Ramie cluster between 31 to 33 cm and 24 to 25 cm (Gifford 1976:256).

If the tripod plates were made with a specific ratio as a mental template then we can

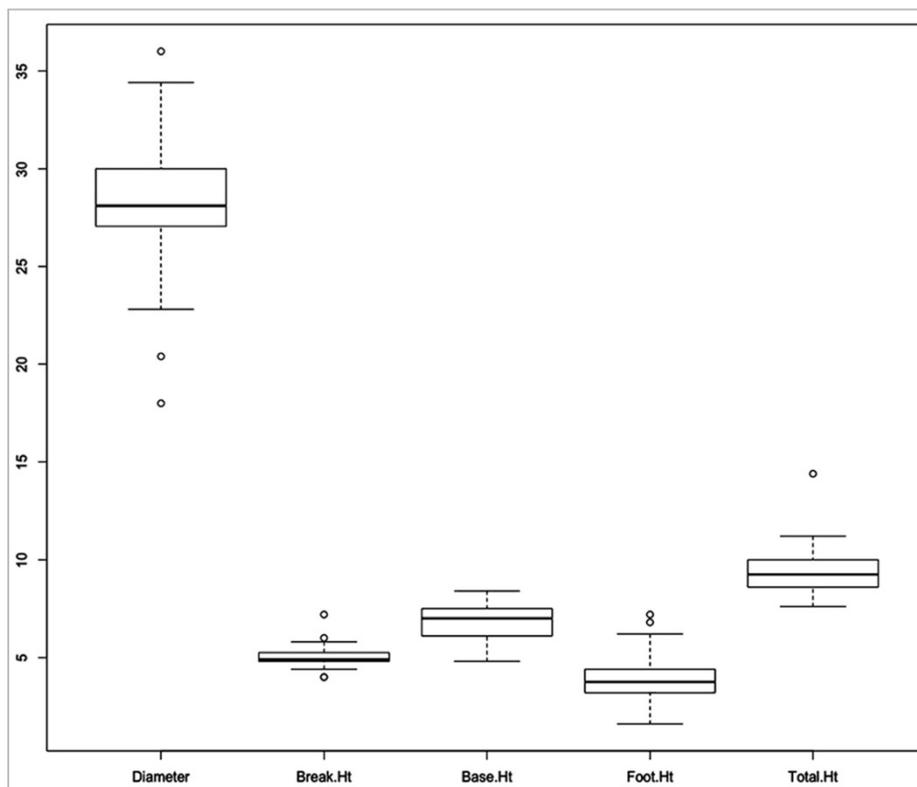


Figure 6. This is a box and whisker plot of the variables of Belize Red tripod plate vessels measurements. Table 3 shows the values for this graph.

expect the measured values to show a strong correlation in the scree plots of the variables against each other. The resulting scree plot does not seem to show these strong correlations (Figure 5). In fact, the two best correlations in the scree plot are between total height and rim diameter and total height and foot height, and those correlations are 0.45 and 0.42 (Table 2). This makes sense because total height incorporates foot height. The low Pearson's R values show correlation of sizes, but some values show no correlation. Looking at the correlations between variables and their scattergrams shows that, while there is a basic ratio between sizes, that ratio is not incredibly strong. This supports the suggestion that there are multiple manufacturing locations or multiple subtypes grouped together. Even so, the type as a whole still seems to be relatively standardized.

The previous two analyses suggest that there is a general mental template for these Belize Red tripod plate vessels; however, there is variation, which reduces the correlation of

vessels. In order to investigate the degree of variation in the data, a box and whisker plot was made and the CVs were calculated. The box and whisker plot (Figure 6) shows very tight sets of measurements for most of the variables. The actual CVs show that most of the correlations are between 0.1 and 0.15 (Table 3) suggesting a high degree of standardization in the data. The only exception is the CV for foot height at 0.34, but foot heights tend to be much smaller values than the other measurements, and the calculations for CV exponentiate near zero. Multiple production locations, multiple producers, or inclusion of separate sub-types could explain this limited degree variation. One feature the box and whisker plot (Figure 6) makes very clear is that there is a very limited span of Break Heights (see Figure 2 for visual depiction of break height measurements) with only three vessels falling outside of that limit. In general this analysis seems to reaffirm the initial conclusions of standardization for the Belize Red type (Chase et al. 2005).

These three analyses suggest that Gifford's T-V-M analysis did in fact lead to the establishment of a ceramic type and form that conformed with an ancient mental template, but there seems to be some factor that makes them appear less standardized than they actually are. This could be the result of vessels being produced by multiple independent potters with a relatively standard mental template for the ceramic type, multiple pottery producer production centers with similar mental templates, or the possibility that there are multiple subtypes of vessels included in the tripod plate category. Testing the multiple independent potters hypothesis would require excavation of many more housemounds near separate marketplaces to try and get at the intra-site market system and to identify separate pottery making household exchange systems. The theory for multiple pottery manufacturers would require analysis of this vessel type from across the Belize valley to see if the sites all show the pattern seen here or if each pattern is different, suggesting regional trade. Finally, the last question can be tested through the use of k-means clustering and re-analysis of the clusters it identifies. However, the k-means cluster analysis does not clarify why these clusters would exist. Even so, strong clustering could still be the result of either independent potters with similar mental templates or trade from individual pottery production centers in the Belize Valley (and possibly the result of both).

Cluster Analysis

Cluster analysis attempts to get at any underlying subtypes that could be separated out and analyzed on their own as separate ideals of Belize Red tripod plates or the products of separate production centers. Based on the stem and leaf plot, a three clustering should separate the ceramics into the portion below a rim size of 25 centimeters, the portion above 31 centimeters, and the portion in-between. However a four, five, or even six clustering might be much better than a three. In order to determine which clustering should be used, a graph of clustering error divided by the original error was made (Figure 7); it shows that there is only marginal improvement after the three clustering. This means that for this analysis, we

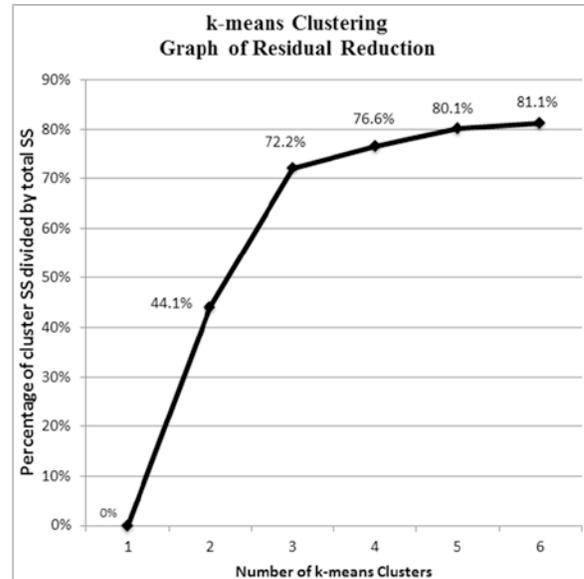


Figure 7. The k-means cluster analysis graph. This shows the percent reduction of distance from the cluster center divided by the one-cluster distance values. The 'kink' in the graph occurs at the three-cluster value.

assume that there are three sub-varieties or styles of Belize Red tripod plates separated from each other by 24 and 31 cm rim sizes. The resulting analysis clearly shows much lower CV values, which implies a very high degree of standardization within each of these sub-varieties. One limitation is that the sample size for this pilot study was only twenty-six footed vessels and the clustering divided that into even smaller sample sizes. In fact the first and third clusters have four and five vessels respectively. This means that their analysis would change drastically with any additional vessel; thus, this analysis focuses on the second cluster which has the largest sample size of seventeen. However, the present analysis will need to be repeated when additional excavation unearths more whole vessels or vessels from other sites are analyzed in conjunction with Caracol's dataset. Based solely on the data under analysis from Caracol, the distinction between three types based on rim size and a single distribution with two large tails cannot be determined; however, the initial analysis by Gifford lends weight to the idea of size variance because the larger and smaller modes were noted in the Barton Ramie assemblage.

Analysis of the second cluster k-means seems to show a lower degree of correlation

Table 4. This is the table of correlations of variables of the second group from the three-cluster analysis of the Belize Red tripod plate vessels.

Pearson's R	Diameter	Break Ht	Base Ht	Foot Ht	Total Ht
Diameter	1.000	0.423	-0.257	-0.058	0.329
Break Height	0.423	1.000	0.242	-0.261	0.251
Base Height	-0.257	0.242	1.000	0.123	-0.010
Foot Height	-0.058	-0.261	0.123	1.000	0.288
Total Height	0.329	0.251	-0.010	0.288	1.000

Table 5. This is the table of values for the box and whisker plot in Figure 8.

Box Plot Info	Diameter	Break Ht	Base Ht	Foot Ht	Total Ht
Min.	26.00	4.400	5.000	2.400	7.600
1st Qu.	27.30	4.800	6.400	3.400	9.200
Median	28.10	4.800	7.100	4.100	9.500
Mean	28.36	4.918	6.847	4.288	9.582
3rd Qu.	29.60	5.000	7.600	4.500	10.000
Max.	30.50	6.000	7.800	7.200	11.000
CV	0.049	0.081	0.120	0.304	0.095

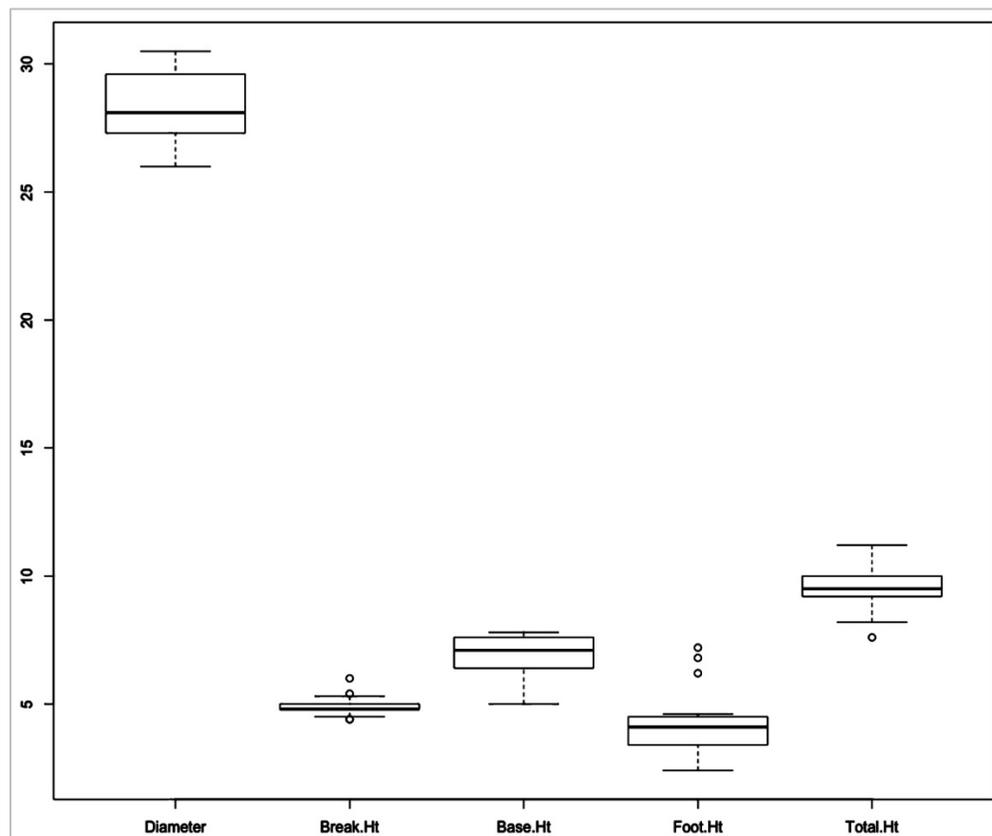


Figure 8. This is a box and whisker plot of the variables of the second group from the three-cluster analysis of the Belize Red tripod plate vessels. Table 5 shows the values for this graph.

between most of the variables (Table 4). The only exception is the increase in the correlation between Diameter and Base Height and Break Height from the complete scree plot data (Table 2). The resultant scree plot also lacks a clearly visible correlation. At first glance this might seem to imply that the group clustering by k-means reduced the relatedness of the vessels in the second group of the cluster; however, after looking at the box and whisker plot (Figure 8), it becomes clear that the vessels in this group are actually much more similar to each other than to the entire set of tripod plates. This can be seen when looking at the data in Table 5. Several CVs in this table are below 0.05 and this value shows a high degree of standardization that generally indicates specialization (Arnold 1991; Arnold and Nieves 1992). The CV of foot height is about the same as before, which may relate to the manner in which the CV is calculated that makes it less reliable for smaller numbers near zero or it could be related to other factors of their production. The CVs in this clustering indicate that the feature of rim diameter may actually have been a ceramic division employed by the ancient Maya for Belize Red tripod plate vessels.

The vessels in the second cluster show a much greater reduction in variation. If this subsample is accepted as a separate style of Belize Red tripod plate, then it becomes clear that, with its small CV, it is a highly standardized type – and this strongly suggests specialization. However, additional vessel data is needed from Caracol and from other sites in order to double check that this cluster makes sense in the greater trade network of Belize Red vessels. If no sites have a higher distribution of vessels in the larger rimmed or smaller rimmed clusters, then these would not actually represent three separate groups, but would instead show the bell-like curve of this ceramic type. The diameter comparisons between the Caracol and Barton Ramie Belize Red samples discussed above, however, suggests that this is not the case.

Conclusion

This pilot study analyzed the degree of standardization of Belize Red tripod plates at the site of Caracol, Belize. Even though these plates

were widely distributed among 29 different residential groups at the site, the statistical evidence suggests that this ceramic type was highly standardized, indicating a relatively unified mental template for the appearance of these pottery vessels. The statistical methods demonstrate several lines of evidence supporting standardization of production of Belize Red tripod plates at a level above the individual household. While standardization is evident, a single production area is not evident; rather, this may indicate a standardized mental framework from multiple specialists or workshops. The major limitation of this pilot study is sample size. Neither theory can be proven without additional dimensional and spatial data. Additional analysis on a larger sample will be necessary to solidify the trends seen in the Caracol dataset and tease apart the production and distribution systems of the ancient Maya. There are two possibilities that need further analysis: Belize Red tripod plates could fall into a single category or they could be subdivided into three size classes. While the foot height seems least well correlated with rim size, there may be a separate dimension of ceramic production and use which could only be identified with additional data. The preliminary results presented here are promising and have helped to construct hypotheses for testing in future work. Such future work could focus at either the site level or at the aggregate level of sites in the Belize Valley in order to identify the degree of full time specialization and the spatial distribution of production sites. These data would augment our abilities to discuss specialized ceramic production and the market economies of the ancient Maya. Even though statistical and chemical means were not employed in Gifford's original definition of Belize Red, this analysis of Belize Red tripod plates at Caracol, Belize supports Gifford's initial assertion that T-V-M ceramic types are in fact not artificial constructs but can represent real types created by the prehistoric Maya.

ⁱ <http://cran.r-project.org/>

ⁱⁱ <http://www.rstudio.com/ide/>

ⁱⁱⁱ Information for running these analyses was obtained from *R in a Nutshell* (Adler 2012), and information on the statistics was obtained from *Quantitative Archaeology* (Shennan 1997).

^{iv} This method is very often used in archaeological analysis of chemical data (Bishop and Blackman 2002; Halperin et al. 2009; Skowronek et al. 2009). It reduces the full set of variables into component axes which are independent of each other. Each component is then given the amount of variance it explains in the original data and the weights from the initial variables.

^v On the left side, or the “stem” side, the data intervals are written in order. On the right side, or the “leaf” side, each individual number is placed into its interval and one, and only one, digit is written (the digit that comes right after the leaf digits).

^{vi} The box is drawn around fifty percent of all of the measurements with the mean represented as the line in the middle. The whiskers extend out an additional quartile from the box. Values further out are represented by circles and statistical outliers are represented by X’s.

^{vii} K-means works by randomly placing the k-points in the data as centers. The algorithm iteratively moves the k-points to the centroid of the points allocated to them and then redistributes the points to the nearest of the k-points. This process is repeated until the k-points no longer move.

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8 **ARTICULATING WITH THE BROADER ECONOMY: CHERT PRESSURE BLADE TECHNOLOGY IN A CARACOL RESIDENTIAL GROUP**

Lucas R. Martindale Johnson, Maureen Carpenter, Arlen F. Chase, and Diane Z. Chase

Ancient Maya domestic economies were varied and complex systems that households depended on for material provisioning. At the site of Caracol, Belize during the Late Classic period (A.D. 550 A.D. – 900) crafters that performed domestic household activities provisioned both markets and households with stone tools and many crafted goods. A recent investigation of one of Caracol’s household groups has shown that lithic blade tools, or “drills,” were intensively produced for the crafting of non-lithic materials – probably shell and/or wood. These chert tools are similar to tools previously reported from Caracol; however, the reduction sequence to produce these tools resembles unidirectional and bidirectional pressure/indirect percussion core reduction used in the production of obsidian blades. We summarize the technological details of some 3,000 chert artifacts with specific attention to the ways in which the production of chert blade tools incorporated both pressure and percussion techniques. We conclude by discussing the implications of household domestic practices in lithic production that included obsidian blade production techniques.

Introduction

Ancient Maya domestic economies can be understood through analyses of household crafts, crafting techniques, the location of crafting households, and the distribution of finished tools and associated materials. More specifically, many archaeologists aim to reconstruct past domestic economic *social networks* through analyses of commonalities/differences in: (1) the exploited materials, their potential source locations, and exchange mechanisms and provisioning materials to sites/households (Hirth 1998 and 2008; Hutson et al. 2010; Masson and Freidel 2013); (2) shared/standardized production techniques, tool form, and context of production debitage deposition (Braswell 2010; Costin 1991 and 2001; Martindale Johnson 2014); and, (3) tool use and the composition of discarded objects (Aoyama 1999; Trachman 2002). At Caracol, with specific attention paid to the general lithic industry, a more comprehensive image is appearing that unsurprisingly shows domestic households used a diverse suite of raw materials for a variety of purposes that continues to support a largely economically integrated landscape.

Provided these broader issues, the aim of this report is to demonstrate that architecturally small and temporally ephemeral households can and do reveal unexpected evidence of the organization of household crafting knowledge. The term *knowledge* is used rather broadly in place of crafting organization, technique,

practice, or other related terms because reconstructing what households *did* with certain materials and seeing broader commonalities at other residences serves as a proxy for how knowledgeable ancient households could interact and learn to craft to continually provision the broader economy in specific ways. This perspective is intended to operationalize a “communities of practice” approach to emphasize the ways in which residences at Caracol’s households were active members of local neighborhoods and extra-household social domains, like those of crafting technicians and provisioners to a local market economy. A household can be a member of a “community of practice” if individuals learn and share through participation in physical and social activities in particular locations (Lave and Wenger 1991). These broader topics are beyond the scope of this report, but are briefly described here to help frame the overall discussion of how domestic economies might articulate with broader city economies.

Caracol’s Lithics: Knowledge Produced from the Current Data and Continued Questions

Research on Caracol’s lithic industries, both ground-stone and flaked-stone, has the potential to broaden our understanding of regional relationships of exchange between polities, as well as potentially leading to a more informed model of regional and local extraction of raw materials (Graham 1987; Shipley and

Graham 1987). Currently, our understanding of Caracol's investigated households shows several things. (1) House groups throughout the site had access to a diverse range of both distant and local resources and that these materials were most likely provisioned *by households to households* through interactions at local Caracol markets (D. Chase and A. Chase 2014). For example, 88% of house group excavations contain obsidian, jadeite is not restricted to elite residences within the site's epicenter (being present in 54 of 118 archaeologically tested residential groups at the site; A. Chase et al. 2015), and other non-local resources - such as slates, granites, and basalts - are regularly recovered from household investigations throughout the site. It is likely that certain non-flaked stone resources (e.g., slate, granite, and basalt) could have been procured just beyond the karstic limestone Vaca Plateau to the north, east, and south of Caracol's residential settlement (Geology and Petroleum Department 2013; Graham 1987; Healy et al. 1995; Dixon 1956; Bateson and Hall 1977). (2) Systematic analysis at eleven domestic crafting contexts shows standardized techniques in tool production and use (Martindale Johnson 2008, 2014; Pope 1994; Pope Jones 1996). (3) Crafting or *multi-crafting* (Hirth 2009:21) was common among households in that flaked-stone tools were used as a contingent element of other crafting practices (e.g., drills perforated stone or shell objects for suspension or decoration). However, not all house groups practiced intensive lithic production and crafting; some appear to be consumers or users of tools rather than producers. In addition, workshops appear to be nested among non-producing households throughout sampled areas or located adjacent to monumental architecture (Martindale Johnson 2008; Pope 1994). Figure 1 shows the extent to which lithic crafting workshops were distributed across a sampled area. These interpretations are based on overall number of chert artifacts (>1,000), the presence of an entire reduction sequence, battered cobbles, pressure flakers, as well as unutilized and utilized tools associated with residential architecture. It is unclear at the present time if workshop producers nested among non-producers constitutes an alternative form of "attached specialization" or is simply

evidence of typical diversity in household practices. Our working hypothesis is that the latter is probably more likely.

Given these broad understandings and preliminary interpretations, however, there remain areas for future research. Within which geographic settlement locations can we expect to see intensive chert workshops based on the current data? Does current data help to predict what we might find in unsampled areas in other parts of the site? Where are the most likely places to encounter material traces of intensive lithic crafting activities in a group selected for archaeological investigation? More specifically, are traces of these activities predictably found within or outside residential mounded structures? Are excavations behind and in between household mounds the best place to find residues of intensive lithic crafting activities? Is a full complement of reduction debris, including finished objects, necessary to make any determination? Once an abundance of flaked-stone debris is encountered through screening, what excavation techniques are efficient, yet effective, in excavating a potential lithic workshop to understand past discard behaviors? Does the current data from Caracol on at least two workshops show a standard behavioral practice of disposing of discrete packages or lenses of different kinds of flaked-stone objects within architecture as opposed to behind it? Does this help to better understand daily cleaning efforts by the occupants of ancient Maya dwellings? And, more broadly, how do these workshops articulate and integrate with the broader domestic economy? Is a domestic workshop strategically positioned near local markets or vice versa? What is the historical trajectory of workshops within an ancient city where markets may have been the primary mechanism for household provisioning? It is argued that a consideration of the archaeological investigations undertaken at the "Dormir Group" and other Caracol residential groups will begin to answer these questions.

Current Study at the "Dormir Group" Caracol, Belize

The "Dormir Group," comprised of Caracol Structure L55, L56, and L57, was investigated as part of a complete residential

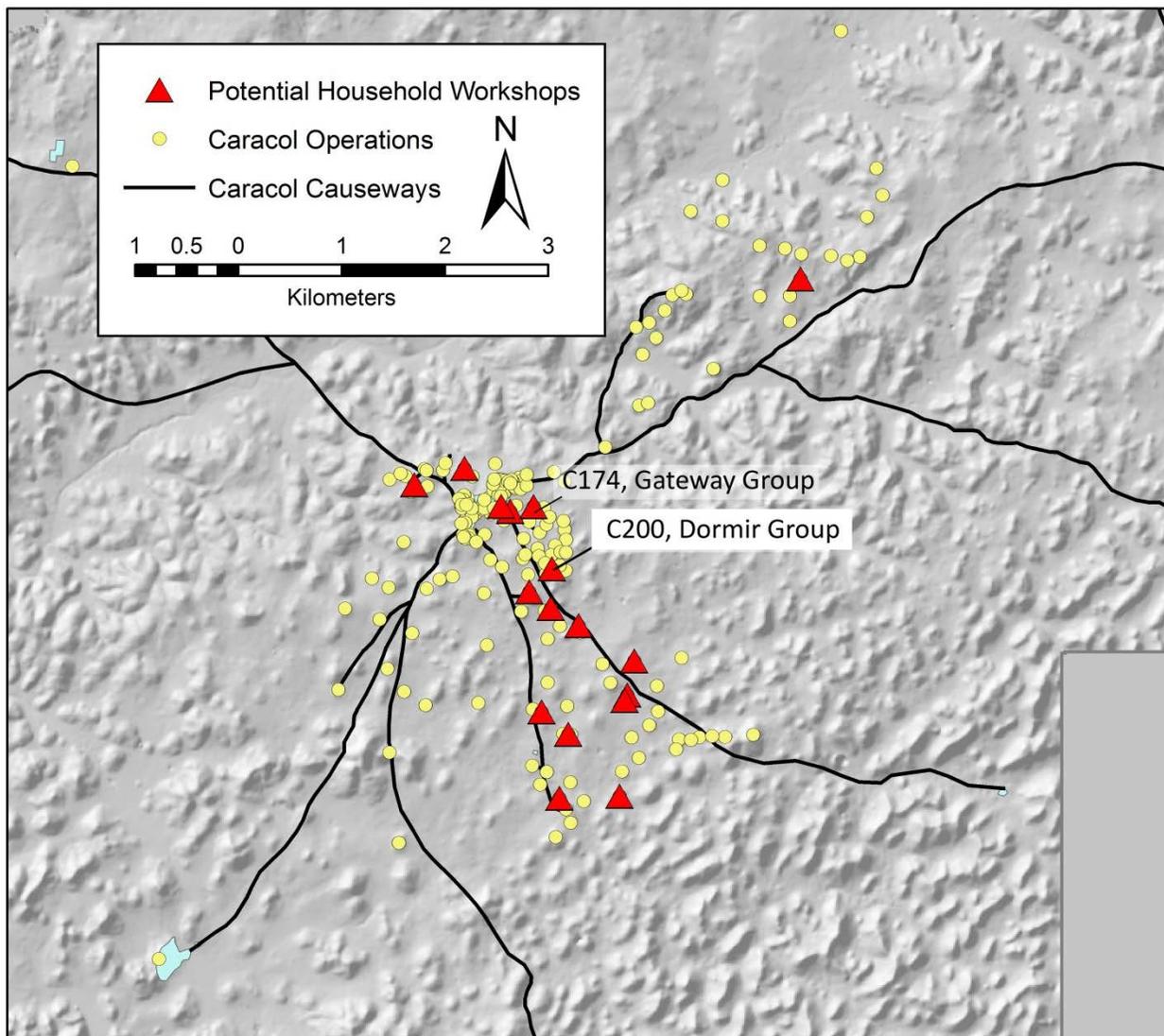


Figure 1. Map of Caracol showing excavation operations and potential chert flaked-stone workshops.

sample that comprised an ancient Maya neighborhood. The group itself is located on the bluff at the southernmost extent of a plateau area occupied by 16 contiguous residential groups. This neighborhood area is surrounded on all sides by lower agricultural terracing. Although this architectural group is relatively small in overall size, it provided archaeological data reflecting a function that was not recovered in the other investigated household groups. Dormir's three structures occupy the east, north, and west sides of a raised platform constructed directly on the limestone bedrock (Figure 2). This type of architecture is typical in the outlying settlement at Caracol and it has been

encountered in other workshop groups. Like the "Gateway Group," it had perishable superstructures and production waste recovered from within construction fill (Martindale Johnson 2008, 2014). Finding construction fill with production debitage is common at Caracol and occurs at other sites, like Colha (Roemer 1991:56), Santa Rita Corozal (Marino 2014), and Tikal (Moholy-Nagy 1997). The Dormir group also included an eastern ritual structure, which is typical of Caracol residential groups (D. Chase and A. Chase 2004), that contained a burial and a pottery cache vessel.

Investigations within Structure L55, the northern structure, were done by means of a

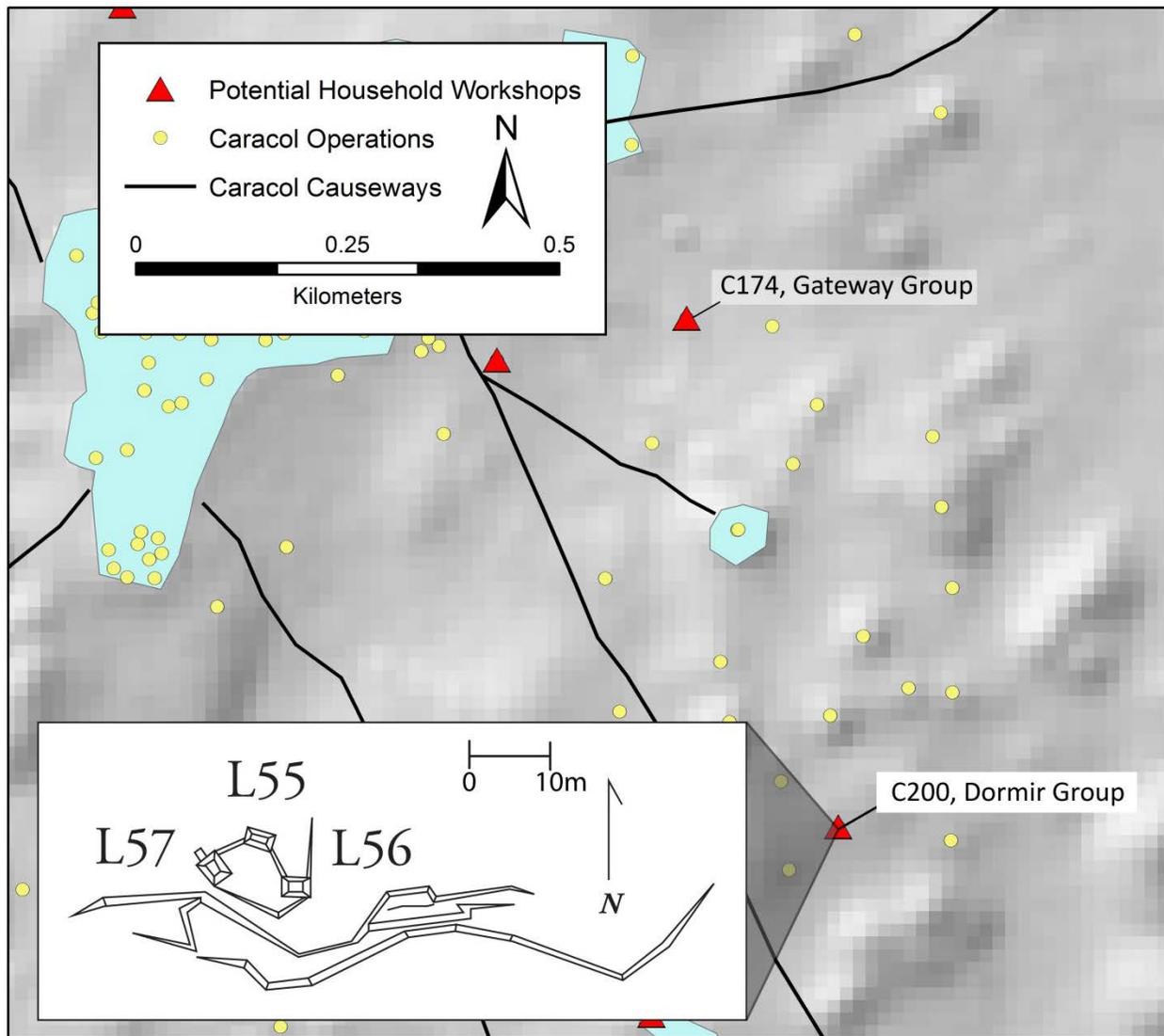


Figure 2. Location and architectural plan of “Dormir Group”, Operation C200, Structures L55-L57.

small centerline trench that measured 2 meters east/west by 4.2 meters north/south. Other excavations on the eastern and western structures were similar in size and placement on the central axis, but recovered different artifact assemblages. The investigation within Structure L55 was subdivided during excavation into eleven lots or smaller spatial units based on various elements within the structure associated with either cut-stone architectural features, floors, construction efforts and fills, stratigraphic changes, or discrete deposits of household refuse. Matrix from the entire excavation was screened with ¼” mesh. In total, approximately 6.94 cubic meters of earth, rock, and artifacts

were systematically removed during the excavation of this structure (Figure 3).

The Flaked Stone Assemblage and its Context: Evidence of Shared Knowledge and Production Techniques between Obsidian and Chert Crafters

In total, 3,133 chert artifacts were recovered from within the Structure L55 axial trench. This contrasts with the paucity of chert flaked-stone recovered from the two other similarly-sized excavations; only 14 chert artifacts were recovered from the eastern mound and only 16 chert artifacts were recovered from the western mound. The bulk of chert lithic

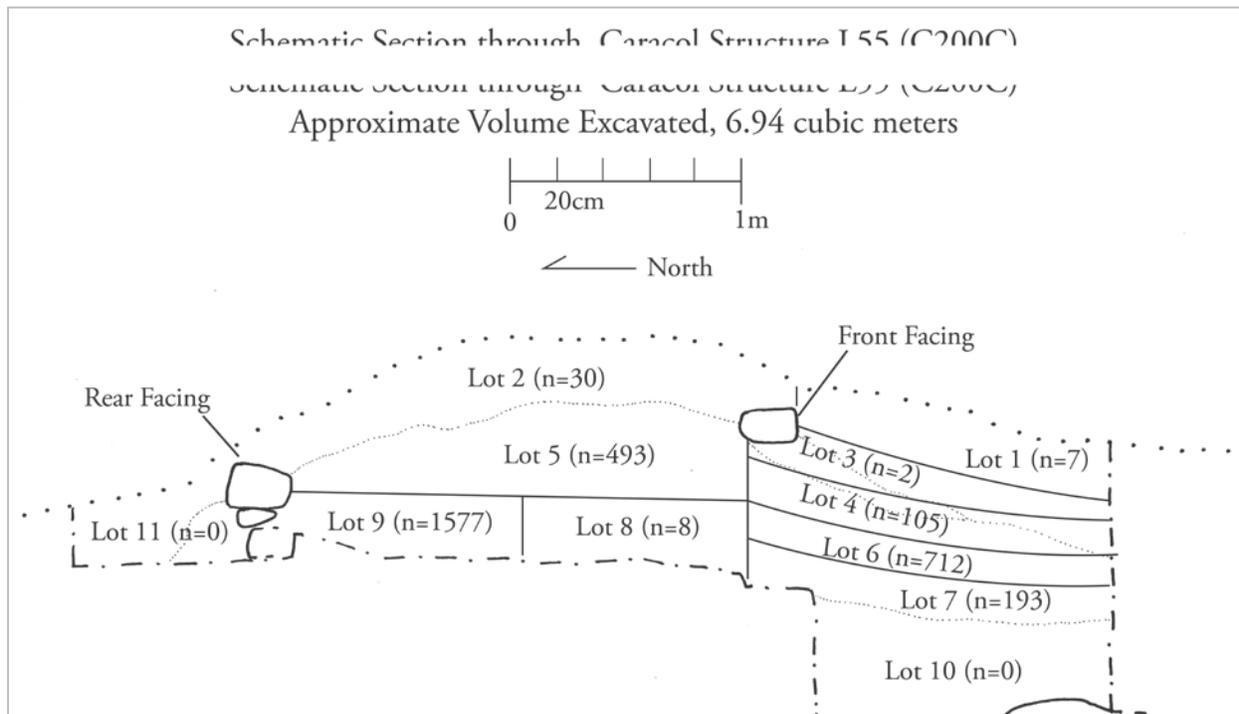


Figure 3. Eastern section of Suboperation C200C in Caracol Structure L55, showing diagram of excavated lots with number of chert artifacts per lot. Note the abundance of chert artifacts concentrated in Lot 9.

debris recovered from *within* the northern structure were flakes (n=1,742); also recovered were utilized blade tools (n=584), unutilized blades (n=249), angular waste pieces or lithic chunks (n=365), cores of various types (n=157), flake tools (n=13), rejuvenation pieces (n=11), core tools (n=8), biface fragments (n=3), and lastly a battered cobble (n=1). To illustrate the density of the deposit, Table 1 lists the 1,577 or 55.6% of the chert artifacts recovered from Lot 9. This lot contained all classes of chert artifacts with the exception of a battered cobble that came from another lot. Because of the dense concentration and occurrence of all types of artifacts in this small spatial unit, it is likely that this small excavation lot probably recovered the debris from a discrete production area; this debris had been recycled into an ancient residence to create interior volume (see Figure 3) and to prevent the debris from being encountered on the surface, effectively eliminating dangerous materials from open areas. Martindale Johnson (2014:87, Figure 4) shows a similar excavation diagram that also depicts discrete lenses of deposited chert

Table 1. List of chert artifacts recovered from Suboperation C200C Lot 9. Notice that a broad technological sequence was recovered from this lot with the exception of a battered cobble recovered from another lot within this excavation.

<i>Chert Flaked-stone Types from Lot 9</i>	
Angular Waste (chunks)	211
Flake (w/; w/o cortex)	808
Blade	116
Core (and fragments)	88
Core Rejuvenation Debitage	11
Flake Tool	7
"Drill" (blade tool)	331
Biface Fragment	1
Core Tool	4
Battered Cobble	0

artifacts recovered from the internal construction fill of a building in the "Gateway Group".

The recovered artifacts are consistent with the production of short chert blades. These kinds of products, in association with small chert blade "drills," are commonly found within analyzed workshops from Caracol (Martindale



Figure 4. A sample of multidirectional cores from Suboperation C200C, Structure L55.

Johnson 2008; Pope 1994; Pope Jones 1996). Chert blades of this type were usually modified distally to create a bit-like drill feature that was used to modify other materials, such as wood, shell, or slate (Pope 1994). Artifacts with these features generally follow a previously documented reduction sequence (Martindale Johnson 2014:87, Figure 5). This process included the removal of cortical surfaces from small chert nodules to create roughed-out cores. These cores were then further reduced to create one or more striking platforms from which blades or large flakes were removed for use as tools. Although the bulk of cores and related production debitage showed similar patterns documented elsewhere, some cores – unidirectional pressure (or indirect percussion) cores and rejuvenation debitage – showed remarkable similarities to those seen in the obsidian blade industry. The Dormir examples constitute the first occurrence in which these types of cores have been recorded from household investigations. Also recovered at Dormir were rejuvenation debitage in the form of chert core-sections very similar to obsidian core-sections recovered elsewhere at Caracol. The inclusion of these kinds of artifacts suggests

then that multiple technical strategies were used to produce blade tools and that these chert crafters had shared knowledge with obsidian crafters. That these techniques occur at Caracol enables discussion of the possibly integrated and shared techniques of lithic crafting at Caracol. The different chert core types, rejuvenation debitage, and blade tools are described below to further demonstrate the multiplicity of techniques used to create a standardized tool type.

Multidirectional Cores

Multidirectional cores are common at Caracol's workshops. Observations during cataloguing these cores recorded that the bulk of chert blade production was performed by creating at least two perpendicular or opposing oblique platforms on different margins of a small nodule of chert. The knapper would then use direct or indirect percussion to remove two or three blades from these core platforms. The diagnostic attributes on some of these cores also shows a noteworthy amount of shattering on the margins opposite the striking platforms, indicating that these cores may have been placed on an anvil during knapping. These cores typically still have a significant amount of cortex on them and are blocky in shape; as a result, blades produced from these kinds of cores often have cortex on their dorsal surfaces (Figure 4).

Unidirectional and Bidirectional Cores

Unidirectional and bidirectional cores appear to be less common at chert workshops and more typical of obsidian blade-cores at Caracol, but when these chert cores are recovered they are usually conical in shape and polyhedral in cross section (Figure 5). This shape is a legacy of removing blades in one direction or two opposing directions as the core is rotated and blades removed (see Titmus and Clark 2003; Flenniken and Hirth 2003). This technique, common among obsidian blade production, is a more controlled indirect percussion or pressure production technique that creates a more uniform core with flat knapping platforms that is nearly absent of cortex (see Moholy-Nagy 1991:192 Figure 2a-c; Roemer 1991:62 Figure 4b). Figure 5 shows an obsidian core fragment from an adjacent residential group

positioned next to chert unidirectional cores from Structure L55, manifesting similar attributes between obsidian and chert exhausted cores of this type. For example, small step and hinge terminations are present along one or many lateral margins. This feature is usually present on cores that are in need of lateral rejuvenation or are too small to knap effectively, resulting in errors prior to discard. These kinds of terminations are caused by either an inconsistent force applied to the core's striking platform and/or an improper angle of force applied to remove a flake or blade (Andrefsky 2005: 21 Figure 2.8 and 2005:87).

Rejuvenation Techniques

Common among pressure cores is the need to rejuvenate the platforms or split the core by either laterally sectioning the core or removing the older platforms. This process enables the knapper to create a fresh error free platform with new lateral margins from which to remove more blades. Roemer (1991:62 Figure 4a) refers to these chert objects as being a "core tablet from a blade core," while Hirth (2006:74 Figure 3.9 and 2006:304) describes them as "core sections" or "core section flakes" and as part of the core rejuvenation process. By viewing these debitage from above or through the core cross-section, one can see the regular lateral scars that have been caused from removing blades and creating a polyhedral cross-section. Figure 6 shows the similarity some chert core sections from Structure L55 have to polyhedral obsidian core sections recovered elsewhere at Caracol. These similarities include: (1) polyhedral cross-sections; (2) bulb of force placed perpendicularly to the direction of the core to remove the existing platform ;(3) and, multiple facets, or flake scars, on the dorsal portion of core sections caused by errors in platform preparation. A closer examination of these core sections is provided in Figure 7, which depicts an alternative, lateral view of the chert rejuvenation artifacts compared to obsidian core sections.

Blade Tools

Like other lithic workshops at Caracol the goal of lithic reduction, regardless of blade production technique (i.e., multidirectional or

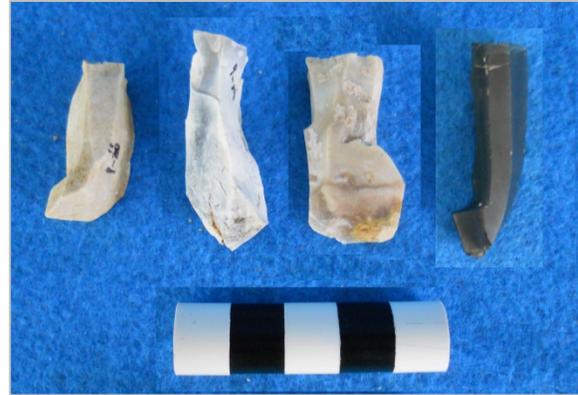


Figure 5. A sample of unidirectional and bidirectional cores from Suboperation C200C positioned to the left of a smaller exhausted unidirectional obsidian blade-core from Suboperation C199B.



Figure 6. A sample of chert rejuvenation artifacts from Suboperation C200C (upper) next to similar obsidian rejuvenation artifacts recovered from an above tomb context in the epicenter of Caracol (lower).

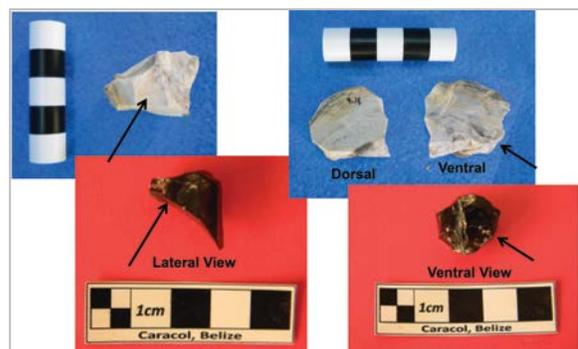


Figure 7. A lateral and top view of chert (upper) and obsidian core sections (lower) resulting from the rejuvenation process. Notice the similar sized cross-sections (left) and the platforms on each have multiple flakes on dorsal surface and a similar sized cross-section (right).



Figure 8. A sample of chert tools recovered from Suboperation C200C Lot 5 (left) and Suboperation C200C Lot 9 (right).

unidirectional core reduction), was to produce small blade-like objects that were then shaped laterally and distally to create a drill-like shape. From a preliminary assessment of the 584 blade tools, or “drills,” using a 20x magnification jeweler’s loop, we observed varying tool sizes and minor variations in shaping and use (Figure 8). No metrics are available at the current time to quantify the diversity in tool size. Although a more detailed quantitative study of these tools is required to determine if these variations are significant, variations among the assemblage could suggest that these differences were likely due to either normal variation that occurred during production or that different sizes and surface features correlate with alternative tool functions. Figure 8 shows the various sizes recovered from Lot 5 and Lot 9. Because some amounts of shell were recovered along with the chert artifacts, it is possible that at least some of these tools were used to modify shell. Shell

found in association with these tools has been documented previously at Caracol (Pope 1994).

Conclusions

The resulting comparison between the chert flaked-stone data from Caracol Structure L55 with the two other small structures at the “Dormir Group” and the nearby residential groups is important in gaining an understanding not only of domestic lithic economies but also of an economically integrated landscape. Based on the paucity of flaked-stone data from other nearby residential groups, it is likely that the people associated with the Dormir Group served a function unlike those found in neighboring residential groups to the northeast and southwest. When compared with the other residential groups, the residents of the small Dormir residential group appear to have had access to an abundant source of raw materials to produce a major tool type used by both crafting

and non-crafting households. The debitage recovered from Structure L55 demonstrates that the associated crafters shared knowledge of traditional techniques of chert tool craft production and those more difficult and controlled techniques that were used to produce obsidian pressure blades. Although techniques of this kind have been found elsewhere (see Roemer 1991; Moholy-Nagy 1991), this is the first documented instance that these crafting techniques occurred at Caracol during the Late Classic Period.

Investigations at this house group, therefore, shed light on the practices of ancient Maya domestic crafters and how they may have been exposed to and learned – through crafting – different techniques of lithic production. In addition, these dynamics further emphasize that an integrated domestic economy is characterized by shared resources, as well as shared knowledge of the techniques of production and use. In effect, not only were resources shared within this broader “community of practice”, but the knowledge of acquiring raw materials and resources, as well as the techniques used to transform these material resources into tools or crafts, were also shared through an integrated exchange network.

This case-study has attempted to demonstrate the nuances of production and the dynamic technical practices that took place within a domestic crafting economy. The use of obsidian blade production techniques on chert – a locally available unrestricted resource – provides intriguing evidence about the crafters who only produced chert tools, but who were also fully aware of broader domestic traditions that involved the crafting of obsidian blade tools.

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this group and other groups during the 2014 field season may be found at www.caracol.org. The study would also not have been possible without the permission and support of the Belizean Institute of Archaeology and the National Institute of Culture and History (NICH). We are also grateful to those volunteers working in the University of Central Florida Archaeology Laboratory and to those individuals who conducted the excavations at this house group for their diligence and attention to detail.

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9 ***THE UGLY DUCKLING: INSIGHTS INTO ANCIENT MAYA COMMERCE AND INDUSTRY FROM POTTERY PETROGRAPHY***

James Aimers, Elizabeth Haussner, and Dori Farthing

In this paper we discuss ongoing research on a utilitarian Late Classic pottery type, Coconut Walk Unslipped, from sites on Ambergris Caye. Ordinary pottery types have received far less attention than more elaborate types (e.g., polychromes and molded-carved). The long production history and widespread distribution of types like Coconut Walk Unslipped add complexity to our understanding of the production and distribution of ordinary ancient Maya pottery, and draw attention to some basic issues about how we characterize and study Maya pottery. We highlight the relevance of pottery petrography to our understanding of this pottery and Maya commerce and industry more generally.

Introduction

In this paper we discuss ongoing research on a utilitarian Late Classic pottery type, Coconut Walk Unslipped, from the sites of San Juan, Ek Luum, and Chac Balam on Ambergris Caye. The long production history and widespread distribution of types like Coconut Walk Unslipped add complexity to our understanding of the production and distribution of seemingly ordinary ancient Maya pottery.

Coconut Walk Unslipped

Coconut Walk Unslipped (Figure 1) is, in Aimers' opinion, the ugliest pottery the Maya ever made. Vessel shapes are irregular and it is very difficult to take diameters from the rim sherds, which in our sample were small. Surface finish is rough and irregular even on well-preserved sherds. Vessels are coarsely tempered with fabrics that range greatly from orange to tan, gray, and black even in a single deposit. Many sherds are fragile and we know of no intact vessels. We chose to discuss Coconut Walk given the 2014 Belize Archaeology and Anthropology Symposium theme of domestic economy because we assumed it was made locally for domestic use.

We also wanted to study this type because although ordinary pottery types dominate archaeological collections, they receive far less attention than their more decorative but rarer relatives like polychromes and molded-carved. But, like the Ugly Duckling who surprises his tormenters by maturing into a gorgeous swan, Coconut Walk Unslipped surprised us by revealing it was much more than it seemed at first. Finally, we were interested in it as part of

a ceramic system because Satoru Murata and I had found thousands of similar sherds while working with the ceramics from Wits Cah Ak'al or Mile 12 just south of Belize City (Aimers, et al. 2015).

Elizabeth Graham (1994:153-156) first published a description of this pottery from Early Classic to Late Classic (or Middle Classic) contexts in the Stann Creek area with the typological designation of Coconut Walk Unslipped Ware. Later she identified this style at the site of Marco Gonzalez in the Late Classic. For the Ambergris Caye sites of Ek Luum, Chac Balam and especially San Juan, Valdez et al. (1995:97-99) referenced Graham's ware identification in a type they called Coconut Walk Plain in Late and Terminal Classic contexts. Coconut Walk Unslipped is now the type name most commonly, or at least recently, given to this pottery type (e.g. Andrews and Mock 2002). Finally, this pottery is very similar to Punta Ycacos Unslipped defined by Heather McKillop and associated with salt making (McKillop 2002).

Not only is this pottery widespread, it is long-lived. It is part of a pottery tradition (or sequence as it is more formally called in type-variety terminology). This tradition or sequence (Gifford 1976:12) of related types has antecedents from at least the Early Classic period and probably the Late Preclassic, and extends into the Terminal Classic and Postclassic periods (Aimers, et al. 2015). Further, this quartz-tempered technostylistic tradition appears to spread inland rapidly at the end of the Early Postclassic to sites as distant as Lamanai, the upper Belize Valley, and the Petén

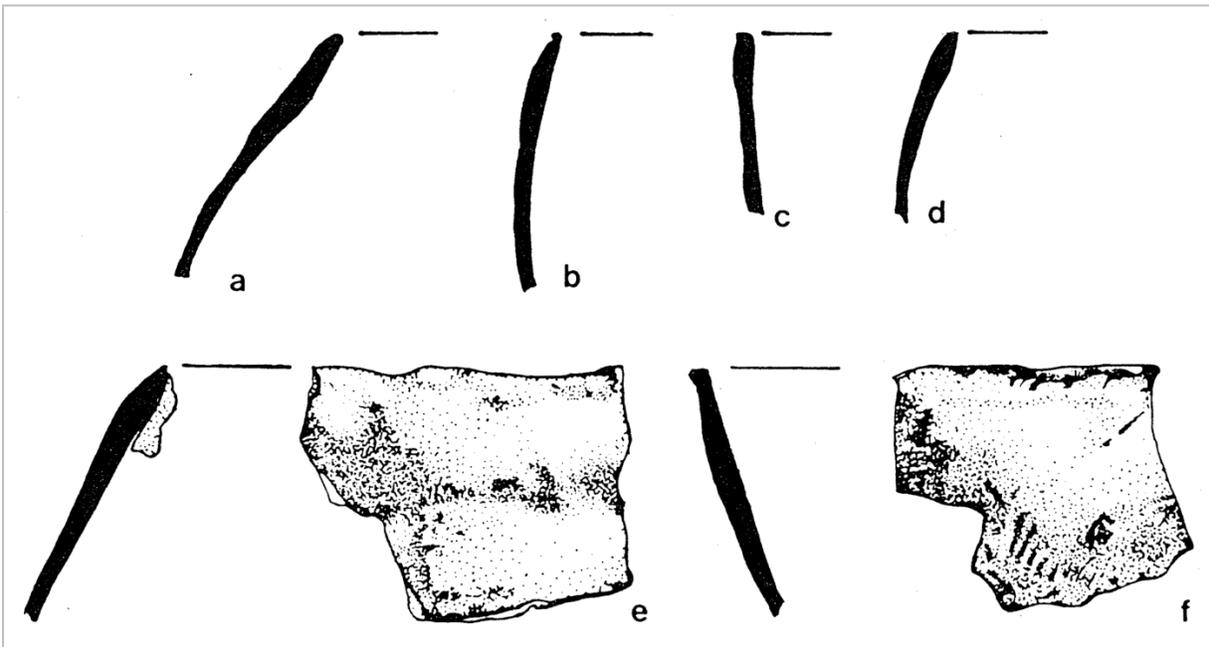


Figure 1. Coconut Walk Unslipped sherds from Colson Point. Modified from Graham (1994: Fig. 5.8). No scale bar was provided in original but the diameter of example “e” was noted as 50 cm.

Lakes. Maybe due to the Ugly Duckling Effect, no one has given these quartz-tempered types ware designations, so Calabash Unslipped Ware may be the best ware designation due to its similarity to Postclassic types in the Belize Valley, an issue to which we return later in this paper.

Petrography

Elizabeth Haussner undertook petrographic investigation of 15 samples of Coconut Walk Unslipped and related types under the supervision of myself and Dr. Dori Farthing of Geneseo’s Department of Geological Sciences. Thin section petrography is one of the oldest and most useful of the materials science techniques that we use to examine pottery. Thin sections are made by breaking an edge off a sherd, embedding it in epoxy, grinding it to a thickness of 0.03 mm, and mounting it on a glass slide. The sample is then examined with a microscope using different kinds of light. Polarized light effects how the minerals in the clay and the inclusions that have been added to it appear to the human eye, often creating dramatic color differences in a mineral as the slide is rotated. The color of the minerals under cross

polarized light are sometimes distinctive and along with other characteristics can be used to identify minerals. We can also use the microscope to examine voids in the sample. Using these basic techniques, petrography can help us identify the materials in the pottery and how the pot was made.

Although the methods of preparing thin sections are quite standardized, methods of analysis and characterization vary greatly. One of the questions we would often like to answer with petrography is “Where was this pot made?”. The goal is to tie the mineralogy of the sherd to the geology of some place. Unfortunately, the Maya area is not all that geologically diverse compared to other parts of the world and establishing the origin of a Maya pot can be challenging. The petrographic slides discussed here were prepared by Dr. Linda Howie of HD Analytical Solutions. Howie has been a proponent of a system that can be used to interpret thin sections pioneered by a scholar named Whitbread working with Greek transport amphorae (Whitbread 1989, 1995). Whitbread’s method is detailed and time-consuming but it is to our knowledge the most precise and thorough method for the petrographic description of Maya

pottery. Unfortunately, despite its use in studies of European pottery, it has not been widely adopted in the Maya area. Howie's study of the pottery of Lamanai (Howie 2012) using Whitbread's method and other techniques is a landmark study that others should consult when considering petrography in Belize.

We have published more detailed petrographic results of our study elsewhere (Aimers, et al. 2015). The important and surprising finding was that pottery made on a caye covered in sand was not made with sand from that caye. Coconut Walk Unslipped is tempered with quartz sand which is not found on Ambergris but is found in mainland deposits resulting from the geology of the mainland, especially the Maya mountains. When we submitted the abstract for the 2014 Belize Archaeology and Anthropology Symposium, we thought our results would tell us about the production of pottery made close to where it was found, and we expected this to fit in with the conference theme of ancient Maya domestic economy. In fact, the results raise more questions about trade and industry. The results surprised us because many archaeologists take it as practically a given that the cruder the pottery, the more local it is.

We found out from Elizabeth Graham after our analysis that Chellie Teal, a student of Sal Mazullo, wrote an unpublished paper noting the presence of quartz temper in many Marco Gonzalez pottery types, including Coconut Walk Unslipped (Teal 1994). But, at least we now know that Coconut Walk Unslipped from Ek Luum, San Juan, and Chac Balam is also tempered with non-local quartz.

Pottery Ethnoarchaeology

The non-local quartz in this pottery was a surprise because ethnoarchaeological research suggests that utilitarian pottery was made from local materials in local workshops. Teal mentioned in her unpublished 1994 paper that there are some suitable clay deposits on Ambergris Caye but the quartz temper is certainly non-local. This means that people on Ambergris were either importing the whole pots or just the quartz sand temper. Why? A possible explanation is that heavily-tempered, thin-walled vessels facilitate heating compared

to vessels without temper (Skibo and Schiffer 1995:83). The rough textured surfaces also encourage evaporation, and thus when heated they reduce spalling and cracking. Even the globular shapes are relevant since these shapes are better for cooking than vessels with more angular shapes. In any case, the non-local quartz sand temper appears to be very important to the function of these vessels. In her Stann Creek District samples, the thinness and fragility of the vessels, lime incrustations on the interiors, and lack of burning led Graham (1994:153-156) to suggest that this type could also have been used for soaking, for example to make lime from shells or to soak corn in a lime solution. But what about on the caye?

Salt Production

We noted earlier these sherds are very similar to Punta Ycacos Unslipped which is clearly linked to salt production in southern Belize. Elizabeth Graham (1994: 155-6) was the first to point out that given the coastal locations of many analogous vessels they may have been used for evaporating brine to produce salt. Graham (1994:247) noted that "though I have played down the possibility of its use in salt production until more data are collected, the striking similarity of Coconut Walk unslipped bowls to the *cajetes* used in salt making in Sacapulas, Guatemala (Reina and Monaghan 1981) suggests that the ware was used by the Maya at Watson's Island in the same manner-- if not to produce the same product, then perhaps in a way related to the production of lime that took place in Tzakol 3-Tepeu 1 times." Graham is now much more confident in the connection of this style of pottery to salt production (personal communication 2014), and Anthony Andrews, once skeptical, noted that he has "had to eat a fair amount of crow on this matter" (Andrews and Mock 2002:315).

Andrews and Mock (2002:320-321) summarized the evidence for prehispanic *sal cocida* (cooked/boiled salt) production on Ambergris Caye this way: "Coconut Walk Unslipped ceramics have been reported at two sites near the southern end, Marco Gonzalez and Guerrero (Graham 1983, 1989; Graham and Pendergast 1987, 1989) (with cylinders at the latter site) and at four sites on the northern part

of the island: San Juan, Ek Luum, Chac Balam, and Santa Cruz (Guderjan 1988, 1993, 1995). Most of these ceramics were recovered from contexts dating to the Late and Terminal Classic periods. Evidently, salt was produced on Ambergris by cooking brine and harvesting solar salt from the northern lagoons. It is most likely that the inhabitants of northern Ambergris Cay were harvesting solar salt from the northern lagoons throughout the prehispanic period; the Spanish reported salt ponds in the lagoons in the sixteenth century, (Archivo General de Indias 1564-5) and solar salt was harvested in more recent historic times as well (Andrews 1983; Guderjan 1995)."

In Guderjan and Garber's (1995) volume on their Ambergris excavations, Valdez argued that "Coconut Walk is part of an evaporative salt-production complex in coastal northern Belize" (Valdez, et al. 1995:97) although Guderjan and Garber were not completely convinced because the sherds were not associated with the lugs or spacers associated with salt-making. According to the published literature on Ambergris Caye, briquetage-like cylindrical spacers and sockets have only been found on Ambergris at the site of Guerrero (Andrews and Mock 2002:320, citing Graham) and "the Ambergris sites have direct access to large salt-producing lagoons (Andrews 1983) that were productive enough in colonial times for attempts at commercial exploitation to have probably occurred (Guderjan 1988). Some of the contexts of materials from Ek Luum and Chac Balam, . . . also open the likelihood of other functions. However, if this ceramic type functioned in salt production, it may then be conservatism that retains the ceramic form and composition. This conservatism may account for the longevity of a ceramic type in terms of its "description," i.e., form, paste composition, breakage patterns, etc." (Valdez, et al. 1995:97).

In discussing Hector Creek Unslipped (HCU; part of the Coconut Walk Unslipped ceramic system) and contemporaneous unslipped, red-rimmed jars, Murata (2011:232) concluded that "it seems almost certain that both the jars and HCU were deeply related to the *sal cocida* process. Perhaps, as both ethnographic examples (Reina and Monaghan 1981) and logic dictate, multiple vessel types were utilized in the

process—for example, vessels for storing the brine, for pouring the brine into boiling vessels, and for the boiling process itself. Considering the friable nature of HCU, they may have been better suited for storing and pouring, while the jars were used for boiling."

James Garber (personal communication 2014) told me that he recalls some briquetage from the three sites sampled for this project. At Marco Gonzalez, Elizabeth Graham tells us that the Late Classic Coconut Walk Unslipped found so far is associated with burned layers but not typical briquetage (Graham, personal communication 2014). The relatively rarity of briquetage on Ambergris may suggest that there were multiple methods of salt production on the island, or that the pottery had multiple functions.

For us, the most puzzling issue is the imported quartz temper. There are several ways to explain it, each of which raises new questions.

1. The most logical hypothesis is that the temper is imported and used with local clays to produce the pots. This raises the question of whether the Ambergris Caye could support large scale pottery production. Ideally, then, we need to know how extensive suitable clay deposits on Ambergris are, and also if the island could produce (or import) the fuel needed for firing. Teal found that several of the pottery types at Marco Gonzalez were quartz sand tempered, which adds to the volume of production. Most of the pottery Aimers has looked at on the Cayes appears imported, so in this scenario Coconut Walk Unslipped could be one of the few types actually produced on the island.
2. Alternatively, are the vessels themselves imported? The problem here is that these vessels are so fragile it is hard to imagine them surviving transport.
3. Probably the least likely scenario is that the vessels were imported with salt in them. Anthony Andrews (1983: 46) has described Ambergris as a salt production location, I think partially based on the assumption that Coconut Walk Unslipped vessels were locally made. This would still be true if only the temper were imported, and could still be true if these

fragile vessels were imported. We are intrigued by Shirley Mock's (1998) idea that Coconut Walk Unslipped was used to evaporate brine and to make salt molds, but we would add one caveat: She assumed that the molds were broken near where they were made, but we should at least consider the possibility that Coconut Walk Unslipped jars were actually left on salt cakes as they were transported from mainland coastal production sites (possibly as close as Belize City) to the Caye. This idea is reinforced by the rarity of the standard salt-making paraphernalia like cylinders, sockets, and spacers on the Caye. This seemingly implausible idea (since we know that historically a great deal of salt was produced on Ambergris) is at least conceivable if one considers Valdez and Mock's (1991) idea that in the Late Classic the island was using extraordinary amounts of salt for export and for salting fish and game to meet Late Classic demand inland. Ambergris Caye clearly did produce salt, but in the Late Classic it is possible to imagine that the scale of production along the coast of Belize made imported salt economically viable and perhaps necessary on Ambergris to meet a high Late Classic demand for salt and salt-preserved foods. Eleanor Harrison-Buck (personal communication, 2014) made the comparison to the importation of oil to the United States. Even though the U.S. produces huge amounts of oil, consumers require more and it is economically viable to import oil. Or, were the Maya using different kinds of salt for different purposes, and some of that salt was imported? In any case, the non-local quartz temper is real, and we need to explain it.

Coconut Walk Unslipped, Calabash Unslipped Ware, and Migration

Aimers et al. (2015) discuss the emergence of the Rio Juan Unslipped type of Calabash Unslipped Ware in the Early Postclassic of the Belize Valley, possibly in relation to population movement after the

Terminal Classic. There, we speculate that the paste recipes of the two Rio Juan Unslipped varieties (one with quartz; one with quartz and calcite) and their corresponding modal attributes (e.g. effigy lugs on the variety with calcite) may represent different populations with distinct traditions. Specifically, we wonder if the exclusively quartz-tempered Rio Juan Variety represents a coastal population that moved inland. In that light, it is interesting that all of the Hector Creek Unslipped sequence sherds from Wits Cah Ah'Kal that Murata (2011) examined via petrography and Instrumental Neutron Activation Analysis have the same exclusively quartz-tempered paste but through time take on the distinctive collared jar form of Rio Juan Unslipped in the Belize Valley.

We suggest that the movement of people spread this techno-stylistic tradition from the coast to the Belize Valley in the Postclassic Period. This challenges the in-situ, devolutionary argument first made by Gifford (1965:384) who believed that "the collapse of a technically specialized society [in the Belize Valley] yields to the basic family unit with an associated lack of technical know-how" (Sharer and Chase 1976:288-289). The problem with Gifford's argument is reinforced by the fact that some of the Postclassic types in the Belize Valley are in fact very well made. Rio Juan Unslipped thus may represent the introduction of a useful if visually unappealing ceramic technology to the Belize Valley after centuries of use along the coast.

Conclusion

So, this ugly duckling pottery turned into something of a Cinderella. Firstly, the temper is not local to Ambergris, it is imported. Robert Fry (2012) has pointed out that ordinary unslipped pottery may have actually moved farther than we think in the Maya world and Coconut Walk Unslipped could be evidence of that. If that were the case, the volume of pottery the Maya moved around may have been much higher than we typically assume and conceivably all of the pottery on Ambergris could be imported. Secondly, the types in Calabash Unslipped Ware that come before and after Coconut Walk Unslipped represent the longest-lived example of a Maya pottery tradition or

sequence of which we are aware. This pottery must have been very useful for something (or some things) to be used for so long.

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10 ***EVALUATING ANCIENT MAYA SALT PRODUCTION AND THE DOMESTIC ECONOMY: THE PAYNES CREEK SALT WORKS AND BEYOND***

Heather McKillop

The organization of production and distribution of salt in the Maya area was an important part of the Maya economy since sources of salt were localized along the coasts. Was salt produced as part of the domestic economy by Maya householders who also controlled the production and distribution of salt? Alternatively, was there state control of salt production and/or distribution by control of the resource, control of the means of production (labor), and/or control of the means of distribution? The distinction often made in discussions of ancient craft specialization between prestige goods made by attached specialists in the political economy and subsistence goods made by independent specialists in the domestic economy can obscure our understanding of the production process and of changing values of commodities. The place of salt in the domestic economy of the ancient Maya will be addressed using a case study of the Paynes Creek Salt Works within a broader context of ancient Maya salt production and distribution in Maya prehistory. Comparisons are made with salt production in ancient China where texts add valuable information to the archaeological record.

Introduction

The daily biological need for some salt by the ancient Maya is not in question. The control of this geographically restricted resource, the labor to produce salt, and the control of its distribution throughout Maya prehistory are unresolved. The distinction often made in discussions of ancient craft specialization between prestige goods made by attached specialists in the political economy and subsistence goods made by independent specialists in the domestic economy (Brumfiel 1987; Costin 1991) can obscure our understanding of the production process and of changing values of commodities (Flad 2011; Hirth 2009; Inomata 2001; Rochette 2009). Was salt produced as part of the domestic economy by Maya householders who also controlled the production and distribution of salt? Alternatively, was there state control of salt production and/or distribution by control of the resource, control of the means of production (labor), and/or control of the means of distribution? The place of salt in the domestic economy of the ancient Maya will be addressed using a case study of the Paynes Creek Salt Works within a broader context of ancient Maya salt production and distribution in Maya prehistory (McKillop 2002, 2005a, 2009, 2010; McKillop et al. 2014; Robinson and McKillop 2013, 2014; Sills and McKillop 2013; Watson et al. 2013). Comparisons are made with salt production in ancient China where texts add

valuable information to the archaeological record (Flad 2011; Li and von Falkenhausen 2006).

Access to salt is rarely a problem in modern Western society where highly-processed foods contain alarming amounts of sodium chloride (Weeks 2009). However, salt often is limited or lacking in non-Western and ancient cultures with plant-based diets. As a daily biological human necessity, the mechanics of salt production and distribution are basic to understanding ancient economies, particularly those based on agriculture such as the ancient Maya. In addition, salt has many other uses in ritual, medicine, as a food preservative, and as a flavor enhancer in cuisine. At times, ancient states directly controlled the production and/or distribution of salt. Soldiers in the Roman Empire were allocated salt as part of their salary (providing the derivation of the word, salt). Salt taxes underwrote significant portions of the central government in ancient China (Adshead 1984). The Aztecs included salt in their tribute demands.

The organization of production and distribution of salt in the Maya area was an important part of the Maya economy since sources of salt were localized along the coasts. The inland Maya at large Classic period cities in the southern lowlands needed dietary salt. An image of a salt person, along with the glyph for salt, painted on the exterior of a Late Classic building at Calakmul (Carrasco et al. 2009: Fig.

6b), acknowledge the urban Maya interest in salt, but it is not clear if salt was procured through trade, tribute, or in the market place. Seafood remains at inland Maya cities such as Tikal, Lubaantun, and Altun Ha, required salting fish on the coast for inland transport (McKillop 1984; see also Graham 1994; Valdez and Mock 1991). As a flavor enhancer in food (and one of the four taste sensations on the human tongue), the ancient dynastic Maya likely imported this addictive additive for food, which played a central role in feasting events associated with the political economy depicted on painted pictorial vessels. Coastal and inland salt sources were utilized at various times in Maya prehistory as part of the domestic economy and at times as part of the political economy with direct elite administration.

Production in the Domestic Economy and the Political Economy

Ancient craft production in the contexts of the domestic and political economies often is evaluated using Costin's (1991) criteria of intensity, concentration, constitution, context, and scale. *Intensity* of production refers part-time to full-time work—including seasonal, periodic, occasional, and intermittent work, and considers whether other productive activities are also carried out, such as farming. *Concentration* includes dispersed to nucleated locations of producers within a region—often related to the distribution of resources (such as the high-quality chert outcrops at Colha or the super-saline, coastal lagoon waters around the Yucatan). *Constitution* describes the composition of the workforce, from kin-based to industrial. Flad (2011:23) suggests the relationships among workers should not be described as a continuum since there are qualitative differences among wage labor, labor duty, slave labor, and clan-based production. *Context* refers to independent or attached specialists, with independent specialists making utilitarian goods for widespread use, whereas attached specialists make prestige goods for more limited use by elites (see also Brumfiel 1987). *Scale* refers to the size of the labor force.

In the Maya area, the political economy comprises the production and distribution of prestige commodities and resources for the

dynastic leaders (Masson and Freidel 2002). These goods helped underwrite and maintain the political and social hierarchy. Prestige goods typically were made in elite households of royal courts by skilled workers. They painted pictorial scenes and glyphic records on pottery vessels and codices; carved jadeite, marine shell, bone and wooden objects; and carved images and text on stelae, altars, building facades, and wooden lintels; and painted murals and masks on public buildings.

In contrast, the domestic economy includes the production, distribution, and use of subsistence and ritual resources and goods for household use, as well as production for exchange outside the household. Production in domestic workshops often is referred to as carried out by “independent specialists” since they did not work for the state (see Costin 1991). The products of domestic production by independent specialists generally are regarded as destined for use by the common folk. However, the dichotomy often made between attached and independent specialists in workshop production can obscure our understanding of the ancient Maya economy. Inomata (2001) reports elite householders at Aguateca crafting goods for the dynastic Maya leaders as attached specialists, but also making finely-made commodities for others as independent specialists. In some cases, the products of household production were incorporated into the political economy, such as the extraction of jadeite at Motagua Valley outcrops (Rochette 2009), one of the highly-sought wealth items of the dynastic and other elite Maya. Following the attached vs independent dichotomy, independent specialists are actually “attached” to the political economy of the dynastic Maya and royal court if they pay taxes or tribute or if the state otherwise controls the production and or distribution of their products (see Flad 2011: 25-29).

The ancient Maya domestic economy included large-scale production with products distributed regionally or even farther from the household workshops. For example, stone tools produced in household workshops at Colha (Shafer and Hester 1983) were distributed regionally to Cerros, Santa Rita, and other communities in northern Belize. In some cases, partly-finished objects were transported, such as

large pre-form “blank” chert blades made from distinctive Colha chert that were recovered from the trading port at Moho Cay in the mouth of the Belize River (McKillop 2004). In other cases, distribution of subsistence goods was well beyond the region: Chert stone tools made from Colha chert were recovered from Early Postclassic household middens at Wild Cane Cay and Frenchman’s Cay in southern Belize (McKillop 2005b), as well as at the nearby Paynes Creek Salt Works during the Classic period. These examples attest to wide distribution of goods produced in household workshops as part of the domestic economy in the Maya area. The production and distribution were outside the dynastic control of the urban Maya who controlled the political economy.

Sources of Ancient Maya Salt

Salt sources in the Maya area include sea salt from coastal lagoons, brine from inland salt springs, and salt obtained from plants and animal meat (McKillop 1996, 2002). Methods of salt production include solar evaporation of salty water and evaporation of brine in pots over fires. Inland salt springs at Salinas de los Nueve Cerros were exploited during the Classic period, using pots over fires to evaporate the brine (Dillon et al. 1988). The historic production of salt at Sacapulas in the Guatemalan highlands provides a model for ancient salt production using pots over fires, as at Salinas de los Nueve Cerros and along the coast of Belize (Reina and Monaghan 1981). Solar evaporation was common historically (Andrews 1983) and was reported during the sixteenth century by de Landa and others (Tozzer 1941). Solar evaporation in ponds created by stone walls or wooden posts was common in the northern Yucatan where there is a reliable, long dry season. Major salt evaporation areas were located near Xcambo near the Celestun salt flats on the northwest Yucatan coast (Sierra 2004) and by Emal on the Rio Lagartos on the north coast of the Yucatan (Kepecs 2003). Other coastal lagoons along the Yucatan coast were exploited for salt (Andrews 1983), including Oxtankah on the north shore of Chetumal Bay in Quintana Roo (de Vega et al. 2010).

Farther south along the Yucatan coast in Belize where the dry season is shorter, salt was

produced by evaporation in pots over fires, producing briquetage. At the Paynes Creek Salt Works, the salt content of brine was enriched by pouring it through salty soil before the evaporation process, as evidenced by earthen mounds (McKillop 2002; Watson et al. 2013). Recovery of a pipe connector is evidence that brine was piped to brine evaporation locations as described for the Sichuan province of China (McKillop 2010). The Paynes Creek Salt Works, salt works along the shores of Placencia Lagoon, Moho Cay and Wits Cah Ak’al near Belize City, and Northern River Lagoon include pots that were supported by solid clay cylinder vessel supports. Thin-walled, open platters of the type “Coconut Walk Unslipped” are reported from Colson Point near Dangriga and from Ambergris Cay (Graham 1994; Graham and Pendergast 1989). Perhaps salty water was evaporated in the shallow pans to form salt.

The Place of Salt in the Ancient Maya Domestic Economy

As was the case worldwide, access to salt became a concern for the ancient Maya with the rise of agriculture. The earliest Paleoindian and later Archaic occupants of Belize obtained dietary salt from eating meat, and possibly seafood. At some point during the Preclassic period, with increasing population size and density of Maya communities, the search for salt began. Perhaps not in the Early Preclassic at Cuello or Cahal Pech, but certainly a quest for salt emerged with the rise of complex polities by the Late Preclassic. Salt was surely in demand with the Late Preclassic rise in population, agricultural subsistence, reduced meat diet, and community labor requirements beyond the household. Late Preclassic Maya at Butterfly shell midden site on the south coast of Belize (McKillop 1996) likely had enough salt in their diet from seafood. Coastal sites along the Mexican coasts of Campeche, Yucatan, and Quintana Roo may have included salt production (Eaton 1978).

The rise of Classic Maya civilization in the southern lowlands meant a dramatic increase in demand for dietary salt, but also likely for salt as a flavor enhancer in the royal dynastic diet and for feasting events, for salted fish from the coasts, and for medicinal and other uses. Salt

works expanded along the coast of Belize, at the inland salt springs at Salinas de los Nueve Cerros, and along the Yucatan coast in Mexico. The coastal salt works in Belize and Mexico served nearby inland markets through regional trade, extending far up rivers in Belize and by overland trails. Salinas de los Nueve Cerros likely supplied nearby inland cities with salt. The height of salt production along the coasts of Belize and Campeche was during the Late and Terminal Classic periods, coinciding with the largest inland populations of lowland city states. The demand for salt collapsed with the abandonment of most inland Maya cities in the southern lowlands over the course of some 150 years beginning about A.D. 750. The Paynes Creek Salt Works were abandoned when the nearby inland cities of Lubaantun and Nim li Punit in Belize and Seibal and Altar de Sacrificios in adjacent Guatemala were abandoned (McKillop 2002).

Without the inland demand for the Paynes Creek salt, there was no market for salt. However, the nearby coastal communities of Wild Cane Cay and Frenchman's Cay were not abandoned. The Maya at these island trading ports continued to make salt during the Postclassic as part of the domestic economy of household production, as evidenced by briquetage in household middens (McKillop 2002). The dietary need for salt at Wild Cane Cay may have been met by the salt from seafood, the remains of which were abundant in household middens (McKillop 2005b). The Wild Cane Cay Maya may have developed a taste for salt in cuisine, as well as use of salt for preserving fish, manatee, sea turtle, and mainland animal meat, the bones of which were recovered in household middens.

The emergence of Chichen Itza as a powerful city in the Early Postclassic coincided with the expansion of the nearby Emal salt works on a coastal lagoon (Kepecs 2003). In the Late Postclassic, the Emal salt works were owned by various families who maintained salt pans and harvested salt. Eye-witness accounts in the sixteenth century by Bernal Diaz, Davila, and de Landa report salt from the northern Yucatan was transported by canoe traders to the Bays of Campeche and Honduras. Davila encountered a trading canoe containing Yucatec

salt on the north shore of Honduras near the mouth of the Rio Dulce, evidently the destination for the salt.

Salt Production and Distribution in Ancient China

Discussion of salt production in ancient China is relevant to an understanding of ancient Maya salt economics for the following reasons. First, the same techniques of evaporating brine in pots over fires and of solar evaporation were used in both areas, on a large scale. Secondly, evaporation of brine in pots over fires provided vast quantities of salt in inland areas in China, which underscores that this method should not be considered second rate in quantity or quality to salt from solar evaporation, as has been argued for the Maya area (Kepecs 2003; MacKinnon and Kepecs 1989). Third, the Chinese state developed various strategies to obtain salt for dietary purposes as well as to underwrite significant portions of the state budget. During the late Tang period (A.D. 618-907), the state purchased all salt and sold it to merchants who were responsible for collecting salt taxes, which by A.D. 779 comprised half of state revenue (Flad 2011: 36). Fourth, the archaeological record of salt production in China is enhanced by documents pertaining to production and distribution, related to the state's interest in salt and taxation.

At various times historically and prehistorically, the Chinese state took a direct role in controlling the production and distribution of salt produced from solar evaporation along coastal areas, evaporation in pots over fires of brine from dug, bored, or drilled wells at inland areas, variations of solar and fire evaporation, and extraction of rock salt from below the ground surface. Research in Shandong province (southeast of modern Beijing) by Shuicheng Li and others revealed large rectilinear salt pans for solar evaporation as well as salt works where brine was evaporated in pots over fires, resulting in briquetage (personal observation, 2010). By 685 B.C., the Qi state in Shandong province had a monopoly on sea-salt production: Government officials bought all salt from private producers, transported the salt to state warehouses, and sold it at a profit (taxation) to salt merchants

(Adshead 1984:40; Flad 2011:35). Still, at various times, small-scale salt production continued without state intervention. Sometimes the salt administration directly controlled salt resources that were concentrated, as with saline ponds in Shanxi, in which case attached workers were used (Flad 2011:51). With more dispersed small drilled wells in Sichuan province, the salt administrators controlled distribution or supervised production without direct control.

In Ningchang Township, before state consolidation of salt production, individual families piped brine in bamboo pipes to workshops from a natural well where brine seeped from a rock face (Flad 2011: 43-46). Remnants of 22 holes for bamboo pipes are visible in a wooden beam at the entrance to a temple constructed over the well. Before the brine was evaporated in pots, impurities were removed in wooden basins by scooping, filtering through five layers of sand, mixing lime into the brine, and by saturating terra-cotta slabs with salt and then dissolving them in other brine. Families sold all salt to a government salt administrator or paid a salt tax to him.

Excavations at the Zhongba salt works in Sichuan province revealed millennia of briquetage—the pots used to evaporate brine over fires (Flad 2011; Li and von Falkenhausen 2010). Most salt produced in Sichuan, using the method of evaporating brine from wells over fires, was used in food preparation—especially as a flavor enhancer and preservative, including popular fish sauce. There were different grades of salt, including prestige salt for rituals or for guests, produced in different locations and also by varying techniques at specific salt works (Flad 2011: 52). By the eleventh century, some bored wells (with bamboo tubes) reached over 1 km in depth, accessing brine and natural gas deposits, the latter used as fuel in the brine evaporation process. Brine was variously transported in containers or by bamboo pipes, sometimes at great distances, from the source to pans in brine-evaporation workshops. This method of salt production was still used in Sichuan province in the twentieth century (von Falkenhausen 2006).

Who Controlled Maya Salt Production and Distribution?

Salt was produced as part of the domestic or political economies depending on state demands for salt, the accessibility of salt sources, technology of transportation, and other factors. The switch from hunting and gathering to an agricultural diet low in sodium marked the initial demand for salt, but early use of salt sources in the Maya area is unknown. Salt was produced in households and household workshops as part of the domestic economy during the Early and Middle Preclassic, during the Postclassic along the coast of Belize, and variously during the Classic period, such as at Northern River Lagoon. Coe and Flannery (1967) report the salt works associated with earthen mounds by the shores of coastal estuaries at Salinas la Blanca on the Pacific coast of Guatemala. Although some Usulután pottery provides a Terminal Preclassic date for some of the Salinas, they are largely undated, although consist of thick-walled, crude vessels with coarse paste that Coe and Flannery assign to salt production. They also report solid clay vessel supports that they compare with salt making elsewhere (Coe and Flannery 1967: 91-92, 99, 102, Fig. 50, Plate 28 p-s).

The Preclassic rise of social complexity and population increase included salt production by coastal estuaries in the Yucatan and Belize, notably Komchen and Cerros in the Late Preclassic. The Late Preclassic rise of aggrandizing elites at Cerros included acquisition of prestige goods that were highly-crafted and of imported material such as jadeite. As at Zhongba in Sichuan Province, China, the Late Preclassic emerging Maya elite may have included salt in their suite of preciosities, as a flavor enhancer for feasting, for salt-drying fish or meat for feasts. The elite Maya may have controlled coastal and inland salt trade.

The increased demand for salt during the Classic period in the southern lowlands was associated with a tremendous growth in salt production along the Belize and Campeche coasts and trade to nearby inland cities and other inland Maya who needed, craved, liked, or wanted salt. Early Classic coastal salt works are few in number, but are known at Moho Cay and at the Paynes Creek Salt Works from briquetage,

indicating salt was produced by evaporating in pots over fires. The funnel under an Early Classic canoe at one of the Paynes Creek Salt Works—the Eleanor Betty Site—documents that the salt content of brine was enriched by pouring salty water through salty soil, as was common world-wide, such as in ancient China (Flad 2011) and France (Weller and Desfosses 2002), for example. At the Eleanor Betty site, the canoe was likely filled with salty soil, with salty water then poured through and saltier brine collected below the canoe, which was held in place by wooden posts. Any mounds of salt-depleted soil (as reported ethnographically elsewhere, Flad 2011; Reina and Monaghan 1981), would have been washed away when sea-level rise submerged the Paynes Creek Salt Works there were on dry land when in use. The only remaining examples of earthen mounds are preserved due to their location in the mangrove swamp (McKillop 2002; Watson et al. 2013).

During the Late Classic in the southern Maya lowlands the dynastic Maya had a state interest in maintaining a regular supply of salt. Salt production expanded along the coast of Belize during the Late Classic and extending through the Terminal Classic. Oxtankah produced salt on the north shore of Chetumal Bay in Quintana Roo (de Vega et al. 2010). The nature of salt production on Ambergris remains to be described more fully by researchers, but includes Coconut Walk Unslipped pottery, also found at Colson Point near Dangriga in southern Belize (Graham 1994). The thin-walled platters may have been used for solar evaporation by placing the platters with brine in the sun, as reported elsewhere (Kepecs 2003). The Coconut Walk platters lack associated solid clay cylinder vessel supports found at most other Belize salt works, so a different salt production technology evidently was in use. Salt production at Northern River Lagoon was part of the domestic economy since briquetage was recovered from household middens (Andrews and Mock 2003). Valdez and Mock (1991) suggest that salt was produced at Northern River Lagoon to salt fish for inland transport. Briquetage from Moho Cay includes a jar and a solid clay cylinder vessel support from a burial (McKillop 2004). Salt production at Wits Cah Ak'al included similar briquetage to the Paynes Creek material (Murata

2010). Salt production at Placencia Lagoon sites (MacKinnon and Kepecs 1989) was similar to the Paynes Creek briquetage. Celestun emerged as a Late Classic salt production locale on the Campeche coast of Mexico. Solar evaporation in salt ponds was extensive at Celestun. Solar evaporation in salt pans to harvest salt beside Emal evidently began in the Late Classic, since Classic pottery was found at Emal (Kepecs 2003). Emal flourished as a salt production and distribution site in the Early Postclassic.

A state interest in salt also occurred in the Postclassic and was evident with sixteenth century eye-witness accounts of salt transport in sea-going canoes. State control may have included: 1) sending a state administrator to oversee production and/or distribution, taking a state tax in salt, as in ancient China (Flad 2011); 2) sending a state administrator with seasonal workers to obtain salt and transport it inland—similar to family-owned salt works at Emal during the Late Postclassic (Kepecs 2011); 3) exacting tribute from salt works, as in Shandong province in China (Flad 2011) and in line with tribute payments made to dynastic Maya of other commodities such as chocolate; and 4) establishing alliances with coastal elite to obtain salt through trade, similar to what is described by Flad (2011) for Zhongba in China and a model I proposed for the Paynes Creek Salt Works (McKillop 2009).

The Classic Maya at the trading port on Wild Cane Cay may have established alliances with nearby inland Maya. They wanted to procure salt, seafood, and ritual items such as stingray spines, as well as obsidian and other commodities obtained from farther away through sea trade with Wild Cane Cay (McKillop 2005b, 2009). The coastal Maya obtained status goods and ritual items such as ocarinas of interest to the coastal elite. In contrast, there was evidently direct administrative control of salt production in the Early Postclassic on the Yucatan coast by elite at Emal, located beside the salt pans (Kepecs 2003). State administration of salt production and distribution has been attributed to the rise and prominence of Chuchucmil during the Late Classic, for Komchen during the Late Preclassic, and for the north coast of the Yucatan during the Late Postclassic. The expansion of the Late

Postclassic coastal canoe trade around the Yucatan linked the Gulfs of Honduras and Campeche and beyond the Maya area and included long-distance trade of north Yucatan coastal salt.

Conclusions

Viewing the ancient Maya society from the perspective of a dichotomy between attached specialists crafting prestige items as part of the political economy versus independent specialists crafting utilitarian items as part of the domestic economy is not useful for understanding ancient Maya salt production and trade. As in ancient China, salt was a desired commodity by Maya leadership, particularly during times of high population and due to the limited geographic availability of salt sources. Salt works associated with super-saline estuaries along the Yucatan coasts of Mexico and Belize produced salt by solar evaporation and by heating brine in pots over fires. At times, salt production was likely carried out by independent workers who negotiated with inland dynastic leaders who needed/wanted salt, salted fish, and stingray spines, as in southern Belize with the Paynes Creek Salt Works (McKillop 2009). In contrast, state control of the Emal salt works on the north coast of the Yucatan is evident from the public architecture adjacent to the solar evaporation ponds (Kepecs 2003).

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11 CAVES WERE THE HOUSES OF THE EARTH LORD, RIGHT?: INSIGHT INTO THE DOMESTIC ECONOMY OF CENTRAL BELIZE FROM THE CAVE CONTEXT

Shawn Gregory Morton, Mariyam Isa and Gabriel Wrobel

When archaeologists refer to ‘domestic economy,’ they typically intend to indicate an artifact assemblage representative of patterns of production and consumption within household contexts. As one would expect, such studies focus heavily on commoner households, their middens and garden plots. Other studies have expanded the discussion of domestic economy to broader practices of farming and resource acquisition. Most modern iterations use such studies to speak to topics such as status, wealth, political affiliation, and other nuanced aspects of identity. In this paper, we endeavor to do the same, using assemblages gathered from the cave context we attempt to tease apart broad patterns of consumption, economic affiliation, political affiliation, and status within the Caves Branch River Valley.

Introduction

It has been frequently remarked that the material assemblage of the ritual cave context is similar in content to that of the domestic sphere. A number of possible practices have been offered up in explanation of this, including the extension of household ritual across broader landscapes (Vogt 1976:11), and the reuse (particularly in the case of commoner ritual) of household items in cave contexts either as ritual set pieces or in more extreme cases through the deposition of large volumes of commingled artefacts (mostly ceramic) as part of annual renewal rituals (Pendergast 1969; Thompson 2005 [1975]:xxxix). Regardless of their particular origins, the sympathetic assemblages of these two contexts (cave and household) afford researchers the opportunity to investigate aspects of the domestic economy, specifically networks of exchange and interaction, from contexts *outside* the household itself. Moreover, as a product of scaled and status-dependent patterns of ritual cave use, we are able to *compare* trends in ‘elite’ and ‘non-elite’ contexts. Such comparison rests on a singular, if significant assumption: that large, elaborated caves served as venues for state-sponsored (writ ‘elite’) rites, while small, modest caves were more often utilized by local ‘non-elites’ and that the archaeological assemblages contained therein reflect this essential difference. In this paper, we invoke these characteristics and assumptions of the material assemblage to explore several aspects of the domestic economy in the Caves Branch River Valley (CBRV).

Caves Branch River Valley

The Caves Branch River heads in the escarpment of the non-carbonate highlands, its basin covering an area of about 200-235 km² (Figure 1). Small streams join as the river flows northward, along with two major sources of input — that is, the resurgences of two major caves, Footprint Cave (a.k.a. Actun Chek) and Actun Lubul Ha (a.k.a. Waterfall Cave) — in the heavily entrenched cockpit karst of the foothills (Miller 1981:3). The remaining catchment area is internal and only loosely defined — the product of a karstic landscape, and broad *polje*. The main stream of the Caves Branch subsumes approximately 3 km north of the Hummingbird Highway. Finally, after ~2.5 km under ground, the Caves Branch resurges, reaching the low, non-karst plains where it is joined by several minor streams before flowing into the Sibun River (Miller 1981:5).

This region received sporadic attention from archaeologists from at least the mid/late-1970s up until the mid-1990s. Somewhat unique in the broader Maya area, evaluation of the Pre-Columbian heritage of the CBRV has always focused rather heavily on subterranean loci. This has been fostered, in large part, through a long tradition of speleological exploration by geologists, biologists, avocational archaeologists and spelunkers (e.g. Albert and MacLeod 1971; Bartholomew 1973; Day et al. 1987; Lloret and Ubach 1993; Marochov and Williams 1992; McKenzie 1991; McNatt 1996; Miller 1981; Williams 1996). Beginning in the mid-1990s, the CBRV fell under closer

archaeological scrutiny. Researchers, mainly working under the auspices of the Belize

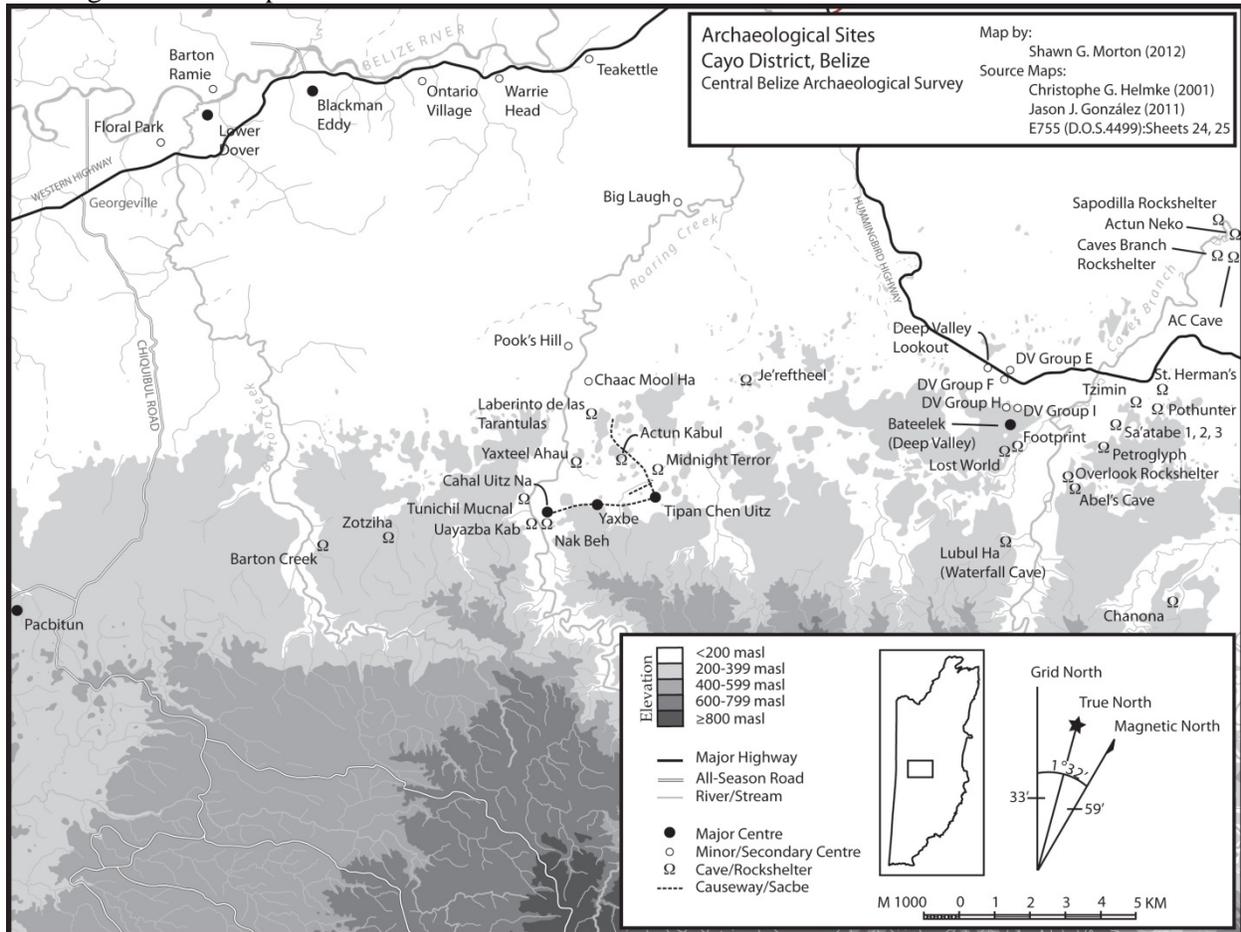


Figure 1. Map of CBAS project study area.

Department of Archaeology (Bonor Villarejo 1995; Bonor Villarejo and Glassman 1999; Bonor Villarejo and Martínez Klemm 1995; Glassman and Bonor Villarejo 2005) and later, the Belize Valley Archaeological Reconnaissance (BVAR) project (Hardy 2009; Morton 2008; Morton et al. 2012; Wrobel 2008a; 2008b; Wrobel and Tyler 2006; Wrobel et al. 2007) began to record systematically and in detail, the archaeological remains of the CBRV. Their efforts revealed a rich subterranean archaeological heritage in the region, describing an abundance of additional caves, sinkholes, and rockshelters used by ancient Maya peoples.

Unfortunately, our knowledge of the region's surface archaeology is encapsulated within only a relatively small number of studies at the sites of Deep Valley Lookout (Davis

1980), the Xubzulima plazuela (Goldstein 1995) and Deep Valley (Jordan 2008). Ceramic chronologies from these sites universally focus on the Spanish Lookout Complex, identified by Gifford at Barton Ramie (1976:46) and associated with late Tepeu 2 and Tepeu 3 at Uaxactun (Smith 1955; ca. AD 670-900). The 'Spanish Lookout Sphere' is wide-spanning and includes sites in the Belize River Valley, (e.g. Baking Pot, Tipu [Aimers 2002], Xunantunich, and San Lorenzo [LeCount et al. 2002]), and the Sibun River Valley, (e.g. Hershey and Pakal Na [Harrison-Buck and McAnany 2007:120]). It is suggested by Jordan (2008) that the universally late date of diagnostic ceramics recovered from the Caves Branch sites along with the limited number of construction phases in evidence indicates a Late Classic date for the inception of nucleated (or urban) settlement in the CBRV.

Later excavations by Christopher Andres at Deep Valley with the Central Belize Archaeological Survey (CBAS) project substantiate this suggestion (Andres and Shelton 2010).

Subterranean Assemblages from the Caves Branch River Valley: Large Caves

Several large caves have been intensively studied and serve as our baseline for understanding the material assemblage of sites in this region. Due to their size, the richness and diversity of their associated material assemblages, and extensive architectural modifications, these caves are associated with large elite ritual performances during the rise and rule of local hegemonic polities such as Deep Valley, and indeed, may push such developments further back in time than previously considered.

One of the best-known sites in this region is Petroglyph Cave, a large, multi-component ceremonial cave located just above the valley proper. Relative ceramic dating suggests a period of use concentrated between the Early and Late Classic. The Early Classic is represented by a fairly homogenous array of diagnostic Hermitage Complex vessels, including Tzimin Appliqued type vessels and Petén Gloss wares such as Paradero Fluted, Urita Gouged-Incised, and Pucte Brown types (Reents-Budet 1980), all of which are commonly associated with Petén sites such as Uaxactun, Tikal, Naachtun, and Holmul. In contrast, the Late Classic assemblage at Petroglyph shows both a greater diversity of types and a relative increase in diagnostic materials local to the Central Belize region. Early Late Classic vessels of the Tiger Run Complex still include some Petén wares at Petroglyph, however, these are few in comparison to ‘local’ Macal Orange-Red and Mountain Pine Red types (Reents-Budet and MacLeod 1997). Later Spanish Lookout Complex vessels continue this apparent shift away from Petén influence and toward a decided ‘Belize Valley’ focus. The numerous local, late, types recovered include Dolphin Head Red, Vaca Falls Red, Roaring Creek Red, Garbutt Creek Red, Duck Run Incised, and Daylight Orange, and may represent the consolidation of a local economic and political

base. Indeed, it is during this very period at the nearby site of Tipan that we find evidence for the expression of a self-determined political identity in the form of a unique royal title (glossed ‘Palanquin Lord’; Andres et al. 2014) and it is during this period that local political power may have coalesced in the CBRV at Deep Valley (Jordan 2008).

On the opposite side of this narrow valley, Footprint Cave seems to follow similar patterns of use and affiliation. Concentrating on a large cultural deposit encountered on a ledge just inside the voluminous entrance, the majority of materials in this portion of the cave date from the Late Classic to the Early Postclassic (Spanish Lookout complex, Garbutt Creek Red, Vaca Falls Red, and Duck Run Incised types; Graham et al. 1980). A Belize modeled-carved vase recovered from Footprint Cave provides a specific example of Late Classic regionalism; while Petén influence seems likely, these vessels are only known from other Central Belize sites, including Actun Tunichil Mucnal, Actun Lubul Ha, Chanona Cave, and a surface site in the neighbouring Roaring Creek Valley known as Pook’s Hill (Helmke et al. 1998).

In addition to these specific types, a preponderance of Late Classic red ceramic wares, nearly to the exclusion of black wares, was noted within both Footprint (Graham et al. 1980) and Petroglyph (Reents-Budet and MacLeod 1997) Caves. Recent studies of Late Classic ceramic distribution patterns in Belize have shown a correlation between high frequencies of red wares (such as the Garbutt Creek Red type) and eastern Belize Valley settlements including Barton Ramie, Baking Pot, Pacbitun, and Cahal Uitz Na. Conversely, Xunantunich and related, Petén-affiliated western Belize settlements exhibit low frequencies of Garbutt Creek Red and high frequencies of Mount Maloney and other black wares within the same period (Connell 2000). Thus, we are able to make still more precise suggestions regarding the specific economic (and political?) networks with which the local elite associated. Specifically, the strong presence of red wares and dearth of black at both Petroglyph and Footprint during the Late Classic may signal economic and political affiliation

with the eastern Belize Valley and a shift away from Petén influence.

Subterranean Assemblages from the Caves Branch River Valley: Small Caves

Suffice to say, the majority of subterranean sites used by the ancient Maya were neither large, nor spectacular in terms of either their geomorphology or archaeological assemblage. Whereas larger caves such as those discussed above have traditionally attracted the attention of archaeologists, the utilization of caves within the CBRV approaches ubiquity. Subterranean sites in the Caves Branch region fall within a wide range of spatial categories based on the size and form of their interior spaces as well as their location in the wider landscape and relative associations with other sites. However, a basic division between large caves capable of supporting more-or-less public ritual (such as those discussed above) and small, restricted, caverns seems to account for the majority of variation within the valley. How do the basic patterns of economic affiliation in these largest of caverns compare to more modest subterranean contexts, those presumably utilized by a much more modest segment of society? A number of caves that fit this description have been formally investigated as part of the lead author's doctoral research, among these are two caves in particular: AC Cave and Actun Neko.

AC Cave

AC Cave is merely an upper entrance and series of restricted and closely linked chambers that form part of a much larger network of caves through which passes a branch of the Caves Branch River (Caves Branch Cave; see Reents-Budet and MacLeod 1997), and is located perhaps 3 km north of the Hummingbird Highway. The floors are generally wet and active flowstone covers many of the cave surfaces, yet material representing a span of up to 900 years or more is co-present on the surface. The surveyed area with its associated artifacts is found on a level ~8 m below the entrance. During the initial reconnaissance it was noted that material deposits within the upper reaches of AC Cave were strongly clustered, and generally consisted of a number of large sherds from one or two vessels each.

Relatively few sherds in the AC Cave assemblage have been securely typed, the assemblage being composed predominantly of non-diagnostic utilitarian body sherds, making any discussion of spatio-temporal trends in the objects used (and in the spheres/networks involved) unfortunately limited beyond a single sparse, but relevant, observation. The economic network represented by the assemblage in AC Cave is consistent with that available to the elite class utilizing the largest of caves. The identified ceramics seem to date predominantly to the Late/Terminal Classic and Early Postclassic periods (Spanish Lookout and [early facet] New Town), a span consistent with intensified use of Footprint Cave, and slightly later than Petroglyph (Graham et al. 1980:160; Reents-Budet 1980:265; Reents-Budet and MacLeod 1997:22; see also Helmke 2009:237, 412, 465; Moyes 2001:70; Peterson 2006:104 for similar patterns in neighbouring regions). The presence of a Fowler Orange-red vessel likewise conforms to expectations from these other caves, establishing a period of use extending as early as the Hermitage complex (Early Classic Period). Moreover, in general outline, the material assemblage from AC Cave matches those general patterns noted at both Footprint and Petroglyph Caves in its shift from Petén-affiliated types (e.g. Fowler Orange-red) during the Hermitage complex to local (Belize Valley) types (Cayo Unslipped and Daylight Orange) in the later Spanish Lookout and New Town complexes.

Actun Neko

Actun Neko is located close to AC Cave, on the north side of the Hummingbird highway and the eastern side of the Caves Branch River just south of where it subsumes into the coastal plain. It was investigated during the height of the rainy season and contains numerous active flowstone formations. The floors are generally wet and consist largely of concentrations of alluvial matrices, decayed limestone, and guano. The cave has two entrances, connected by ~95m of passage. As in AC Cave, there are no expansive interior spaces that would be appropriate for a large group of ritualists and observers as may be expected of at least some state-sponsored ritual. The assemblage consists

almost entirely of ceramics with the notable exception of an inlaid shell disc that was found in a side passage extending ~19m southwest, roughly halfway between the two entrances (discussed in Morton et al. 2012). During the initial reconnaissance it was noted that artifact scatters were concentrated near the two entrances with little material found between.

In its morphology, Actun Neko differs significantly from any of the previously discussed caves and its pattern of use reflects this (little evidence for the use of ritual set pieces). Where it is similar is in the material content of the artifact assemblage contained therein (predominantly sherds from fragmented and incomplete ceramic vessels) and the broad shifting pattern of localization vs. regionalization represented. In particular, beginning in the late facet of the Jenney Creek complex, the assemblage from Actun Neko shows strong affiliations to types common in the broader lowlands (incl. Sayab Daub-striated and Jocote Orange-brown types), a trend that continues into the Floral Park complex (incl. varieties of Aguacate Orange), and Hermitage complex (the site's principle period of use based on artifact frequencies, incl. varieties of Socotz Striated, Aguila Orange, Lucha Incised, Minanha Red and Balanza Black; Gifford 1976). Helmke was able to date the carving of the shell disc by its iconographic elements to between AD 396 and 652 (c. 8.18.0.0.0 and 9.11.0.0.0) and associates the style of image explicitly with the Petén during this period. Finally, the assemblage of Actun Neko swings back toward local types during the following Tiger Run and Spanish Lookout complexes (incl. varieties of Macal Orange-Red, Rubber Camp Brown and Mount Maloney Black along with several utilitarian vessels; see various sections in Gifford 1976). Interestingly, diagnostic local types such as Daylight Orange are not present in the Actun Neko assemblage, but rather local expressions of More Force Unslipped and perhaps examples of Miseria Appliqued that may signal a late return/continuation of Petén influence (Sabloff 1975:174; LeCount 1996:139). Perhaps the most intriguing data, given the prominence of Late Classic ceramics within Actun Neko, is conspicuous for its

absence: that is, there is neither a preponderance of red nor black wares in the Neko assemblage.

Insight into the Domestic Economy from the Cave Context

Perhaps the most significant data relates to period of use and degree of integration into broad networks of exchange. As noted elsewhere (Morton et al. 2014), the ubiquity of cave use in the CBRV, together with its antiquity, suggest a much longer period of occupation in the valley than do data from surface contexts. Moreover, given that even our earliest material, extending all the way back to the Jenney Creek complex in Actun Neko, conforms to types common across much of the Maya lowlands, it seems clear that those living within the CBRV were, from the start, tied into broad-sweeping networks of exchange and consumption.

Accepting the basic division between 'elite' and 'non-elite' caves noted above, then we are similarly able to note that, at least in its broad strokes, the material assemblage of the domestic sphere and that of elite consumption mirror one another in broad trends of regionalization and localization. In all periods, local utilitarian wares are common, while non-utilitarian serving vessels conform to the ebb and flow of regional interaction seen in the neighbouring Belize and Sibun River Valleys.

Where the assemblages differ is also of interest. In general, the assemblages of smaller caves are less diverse and more modest in proportion to those of larger caves; perhaps not surprising given the hypothetically reduced emphasis on public performance and less intensive use (we can imagine a model in which individual households/kin groups retain exclusive stewardship over individual caves, only engaging in low-level or periodic rites; see modern 'waterhole groups' in Vogt 1976). More interesting, the eastern-Belize Valley red wares that dominate the assemblages at both Petroglyph and Footprint Caves (to the near exclusion of black wares) are only poorly represented in smaller cave contexts and do not dominate over the black. It is possible that non-elite populations within the valley had less access to those specific goods signalling political affiliation, however, we know from the presence

of *some* such wares that access was not exclusive. Further, based on the presence of the shell disc from Actun Neko, it seems clear that even those making use of small caves in the region had both access to exotic, high-value goods, and the freedom to use them. Both of these observations may be linked to general patterns of increasing affluence during the Classic Period, perhaps associated with the rise of nucleated polities in this and neighbouring valleys. Thus, it may be that preferences for red vs. black wares in evidence in elite contexts, while signalling general political affiliations, is not reflective of broader practice, access, or affiliation at the household level. Comparing the two contexts in this manner, we are able to begin to characterize several aspects of the domestic economy in the CBRV, though ultimately, these assumptions and trends need to be supported/validated through settlement research in the region. Upcoming seasons of the CBAS project will seek to fill, precisely, this gap.

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12 RAW MATERIAL ECONOMY AND TECHNOLOGICAL ORGANIZATION IN THE HINTERLANDS: DOS HOMBRES TO GRAN CACAO ARCHAEOLOGY PROJECT

Marisol Cortes-Rincon, Sarah Boudreaux, and Erik Marinkovich

This paper evaluates the diversity of the domestic and communal economy of hinterlands in northwestern Belize. This research relies on geospatial analysis to explain site function in relation to landscape utilization and exploitation of natural resources. Multidisciplinary data helps to understand multiple levels of a site's function by scrutinizing repetitive patterns of human behavior such as ritual offerings or craft specialization. A community's specific adaptive patterns most likely correlated to the nature of its exploited territory, raw-material availability, and local inter-dependency household economy. Various sites located on the hinterlands provide evidence of domestic production, with some evidence of multi-crafting. In this paper, the authors present preliminary data from such sites and discuss ways in which these loci may have been integrated into the broader regional economy.

Introduction

Many questions regarding economic development and structural change in hinterlands need to account for relationships between urban centers and periphery regions and are best analyzed in terms of a macro-scale economy. A deeper understanding of linkages between rural and urban economies would aid researchers in addressing interrelated problems such as declines in economic resources and the impacting result on household economy. Most scholars concur that Classic Maya economies were generally unspecialized and organizationally redundant (Demarest 1989; Inomata 2001). Food and crafts were produced in dispersed areas away from centralized control (Ardren and Manahan 2004). For this reason, many researchers argue that elite and non-elite economies were poorly integrated (Demarest 1989, 1992; Hendon 1991; Inomata 2001; Sanders 1989; Webster 1985).

This research seeks to investigate how hinterland economies adapt to population growth, limited access to resources, and integration within a regional economy. The key for interpreting the articulation of household and political economies is to envision them along a continuum of economic scales (Manahan and Ardren 2008). A household perspective reveals the social relations of production within a micro-scale unit. Conversely, an examination of hinterland labor organization, industry scale, and intensity of production may reflect external influence from regional shifts in the political and economic landscape (Costin 1991, 2000).

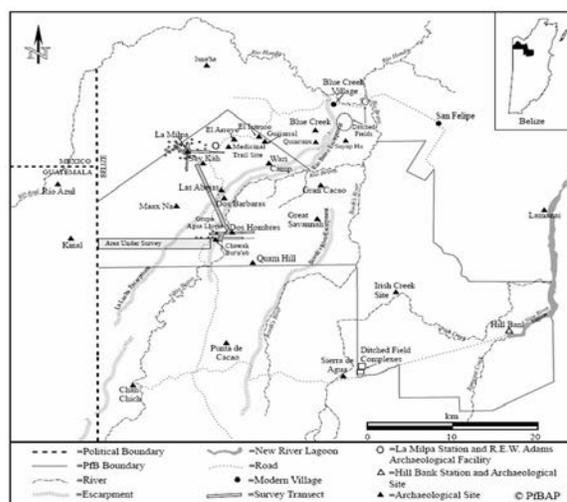


Figure 1. Programme for Belize Archaeological Project. © PfBAP.

Field work has been carried out under the auspices of the Programme for Belize Archaeological Project (PfBAP; See Figure 1). The PfBAP, currently under the direction of Dr. Fred Valdez, Jr., is a long term research effort that conducts interdisciplinary research on 260,000 acres in northwestern Belize (Adams et al 2004; Valdez 2005). The Dos Hombres to Gran Cacao Archaeology Project (DH2GC) includes the integration of environmental, artifactual, architectural, and landscape modification metadata. This permits evaluation of interdependent economic entities at varied levels of the socio-political strata which allows for a broader understanding of the nature of the core-periphery economic linkage. Field methods utilized are directed toward questions of social

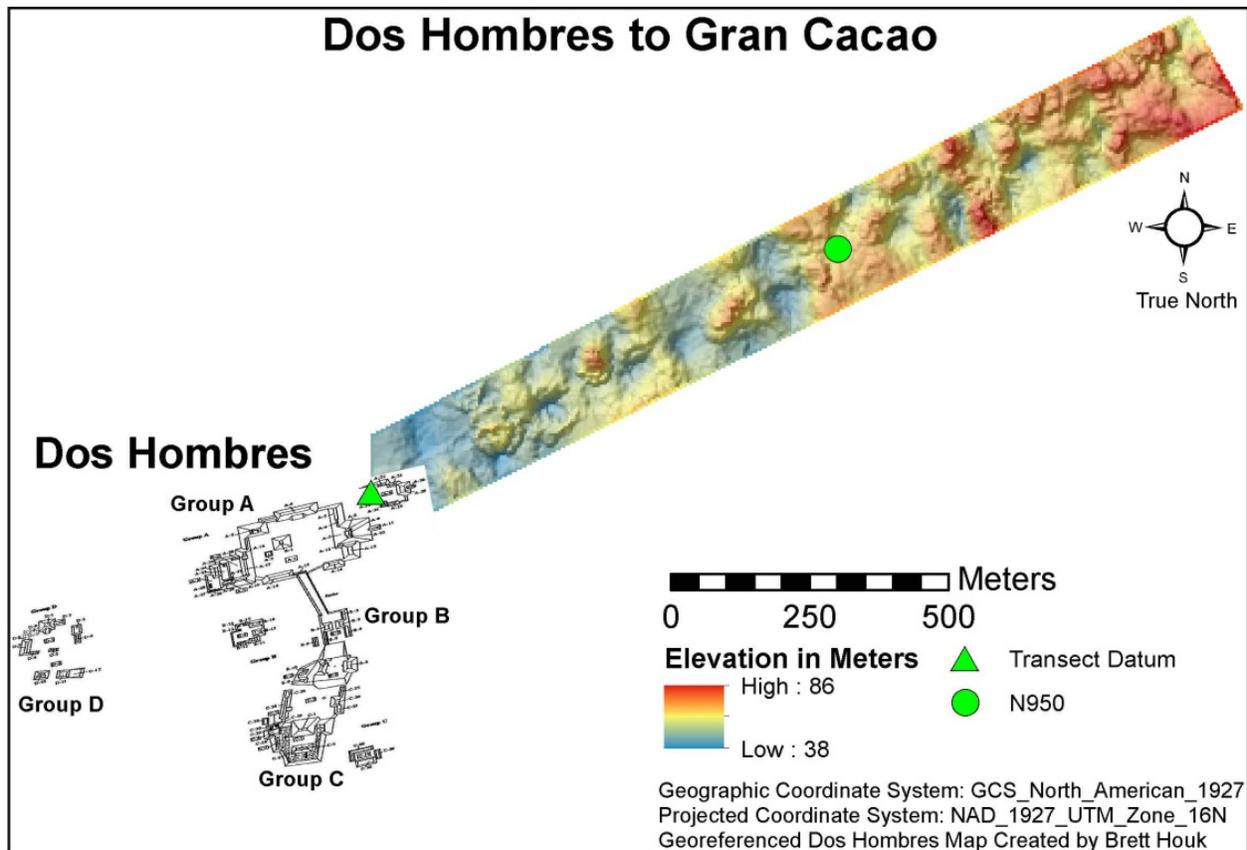


Figure 2. Dos Hombres to Gran Cacao Archaeology Project. Survey Data Collected by DH2GC 2009-2014 field school participants. Data rendered in ArcMap 10.1 by Erik Marinkovich. © DH2GC.

structure and demography, patterns of growth, subsistence, political economy, administration, and socioeconomic organization.

Geographic Information System (GIS) Database Management System

Attention is also focused upon the identification of archaeological sites and the density of culturally modified features such as reservoirs, chultuns, terraces, and quarries. Datasets are integrated into the project's regional geographic information system (GIS) database which includes nearby sites, previous transect projects, and material cultural data. A primary goal is to synthesize available datasets within a 5 km buffer around Dos Hombres.

The GIS database facilitates robust visual and temporal representations of political and economic regional structures on intra-site and micro-regional scales. The DH2GC project offers the opportunity to concentrate research at

the household level on a micro-scale, something that has often been overlooked by projects testing traditional models of political economy (Blanton 1994; Flannery 1976; Hendon 1996; Santley and Hirth 1993; Wilk and Ashmore, 1988; Wilk and Rathje 1982). The DH2GC project considers the premise that individual households remain the basic unit of production by maintaining some degree of autonomy, despite being communally bound through social and cultural ties (Manahan and Ardren 2008). Research on food and craft production provides a means to examine household practices and how their strategies of economic production articulate within the community and micro-region. Since debris from craft production often survives better than agricultural remains, it is possible to closely trace processes of intensification and change within different stages of production in these settings (Manahan and Ardren 2008).

Systematic work has been carried out in the periphery of Dos Hombres for the past twenty years, beginning with Hugh Robichaux's (1995) investigations along the oil transect west of Dos Hombres. Stan Walling (2004) has been researching settlement patterns and ecological studies at Chawak But'ob, a small farming community southwest of Dos Hombres. John Lohse (2001) carried out two transects: east and west of Dos Hombres. Jon Hageman (2004) carried out an estimated 6 km transect northwest of Dos Hombres towards La Milpa. DH2GC is a survey transect which originates on the northeast corner of the main plaza of Dos Hombres and is projected to terminate at Gran Cacao with an estimated length of 12 km (see Figure 2).

For the purpose of this paper, the authors are focusing on Lohse's (2001) transects A and B, the four survey blocks investigated by Robichaux (1995) northwest of Dos Hombres, the DH2GC transect to the northeast of Dos Hombres, and Rio Bravo (R.B.) site No. 73 – which is located approximately 2.4 km east of La Milpa site core. A cohesive analysis of these four projects provides comparative data of occupational history, craft specialization, and availability of natural resources as it pertains to control and access in the hinterlands. By reconstructing the movement of raw materials from procurement areas to production locales, the interconnections of varied levels of complex economic systems can be assessed through analysis at a communal level.

Chronologies, Settlement Patterns, and Population Estimates

Communities with multiple construction phases exhibit shifts in material usage, architectural styles, as well as settlement patterns that most likely reflect changes in their economic organizations. The habitation pattern for the household groups closest to the site core is characterized by lengthier occupation periods spanning from the Late Preclassic through a Late/Terminal Classic occupation. Conversely, as distance increases from the site core, household groups have shorter occupational episodes dating to the Late/Terminal Classic.

Continuous occupation from the Late Preclassic through the Late Classic was

established at an informal household group located at N150E75 along the DH2GC transect. The N150 group is the closest to the Dos Hombres site core and has exhibited the most varied ceramic assemblage including 28% Late Preclassic material (Cortes-Rincon and Boudreaux 2014). The N250W50 household group was settled during the Late Preclassic with just 11.9%, Early Classic 1.49%, and a Late Classic 86.57% occupation. Ceramic data at a series of interconnected water basins at the N350W50 household group indicates that these features were utilized during the Early Classic with 31.73%, and Late Classic with 68.27%. Cultural materials recovered from these features were limited to Early and Late Classic water and storage jars and lithic debitage. The N750 structural group has a substantial Late Preclassic component and was continuously occupied until the Late Classic.

The N950 site is located 1 km northeast of Dos Hombres on the DH2GC transect. It is situated on an ecotone approximately 55 m above sea level atop a modified knoll (see Figure 3). Settlement is concentrated around the modified knoll. This site has four water reservoirs, one *sascabero*, two canals, six interconnected small water basins leading down the knoll, two chultuns, a series of small caves, and modest monuments. Excavations within two of the caves were carried out to ascertain the correlation between cave use, ritual activities, and settlement patterns (Cortes-Rincon 2012, 2013; Ports 2013). A Late Classic burial and evidence of ritual activity was documented within the cave feature located at the northeast section of the knoll (Ports 2013, Drake 2013). Preliminary ceramic analysis indicates that this area was predominately inhabited during the Late Classic with 81.25% occupancy. Evidence of occupation prior to the Late Classic is limited; exhibiting a modest Late Preclassic occupation of 4.13% and a small Early Classic occupation of 14.62%, (Boudreaux 2012, 2013, 2014). The estimated population of these spatially dispersed household groups is approximately 384 which is considerably less than occupational figures observed in other areas of the Dos Hombres periphery (Lohse 2001; Robichaux 1995).

Blocks 6 and 7, located between 1.25 km and 2 km east of the Dos Hombres site core on

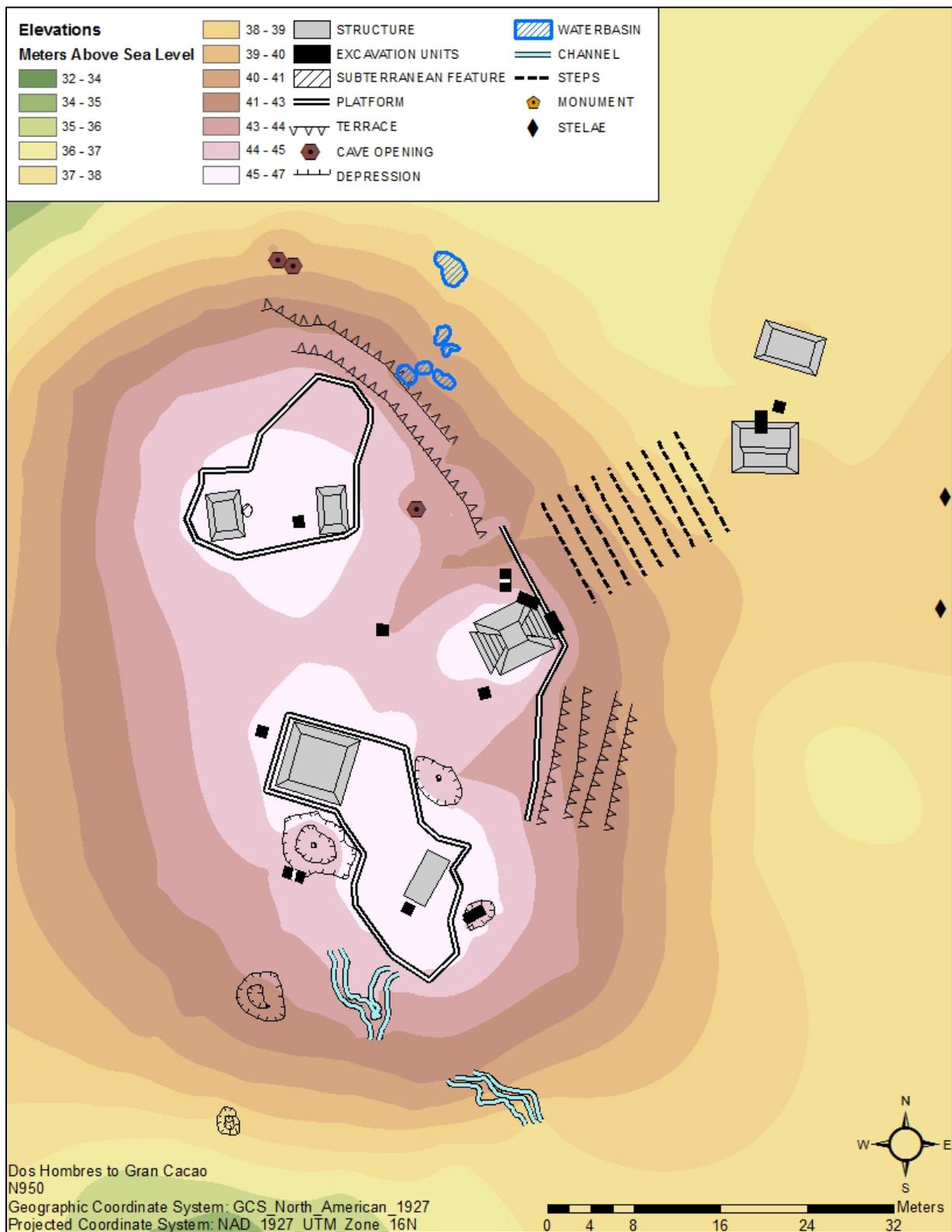


Figure 3. Dos Hombres to Gran Cacao Archaeology Project. Survey Data Collected by DH2GC 2009-2014 field school participants. Data rendered in ArcMap 10.1 by Erik Marinkovich. © DH2GC.

Lohse's (2001) transect B have the highest population density at 1127 residents. The majority of structures in these two survey blocks are categorized as informal household clusters occupied during the Late Classic (Boudreaux 2013; Cortes-Rincon and Boudreaux 2013). The ancient inhabitants settled and extensively modified the area around two large aguadas, one which measures roughly 284 m by 164 m. These water features inundate during the rainy season in a matter of just a few days (Lohse 2001). This section of the study area is densely dotted with long linear features, agricultural terracing, and informal household groups (Lohse 2001). Many of the terraces are not directly associated with household groups which indicate that these features were built utilizing communal labor (Lohse 2001).

The majority of settlement found on Robichaux's (1995) survey blocks is located on transitional and upland environmental zones. Residential groups within upland vegetation zones are situated atop knolls and have the longest span of continuous occupation. Operation 8 located 2.3 km from Dos Hombres was occupied from the Late Preclassic through the Terminal Classic. Operation 9 located 2.9 km away from the site core exhibits a similar occupational history. Operation 10, located 3.95 km from Dos Hombres has the highest population density at an estimated 142 residents. There is a cluster of 19 structures in the southwestern portion of this block containing informal households, a patio group, two courtyard groups, and two water reservoirs. Operations 10 and 11 were only occupied during the Late Terminal Classic (Robichaux 1995).

Fieldwork at R.B. 73, a small community located 2.4 km east of La Milpa site core, began during the 2014 field season. The research team utilized the Humboldt State University-Unmanned Aerial Vehicle (HSU-UAV) for survey and aerial photography. Only two household groups were surveyed and tested. Group A is a cluster of structures and platforms situated atop two modified knolls. Water features and agricultural terracing are also present atop and along the face of the knolls. Multiple lines of evidence including ceramic assemblage, the expediency of construction, the utilization of unmodified bedrock as a

foundational surface, and the informal architectural layout at group A indicate a single construction episode. According to preliminary ceramic data analysis, this group is from the Late Classic (TP 2-3; Boudreaux 2014, personal communication). Group B is located 250 m to the west of group A atop a modified knoll; it has two courtyard groups with a 20 m by 5 m range structure, eight additional structures, a modest monument, one quarry hole, terracing, and one water reservoir with inter-connected channels that funnel water into the floodplain below. A series of long linear features and a nearby 25 m by 10 m water feature with standing water and cut-stones around the bank were noted about 50 m southeast of Group B. These features will be investigated in greater detail during the 2015 field season.

Settlement Patterns

Based on structure density, the most populated areas within the hinterlands of La Milpa and Dos Hombres are found among resource specialized communities (RSCs) such as bajos, terraces, and aguada communities (Scarborough and Valdez 2003:11). Other heavily settled areas are located on ecotones to maximize a variety of resources such as upland forest and limestone deposits (Gill 2001). The sections that have the longest occupation phases in the Dos Hombres periphery are located closer to the site center – usually less than two kilometers, such as N150E75; N750; and blocks 7 and 8 of Robichaux's blocks. The N950 site appears to have been settled due to its location on an ecotone and the existence of caves atop and on the face of the knoll. N250W50 and N350W125 seem to have been settled due to their location near quarries, mid-level bajos, water features, and good soil quality areas as per our soil tests results (Bryant 2013). The groups within the periphery of La Milpa share similar settlement patterning; those closest to the site center have lengthier occupation spans while those such as R.B. 73 only have Late Classic construction and occupation phases. Similar demographic changes have been noted by other PfBAP researchers (Adams et al. 2004; Robichaux 1995; Walling 2004); the cause for the increase in population is highly speculated. This author speculates that the ongoing epidemic

warfare in the western Peten was a motivation for the movement of ancient people across the landscape (Cortes-Rincon 2007; Demarest et al 1997; Inomata 1995).

Craft Production: Local Economy

A study of craft specialization requires a dual approach that includes a macro-examination of elements that constitute ancient economies such as systems of circulation and consumption, and the evaluation of the micro-elements that comprise the internal dynamics of specialized production. The core-periphery approach helps to delineate the social and economic landscape—from households to the macro-region—that exposes the fundamental asymmetry derived from core control in production and exchange which is crucial to its existence (Feinman 1999:55). Rather than focusing on studying individual spatially isolated groups, this method examines a particular entity according to the economic and social interactions it establishes with other entities (Schortman and Urban 1987). Households were not only the place of demographic reproduction but also the location for structural reproduction of the economy through the re-organization of domestic labor (Feinman and Nicholas 2007).

One of the ways to investigate household and community provisioning programs is to analyze ceramic and lithic manufacture processes – this will be discussed in greater detail in Boudreaux's dissertation project. Proofs of ceramic manufacture include kilns, wasters, tools, and raw materials which many archaeological sites in the Maya Lowlands lack (Pool 2009; Rice 1987). Identification of ceramic production areas rely on occurrences of manufacturing mishaps, and firing areas which may look like hearths and pits (Pool 2009). Broken sherds and wasters were recycled as grog, tools, or building material thus leaving the space of clean of debris (Pool 2009).

Understanding ceramic production and consumption patterns at a household level can elucidate household and community-wide provisioning practices. Depending upon access to resources and market areas, ancient inhabitants most likely obtained their domestic necessities through household production,

communal market exchange, or a centrally organized market place. Analyzing ceramics through petrographic and other chemical analyses will allow us to differentiate between the aforementioned provisioning systems. These types of ceramic analyses have a twofold purpose in Boudreaux's proposed research plan concerning household and community provisioning: it can help differentiate between local and regional products and exchange networks. Boudreaux will be able to discern exchange on a community level and eventually on a regional level. The regional analysis will take a few years to complete as a regional sample of material is required. The short-term goal is to understand provisioning of ceramics on a household and community level. The long-term goal is to understand the regional trade system and the role of hinterland communities within the trade network. To begin both research endeavors, Boudreaux created a robust ceramic database of paste signatures used in ceramic manufacture within most groups in the current dataset from DH2GC; this work began in 2011 and is ongoing.

With regard to lithic production, the limited quantity of reduction flakes found at blocks 8 and 10 on Robichaux's (1995) area may indicate expedient lithic tool manufacture. Block 9 on the other hand, has a greater number of reduction flakes which indicates a higher degree of probable lithic activity. Nine residential water reservoirs are located within blocks 9 and 10. These may have originally been used as quarry holes. Similar observations of lithic distribution have been noted within close proximity to multi-functional depressions along the DH2GC transect. Likewise, on Lohse's transect B – blocks 6 and 7 – there is one residential water reservoir and evidence of expedient tool production, retouching and recycling of tools (Lohse 2001).

An analogous pattern is observed at R.B. 73 as per preliminary lithic and obsidian analysis carried out on the 2014 field season (Cortes-Rincon 2014). Large quantities of reduction flakes as well as pressure flaked debitage were recovered from Group A, Operation 1-Subop C. Based on visual analysis by the author, the chert at R.B. 73 is of higher quality than the material found at DH2GC. The location of debris on the

southern portion of Group A's patio indicates that the knappers were using the patio edge for lithic manufacturing and re-sharpening of tools. A similar pattern and greater quantity of debitage was recorded at Group B. Additionally, the majority of obsidian as well as a higher quantity of general utility bifaces (GUBs) and broken recycled GUB fragments were recovered from Group B. The group has a terracing system that was most likely used for local subsistence. Dr. Tim Beech dug a catena on the slope of group B to compare the soil quality to that of the DH2GC transect area.

At the DH2GC transect, evidence of drill production was documented at the N150E75 and N250W75 groups (Forbis 2013; Cortes-Rincon 2013, 2014) as well as modified jute shells which exhibit evidence of drilling (Cortes-Rincon 2013). The N750 patio group also has evidence of lithic manufacture, GUBs, obsidian prismatic blade fragments, and masonry work as evidenced by large limestone flakes. Analysis of debitage and pressure flake scars indicates the obsidian tools were refurbished locally for continued use (Cortes-Rincon 2012). Tool production areas were located in open patios, middens, and depressions around residential structures (Cortes-Rincon 2012).

Regional Trade: Imports

It would be arduous to investigate the procurement and distribution of all resources exchanged by a particular society. Certain characteristics make resources better candidates for study than others, such as obsidian. On Robichaux's (1995) 4.5 km survey area, he documented only 4 obsidian prismatic blades/fragments. In comparison, the DH2GC currently has 172 pieces of obsidian for the 2 km investigated thus far. The majority of obsidian found on the DH2GC transect was found in informal household groups. These artifacts range from prismatic blade fragments to utilized flakes. Only 13 obsidian fragments were found at N950, a small ceremonial site. 19 pieces were found at N150E75 and 125 at N750. At N750, the soil quality is great; additionally there is a quarry and plenty of modified water features nearby. This is indicative that the majority of the local trading and use of obsidian was at informal household groups near natural

resources. Based on X-Ray Fluorescence (XrF) analysis carried out by Beckwith (2011), 87% of the obsidian assemblage is from El Chayal with chronology spanning from Late Preclassic to Terminal Classic – with the majority from Late and Terminal Classic (See Figures 4 and 5; Beckwith 2011; Boudreaux 2012). It is interesting to note that in the Terminal Classic in the Yucatan, trade from El Chayal decreased but it was not the case in the Three Rivers Region as evidenced by Beckwith's XrF study (Beckwith 2011). Guatemalan obsidian was accessible probably from a network-based connection that had been operating since Early Classic times. Its direct importation suggests that it would have been organized since the early Classic by an elite middle class, and supplied through a sort of market exchange (Dahlin 2009:352; Hutson et al. 2008). Two groundstone granite fragments and one limestone mano fragment were found on Robichaux's survey blocks (Robichaux 1995). This is a similar pattern for DH2GC; we have only found 4 groundstone granite fragments (Boudreaux 2012).

Concluding Remarks

The evidence thus far indicates that residents from the informal household groups at N250 and N750 were practicing a multiplicity of economic activities. The participation of these sites in the greater regional economy went beyond consumption to coordinating the movement of raw materials and imported finished products to other areas. Households increased production well beyond local needs. This may have been a way to exploit the new economic network or a means to meet newly imposed tribute burdens, or perhaps both. The assessment of these households provides evidence to evaluate the premise that control over production was necessary to guarantee economic interaction and economic intensification. Indicators of diversification and intensification are expected to appear in productive households to confirm that the local economy was focusing on supplying and procuring materials for commodity and non-commodity production to support administrative structures and guarantee integration into the regional economy.

The basis of the interaction between a site core and its periphery area suggests that cores provide low-bulk, finished products to the periphery in return for high-bulk, staple resources, creating a hierarchical system of dependency. Core economic growth is strongest when the state develops a diversified economy (Smith 1984). In other circumstances, where peripheries are consolidated and multiple cores compete for resources, peripheries could dictate the terms of exchange, essentially playing one core against the other (Wells 2006; State 2004; Schortman and Urban 1994; Smith 2003).

By looking at the micro-regional economy, settlements are separated into distinctly unique clusters, which correlate to multi-craft specialization. Fundamental differences in settlement patterns in the study area suggest basic differences in household economics and community organization. The current stage of our research is the incorporation of procurement, production, and distribution of artifacts into the GIS regional database. The understanding of artifact types and distributions throughout the hinterlands will help to clarify the organizational variances and parallels that exist within the area— as can already be seen from the obsidian XrF data. The Maya were not a homogenous society and therefore no single model can account for every aspect of settlement and economic variability. It is becoming increasingly apparent that a comprehensive analysis of lowland Maya social complexity must include an interpretation of localized processes of economic development and sustainability within micro-scale hinterland communities before the socioeconomic system can be evaluated at a regional scale.

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13 **LITHIC PRODUCTION AND DOMESTIC ECONOMY IN AN ANCIENT MAYA NEIGHBORHOOD AT CHAN CHICH, BELIZE**

Brett A. Houk and Gregory Zaro

During the initial mapping of Chan Chich, survey teams discovered three separate areas at the site containing lithic workshop debris. The largest of these comprised several small residential groups and four mounds of lithic debitage on a hill over 1 km southeast of the Main Plaza and on the opposite bank of Chan Chich Creek. Known as Group H, the house mounds and associated piles of tool-making debris afforded the opportunity to study craft specialization, domestic economy, and domestic architecture within the suburban settlement of the site. In 1998, the project conducted excavations at Group H to determine the nature and intensity of lithic production activities there. This paper summarizes those results and suggests that Group H represents an ancient Maya neighborhood.

Introduction

In both its original incarnation (1996 to 2001) and its revived form (2012 to 2014), the Chan Chich Archaeological Project (CCAP) has primarily focused on elite architecture in the urban epicenter. A notable exception to this observation is the 1998 investigations at Group H, under the direction of Richard K. Meadows. The work at Group H was specifically directed at questions of lithic tool production and/or maintenance within a domestic context (Meadows and Hartnett 2000). Meadows and Hartnett (2000) reported the results of their limited investigations at Group H in a technical report, but did not extend the analysis further. Their data, however, offer an opportunity to address both ancient Maya domestic economy and the nature of non-elite settlement in the periphery of Chan Chich, specifically testing the hypothesis that Group H represents an ancient Maya neighborhood.

Neighborhoods in Maya Cities

Neighborhoods have received attention recently in Maya archaeology, and Michael E. Smith (2010, 2011) in particular has been encouraging archaeologists to consider settlement clusters within an urban context, rather than as non-urban components of the landscape. A neighborhood, as defined by Smith (2010:139), is a residential zone that has "considerable face-to-face interaction and is distinctive on the basis of physical and/or social characteristics." Neighborhoods were important in urban life because of their composition, their social roles, the social relationships created among neighbors, and their functional roles

within cities (Smith 2010:137). Importantly, residents of neighborhoods would often share one or more social attributes such as ethnicity, class, or occupation, which may be reflected in shared patterns of material culture. Smith (2010:145-146) notes that such patterns may be identified archaeologically based on spatial data and material culture in three ways:

1. areas bounded by physical features (natural and/or human-constructed);
2. spatial clusters of buildings or spaces;
3. areas of social distinctiveness.

Boundaries to neighborhoods can be natural or constructed features (Smith 2010:148). Clusters of buildings are particularly useful for identifying neighborhoods in low-density cities, such as those built by the Maya, and Smith (2010:148) suggests that clusters—a term long employed by Maya archaeologists—of Maya houses can be considered urban neighborhoods. Elsewhere, Smith (2011) suggests that Ashmore's (1981:51) group-focused patio cluster, defined as "one or more patio groups with a surrounding cluster of other structures and/or groups," is the type of cluster most likely to represent a neighborhood at Maya sites. Social distinctiveness includes social attributes shared by the residents of a neighborhood, such as race, ethnicity, class, religion, occupation, and/or political affiliation (Smith 2010:148).

Discovery and Investigations of Group H

Although the major groups of buildings at Chan Chich had been mapped first by the Rio Bravo Archaeological Project in 1988 and 1990

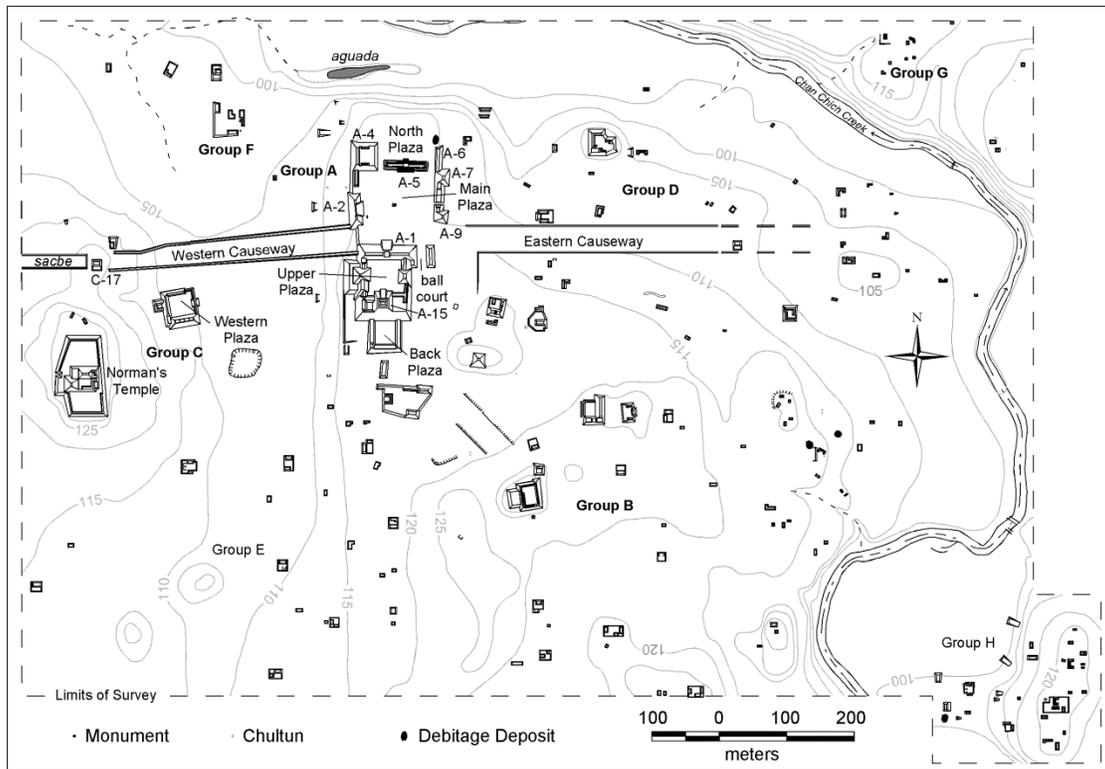


Figure 1. Map of the Chan Chich showing the locations of debitage deposits. Courtesy of the Chan Chich Archaeological Project.

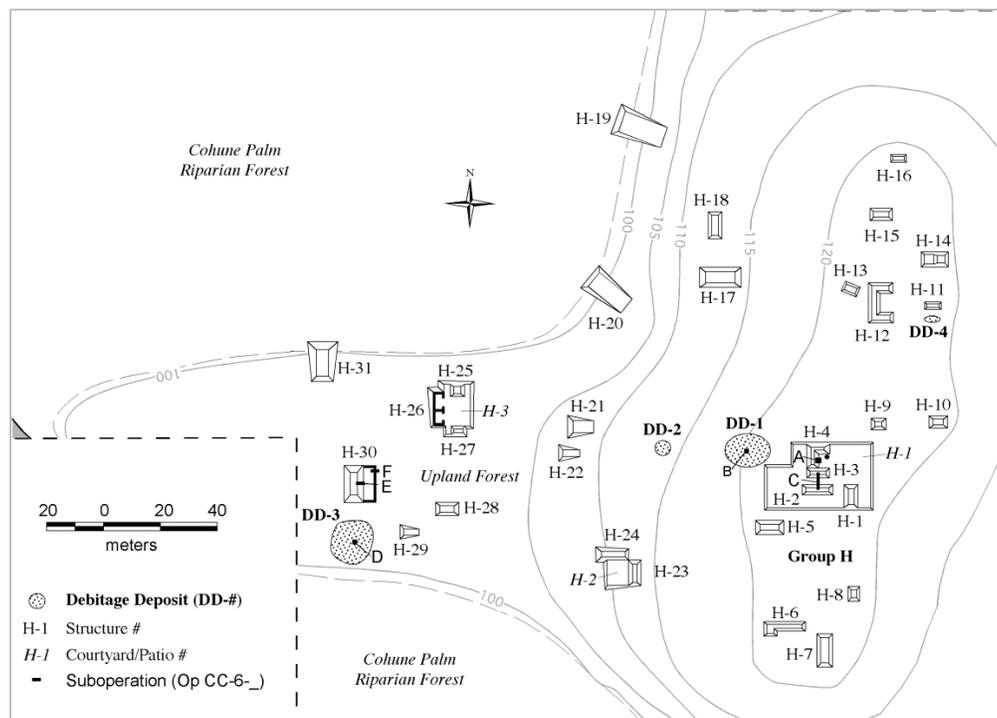


Figure 2. Map of Group H at Chan Chich showing the locations of debitage deposits and 1998 excavation units. Courtesy of the Chan Chich Archaeological Project.

(Guderjan 1991), the nature of settlement around the urban epicenter was unknown when the CCAP began in 1996. During the first season of work, the project planned to map 1 km² of densely forested terrain around the site core, but efficient line cutting allowed the survey teams to expand the map by an additional 0.5 km² to the east of the original block. The last mapping transect cut ended up on the east bank of Chan Chich Creek, the opposite bank from the monumental architecture, on a low hill dotted with small mounds. Inspection of two of the mounds revealed them to be apparent piles of chert debitage measuring over 1.5 m tall (Houk et al. 1996:26). Although survey teams had discovered two other areas with chert debris at the site—one in the North Plaza near Structure A-6 and one associated with Structure B-25—Group H was clearly the most extensive. Accordingly, the mapping effort was extended farther to record as much of the settlement associated with the piles of debitage as possible within the time remaining (Figure 1).

During the 1997 season, a team revisited Group H and collected several thick oval bifaces from the surface of the debitage mounds. Based on those initial observations, Richard Meadows (1998) developed a research design for the following season that focused on establishing a chronology for the occupation of Group H and investigating two debitage deposits (Meadows 1998:87–89). Excavations of the debitage deposits and the analysis of tools, tool fragments, and lithic flakes addressed questions related to tool production, tool maintenance, and the differences, if any, between the two debitage deposits to determine the kinds of activities that took place at Group H (Meadows and Hartnett 2000:27).

Over the span of 4 weeks during the 1998 season, a small crew directed by Meadows excavated six suboperations (Subops A–F) as part of Operation CC-6 (Meadows and Hartnett 2000). The work targeted domestic architecture and two of the four known debitage deposits.

Boundaries and Spatial Configuration of Group H

Group H comprises 31 structures, three courtyards or patio groups, and at least four distinct piles of debitage on the summit and

broad west slope of a large hill (Figure 2). Chan Chich Creek and a wide swath of flat floodplain covered in riparian forest between the base of the hill and the creek form the western edge of the group. Although not formally mapped, the southern boundary is also defined by Chan Chich Creek and the hill's steep slope. The eastern limits of the group are similarly not mapped, but Meadows and Hartnett (2000:15) report a series of apparent agricultural terraces north and east of Patio Group H-1 on the flanks of the hill's slopes. The northern limits of the group are not mapped, but small groups of structures are located on the summit of an adjacent hill (Meadows and Hartnett 2000:15). Although only a little over a kilometer from the center of Chan Chich, Group H would likely be cut-off from the urban epicenter for days or weeks at a time during the height of the rainy season.

The architectural arrangement represents a group-focused patio cluster as defined by Ashmore (1981:51) and comprises three formal patio groups with formally prepared platforms and 22 isolated structures, five of which may form another patio group without a formal platform. Patio Group H-1, a platform supporting four structures, crowns the summit of the hill. Immediately to the south is a small group of structures on a bluff looking south over Chan Chich Creek. Off the northwestern corner of Patio Group H-1 is Debitage Deposit (DD-) 1. A few meters to the west and slightly down the slope is a smaller deposit, DD-2, which is not directly associated with any structures. At the base of the slope are Patio Group H-3, five free-standing structures, and DD-3. Low masonry walls are visible on the surfaces of Structure H-26 and Structure H-30. The structures in Group H are generally small and low, but they are formally organized and largely share a common north-south orientation. The two structures that clearly deviate from the common orientation are Structures H-19 and H-20, two of three small platforms built at the base of the hill and oriented perpendicular to the slope. These three structures may have served special functions related to the swath of floodplain west of the hill.

The available data suggest that Group H is bounded by natural features to the west and

south (Chan Chich Creek) and by topographic and/or cultural features to the east (hill slope/agricultural terraces). The structures in the group are formally organized and represent a cluster. Furthermore, the artifacts recovered from limited architectural excavations support the interpretation that the tested buildings represent domestic structures (see further elaboration below). Therefore, Group H meets the neighborhood criteria of physical boundaries and spatial clustering of buildings.

Group H Social Distinctiveness and Domestic Economy

Evidence in support of "social distinctiveness" and an evaluation of domestic economy at Group H comes from the 1998 excavations that targeted Structure H-30, three structures at Patio Group H-1, and two debitage deposits (see Figure 2). Although ceramic recovery was generally low, Meadows and Hartnett (2000) determined that the structures and patio group they tested were all built and occupied during the Late Classic period. Testing at Patio Group H-1 documented poorly preserved architecture and determined that the surface of the patio was likely packed earth and limestone, not plaster. The courtyard appears to have been constructed in one event, which elevated the platform approximately 50 cm above bedrock. Excavations yielded many local artifacts, including ceramics, manos, debitage, and broken bifaces, but non-local artifacts were recovered as well, such as a granite metate fragment, an obsidian blade, and a shell pendant.

Meadows and Hartnett (2000) report a burial from beneath the patio's floor between Structures H-2 and H-3, near the base of the northern structure. Burial 5, which was analyzed by Frank and Julie Saul, contained the poorly preserved remains of an adult male between the ages of 25 and 35 years old. He was buried in a flexed position with his head to the west. Two battered biconvex oval bifaces and a complete secondary flake made of "red-stained brown chert" appear to have been intentionally buried with the body (Meadows and Hartnett 2000:23).

Structure H-30 is one of the larger mounds in Group H. It measures 15 m in length, 6 m in width, and 2 m in height, and has a low masonry wall on its eastern side that forms a

small enclosure or courtyard. The excavations determined that two construction phases might be present at Structure H-30, both apparently dating to the Late Classic period. The two suboperations combined to expose an intact plaster floor and a profile of the low wall extending off the eastern side of the structure. These features suggest that the structure may have been open along its eastern side facing the courtyard, facilitating activities undertaken in the courtyard. Recovered artifacts included a ceramic spindle whorl, chert biface fragments, and a proximal obsidian blade fragment (Meadows and Hartnett 2000).

Additional excavations at two debitage deposits indicate that occupants of Group H likely participated in a common economic activity, perhaps for over a century. Meadows' crews placed 1.5-x-1.5-m suboperations in the centers of DD-1 and DD-3, employing arbitrary 10-cm thick levels and collecting 1,000-cm³ column samples from the northeast corner of each level.

DD-1 is located 16 m due east of Structure H-4, which is part of Patio Group H-1. The deposit measures 12 m north-south and 16 m along the east-west axis. Prior to excavations, Meadows' crew noted large secondary flakes, several broken biface preforms, and some large limestone cobbles that exhibited abraded surfaces on the ground surface of the debitage deposit. Excavation of suboperation CC-6-B determined that DD-1 is approximately 1 m thick and rests on an artificially constructed platform. Although the composition of the deposit varied from level to level, it was dominated by lithic debitage, including primary decortication flakes, tertiary flakes, biface thinning flakes, and microdebitage. The deposit also contained broken biface preforms, oval biface fragments, limestone cobbles that were likely used as hammer stones, a bark beater, and moderate amounts of pottery (Meadows and Hartnett 2000:20).

The second debitage deposit tested was DD-3, 10 m south of Structure H-30. This mound measures 16.4 m north-south by 15 m east-west, and is 1.8 m high. Suboperation CC-6-D was excavated from the summit of the mound to bedrock. The debitage deposit was approximately 85 cm thick and formed on a

limestone shelf that appears to have been swept clean and used as the location for a lithic workshop (Meadows and Hartnett 2000:24). The upper levels of Suboperation CC-6-D yielded a large amount of lithic debitage ranging from a fine-grained purple and brown chert to a more coarse-grained white and blue chert. The debitage varied to some degree between levels, with primary and secondary flakes dominating the upper levels. In Levels 3 and 4, the excavations encountered a large deposit of coarse-grained sand that appears to have been lain down in a uniform fashion. Below this layer, secondary and tertiary lithic debitage again predominated. Unlike DD-1, the top three levels in DD-3 yielded no other cultural material besides lithic tools and debitage, suggesting different formation characteristics.

Tool Forms

The excavations of Subops CC-6-A through -F recovered 151 tools and tool fragments. Meadows and Hartnett (2000: Table 2.1) provide information on each specimen's size, form, condition, raw material, evidence of use/reuse, and breakage; only the high points are summarized here. The majority of tools and tool fragments came from DD-1. The distribution of preforms, which accounted for 21.5 percent of the total assemblage, indicates that tool production is represented at the debitage deposits, where 92 percent of the preforms originated, while tool maintenance was more prevalent at the domestic structures sampled by the excavations. However, differences between the two debitage deposits are also revealed by the distribution of tools. Of the 117 tools and fragments found in the debitage deposits, 74 came from DD-1, and 28 of those, or 37.8 percent, were preforms. This contrasts with the lower number of tools ($n=43$) and the lower percentage of preforms ($n=6$, or 14 percent) from DD-3. The differences support the interpretation that DD-1 represents the remains of stone tool production activities, while at DD-3 (which exhibits much less production discard), other activities like tool maintenance may have been more prominent (Meadows and Hartnett 2000:32).

It was clear from the analysis of tool forms and tool form fragments that local chert

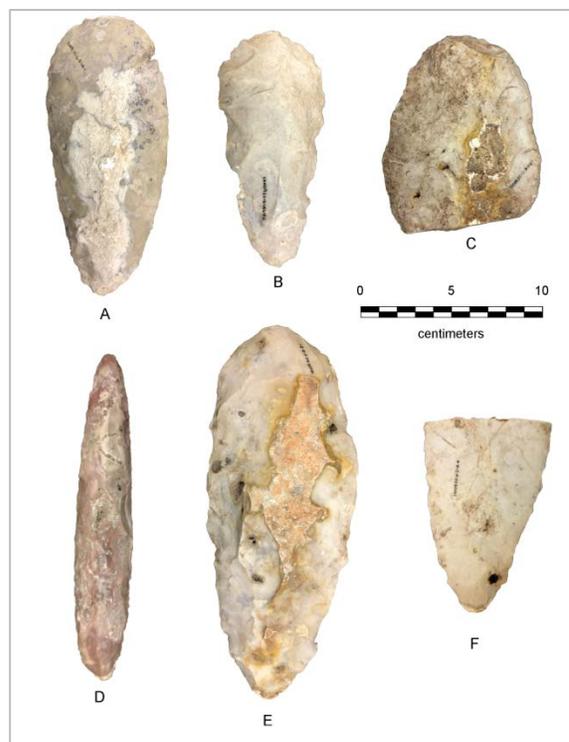


Figure 3. Examples of stone tool forms produced at Group H during the Late Classic: a, b) small oval bifaces; c) general utility biface fragment; d) narrow biface; e) large oval biface; f) thin biface fragment. Courtesy of the Chan Chich Archaeological Project.

was likely utilized in lithic production at Group H. These are highly chalcedonous materials, considered to be of moderate quality, with numerous voids and fossil inclusions visible. Although no quarries have been identified at Chan Chich, numerous chert cobbles are present in the bed of Chan Chich Creek. It seems probable that the creek was the source of the material being worked at Group H.

The analysis of the tools and fragments indicates the residents of Group H produced at least six formal types of tool forms from these local cobbles (Figure 3). Small oval bifaces (15.2 percent) accounted for the most common special form, but general utility bifaces (14.6 percent) and narrow bifaces (14.6 percent) were nearly as prevalent. Large oval bifaces—not the fine tools produced at Colha but rather a production continuum between general utility bifaces at one end and bifacial celts at the other—accounted for 11.3 percent of the assemblage. Three tools (2.0 percent) fall into the thin biface form. The remaining tools (41.0

Table 1. Estimates for Volume, Density, and Tools Produced at DD-1 and DD-3.

DD	Base Radius (m)	Height (m)	Volume ^{1,2} (m ³)	Density (kg/m ³)	Min. Tools/ Max. Tools ³	LC Min. Tools/Year ⁴	LC II Min. Tools/Year ⁵
1	7.0	1.0	77.5	2,007	103,695/155,543	518	1,037
3	8.5	0.85	96.8	1,781	114,934/172,401	575	1,149

1. Volume of DD-1 calculated by WolframAlpha (2014a)
2. Volume of DD-3 calculated by WolframAlpha (2014b)
3. Based on conservative estimates for debitage waste of 1,000 g (maximum tools) and 1,500 g (minimum tools) after Whittaker et al. (2009:150).
4. Minimum number of tools produced assuming deposit formed over 200 years in the Late Classic.
5. Minimum number of tools produced assuming deposit formed over 100 years in Late Classic II.

percent) fall into a generic biface category, which includes most of the preforms from the assemblage.

Tool forms varied between the two debitage deposits, with the main differences being in the production of general utility bifaces, which were much more prevalent in DD-1, and narrow bifaces, which were more prevalent in DD-3 (associated with Structure H-30). The other tool form classifications are relatively similar in terms of overall frequency of appearance, with the exception of large oval shaped bifaces, which were also more common at DD-1.

Production Intensity

Research at Colha in northern Belize indicates that the Maya used a two-step process in producing chert tools (Shafer and Hester 1983, 1991). The first step was the roughing out of large macroflakes and/or very roughly shaped biface blanks at the quarry for later reduction in workshop and/or domestic contexts. The second step was the thinning and shaping of a blanks and preforms into final form. The results of limited debitage analysis recovered at Chan Chich indicate a similar pattern. In the workshops at Group H, craft persons reduced macroflakes via bifacial reduction into tool forms for immediate use and perhaps also for local exchange. The debitage indicates the conservative nature of lithic technology via the standardized form of individual flakes. These debitage deposits represent a continuum of

reduction, evidenced by the presence of numerous larger secondary flakes to the copious quantities of microdebitage (Meadows and Hartnett 2000).

Four types of information are needed to estimate the number of tools produced at each Group H debitage deposit per year: total volume of deposit, density of debitage, amount of waste from each stone tool, and use span of the deposit. Fortunately, all four of these can be estimated or calculated based on available data. For the purposes of calculating volume, the two debitage deposits are treated as spherical caps, and, with known heights for each cap and base radii averaged from the measured horizontal extents of the two deposits, is possible to estimate the total volumes of debitage at DD-1 and DD-3 to be 77.5 m³ and 96.7 m³, respectively (Table 1).

The debitage data from the column samples collected in each level can be used to estimate the density of debris in the two suboperations. At DD-1, the average density of debitage throughout the deposit was 2,007 kg/m³ compared to 1,781 kg/m³ at DD-3.

Experimental tool production by Whittaker et al. (2009) provides a framework for estimating the amount of waste discarded as part of the production of each biface. Whittaker et al. (2009) excavated a lithic workshop and associated debitage dump at the nearby site of El Pilar, which has comparable raw material to Chan Chich. At El Pilar, the knappers produced comparable tool forms to those at Chan Chich,

described by Whittaker et al. (2009:140) as "ovoid bifaces, usually with a thick biconvex cross section," commonly referred to as "'general utility bifaces,' 'oval bifaces,' and 'flaked celts.'" As part of their research, Whittaker's team made replica bifaces and calculated the amount of waste flakes (as both counts and weights) produced for each finished tool. They determined that conservative estimates are 1,000 to 1,500 g of debitage waste per biface (Whittaker et al. 2009:150). Based on those estimates and the densities we calculated for the Group H deposits, each cubic meter represents between 1,338 and 2,007 bifaces at DD-1 and between 1,187 and 1,781 bifaces at DD-3. Based on the calculated volumes for the deposits, DD-1 and DD-3 each likely represents the debitage waste associated with the production of approximately 100,000–170,000 bifaces.

Estimating the scale of production at Group H is difficult because we do not know how long it took each deposit to form, but Table 1 includes estimates for the minimum number of tools produced per year assuming 200-year and 100-year periods of use. The results suggest that knappers produced minimally 500 to 1,100 bifaces per year at each deposit during the Late Classic period. If the deposits formed more quickly, the number of tools produced each year could actually be substantially higher.

In sum, the available data from Group H points to a common economic activity—stone tool production and maintenance. Therefore, Group H seems to reflect social distinctiveness, the third criteria for an ancient Maya neighborhood.

Discussion

It is clear from the analysis of lithic materials reported by Meadows and Hartnett (2000) and summarized here that a number of different tool forms were being produced and maintained by the ancient inhabitants of Group H. The most common forms include the small oval biface, the general utility biface, and the "narrow biface. These were likely intended for use in agriculture, domestic tasks, woodworking, and masonry as evidenced by use wear on complete specimens associated with the structure excavations (Meadows and Hartnett

2000:38). The two deposits, however, suggest that knappers at the two locations focused on the production of different tool forms, but still produced the other forms in lesser numbers. The technological knowledge of how to produce these standard forms over what may have been one or two centuries was a critical component of the lithic craft economy at Group H (Meadows and Hartnett 2000:38). Future research should compare the nature of lithic production from Group H to that of the other two areas with documented debitage deposits in Group B and the North Plaza to examine models of production and exchange (see Figure 1).

It also seems reasonable to refer to Group H as a "neighborhood," as defined by Smith (2010). All three archaeological indicators are present: physical boundaries, clustered houses, and social distinctiveness. However, it is unclear whether all of the dozens of presumably residential buildings scattered around the Chan Chich urban epicenter were organized into neighborhoods that conform to these principles, or were perhaps organized in some other way. Nevertheless, the identification of one Late Classic neighborhood at Chan Chich opens up future research possibilities to identify other spatial clusters of houses sharing common economic functions within the urban landscape, or to perhaps identify additional criteria that can be used to recognize ancient Maya neighborhoods in an urban context. One possibility to be explored is that neighborhoods like Group H are only found on the outskirts of the urban landscape, while those households within the urban epicenter (that is, within 1 km of the Main Plaza) formed essentially a large and specialized neighborhood related to the urban activities of the civic/ceremonial site core.

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14 **DOMESTIC ECONOMY IN NORTHWEST BELIZE: HUN TUN AND LA MILPA**

Debora C. Trein, Robyn L. Dodge and Fred Valdez, Jr.

Prehistoric Maya "Domestic Economy" as seen in subsistence, commerce, and industry, can be identified among elites as well as commoners. We review the kinds or types of activities that may be part of domestic activity as well as archaeological signatures of these activities. As a case study we present evidence from the large site of La Milpa and a small distant group, Hun Tun. At least four seasons of archaeological research have taken place at each site and serve as the basis for interpreting prehistoric behavior. Activities and or artifacts related to subsistence, commerce, and/or industry are presented in terms of concerns that may be elite only or perhaps represented at both levels of society, but in a modified format.

Introduction

In many respects, Prehistoric Maya "Domestic Economy" as seen in subsistence, commerce, and industry, can be identified among elite as well as commoner contexts. Domestic economy is here viewed as all practices that contribute to the many modes of consumption, production, and reproduction of the household at various levels of society. Included here are aspects of economic, political, social, and ideological organization that impacted the household structure in the broadest sense. Limitations in applying any particular part of the above mentioned analysis consist of issues arising from archaeological preservation and our current abilities to identify prehistoric behaviors. With that caveat, however, there is much to be claimed towards understanding certain patterns of domestic economy at the regional level as identified from archaeological research at sites in the Programme for Belize Archaeological Project's (PFBAP) research area in the Rio Bravo Conservation and Management Area (RBCMA) (Valdez 2014).

In this paper we will be discussing employing the study of ancient Maya domestic economy to examine relationship dynamics between different communities. These dynamics may include the creation and maintenance of social, political, and economic bonds between sites, as well as the legitimization of hierarchical relationships. Two specific sites, La Milpa (Trein 2010, 2011, 2012, 2013, 2014, 2015; Trein, et al. 2014), a large Maya center, and Hun Tun (Dodge 2009, 2011, 2012, 2013; Dodge and Doumanoff 2010), a minor settlement within the La Milpa realm, are used here to explore some

approaches to the study of ancient Maya domestic economy at the regional level.

Traditionally, there has been a tendency to view ancient Maya society as a two-part construction where elite and non-elite groups are generally distinct and distinguishable. Nevertheless several alternative models for the organization of ancient Maya society have been proposed that are more nuanced and more diligent to the dispositions of existing data sets. These models were inspired greatly by studies of ancient households and their domestic economy (Becker 2004; Gillespie 2001; Iannone and Connell 2002; Inomata 2001, 2004; Joyce and Gillespie 2000; Lohse and Valdez 2004; Lucero 2007; Robin 2003; Scarborough and Valdez 2003, 2014). In these analyses, household practices have been positioned within and as part of the larger-scale societal landscape through the examination of the intersection between state-level processes and domestic economic operations of smaller sites (Hendon 2010; Hutson 2010; Robin 2002, 2003; Webster and Gonlin 1988). We would like to contribute to this discussion by examining the nature of the relationship between the sites of Hun Tun and La Milpa.

What Constitutes "Domestic Economy"?

Domestic economy is defined here as practices of production and reproduction for the subsistence of the household, or "that which is done for the household". It is imperative to note that this definition should not discriminate against a context that is external to the physical household space. We argue for the notion that domestic economy is concerned with the processes and operations that are carried out or

undertaken by a household for the household's maintenance. Alongside activities most traditionally associated with domestic economies, such as cooking and planting of crops for local consumption, these processes and operations may also include extra-household practices such as paying tribute to a larger political entity with the products of domestic work, or the production of goods in a domestic setting for inter-community exchange (Ardren, et al. 2010; Hendon 1996, 1997; Hester, et al. 1994; Inomata, et al. 2002; Robin 2002; Sheets 2002). These practices, both at the intra- and inter-community level, benefit the household and community in the immediate term and aid in the persistence of the household in the long-term (Hendon 1997, 2004; Hester, et al. 1994; Wilk and Ashmore 1988).

Included in the study of domestic economy is also the examination of how large regional centers may have harnessed the labor and materials associated with domestic economic practices, including cloth, pottery, feathers, and lithic tools for such activities as tribute payment, ritual practices, construction events, short- and long-distance trade, and so on (Buttles, et al. 2015; Valdez 2014). Included also as material expressions of ancient Maya domestic economic practices are varying settlement strategies and landscape modifications that included terracing, chultun and sacbeob construction, and poza excavations, among other features, as these supported and in many ways represented the control of resources in an occupied area that enabled the performance of economic practices at the domestic level (Valdez 2011, 2014).

Aspects of domestic economic practices are most directly identified through its material proxies (Buttles, et al. 2015). These are often discussed as objects such as pottery (sherds and vessels), chipped stone (flakes and a myriad of tools), modified fauna (shells and bones, among others), and etc. We here also wish to include raw materials collected for the production of these artifacts, whether clay, chert nodules, and others. It is important also to keep in mind the majority of material culture that has long disappeared due to preservation conditions. The various cloths, feathers, bark, and wooden artifacts that we see depicted on pottery, murals,

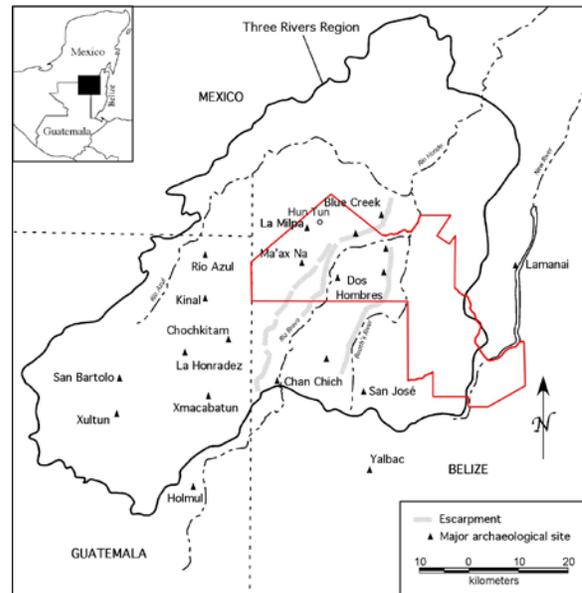


Figure 1. Map of the Three Rivers Region, with the outline of Programme for Belize property and the location of the sites of La Milpa and Hun Tun. Modified from a map provided by Brett Houk.

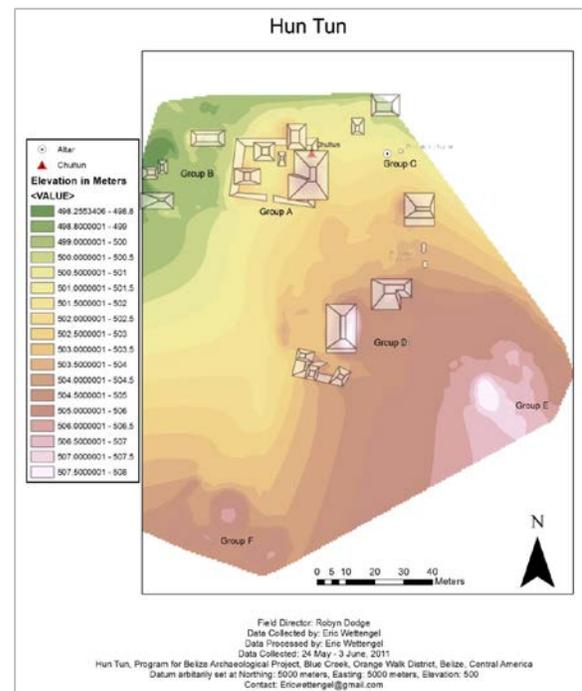


Figure 2. Topographic map of Hun Tun. Map by Eric Wettengel.

and stelae, are all too often absent in our discussions (Buttles, et al. 2015; Valdez 2014). Many of the small sites observed across the landscape may have been the production centers for these kinds of materials, now gone and very

difficult to identify with traditional archaeological methods. Nevertheless, we here emphasize that it is the archaeological context that may best aid in defining a particular activity and therefore, its signature.

Case studies: La Milpa and Hun Tun

Both sites discussed are situated within the Three Rivers Region, and more specifically, within the RBCMA (Figure 1), in northwest Belize. This region is rich with archaeological heritage, with over 70 sites documented over the last 20 years of fieldwork in the area. While the research that is currently being conducted at both Hun Tun and La Milpa is not necessarily focused on a specific study of the domestic economy of either community, the 2014 BAAS presented an opportunity for us to think about how these two sites articulated with each other at the level of domestic economy.

Domestic Economy from Hun Tun's Material Assemblage

Hun Tun is a modest settlement approximately five kilometers southeast of La Milpa (Figure 2). Hun Tun is composed of five courtyard groups, two of these, Groups A and D, were designed and built as tightly spaced plastered platform groups with complex architecture. These groups make up the site center. Three other courtyard groups, Groups B, C, and E, consist of low-lying platforms with rammed earth floors, and form the perimeter of the site (Arndt 2011; Dodge 2009, 2011; Dodge and Doumanoff 2010). A set of terraces marks the eastern boundary of the site, which correlates to the naturally sloping terrain. Present at Hun Tun are also one altar and a possible set of stelae. It is currently understood that the site was constructed, occupied, and abandoned entirely during the Late Classic period based on ceramic evidence (Lauren Sullivan 2012 personal communication). Excavations over the past seven seasons have focused on mapping, settlement pattern analysis, testing and excavating various features within the site boundaries (Dodge 2009, 2011, 2012, 2013; Dodge and Doumanoff 2010).

The position of Hun Tun within the polity structured and influenced by La Milpa can be, at a general level, garnered from its life-history.

Hun Tun is situated within a landscape that experienced great socio-political change in the Late Classic: the population density of the area greatly increased, and La Milpa achieved its political and economic status as a significant regional power (Adams and Jones 1981; Adams, et al. 2004; Hageman and Lohse 2003). Additionally, research undertaken over the past 20 years on the RBCMA indicates that the Late Classic was a period that was characterized by a strong local tradition of goods production and significant regional independence for La Milpa and its surrounding landscape, based on the material evidence found in the area at this time. Local goods comprise the overwhelming majority of all objects observed and collected throughout all social contexts in the sites excavated in the RBCMA, including at Hun Tun and La Milpa (Sullivan and Sagebiel 2003). In the Late Classic period the economic and political relationships between communities in this corner of northwest Belize were mostly confined to the immediate surroundings of any one center, the largest of these being La Milpa (Sullivan and Sagebiel 2003).

As a site settled in the Late Classic, Hun Tun's presence and permanence in the landscape is intrinsically connected to La Milpa's expansion and eventual decline. Hun Tun's operations, including its domestic economy, arose from and fed into the burgeoning needs of La Milpa in conjunction with satisfying the needs of its own community. Hun Tun's material record to date, which includes lithics, ceramics, obsidian, shell, and greenstone artifacts, as well as its architecture and related features, closely mirrors that of La Milpa and that observed in other sites in the region. This suggests that, while it is unclear who the dwellers of Hun Tun may have been, the Hun Tun community was committed to the social, political, and economic structure supported by La Milpa. Undoubtedly, the leadership at Hun Tun had a strong interest in organizing themselves into a productive community and then, in turn, integrating that community into the regional hierarchy structured by La Milpa, at least partially through the products of its domestic economy and its patterns of consumption (Yaeger 2000).

Of additional consideration are the patterns of exploitation of available resources and goods mediated by an internal social hierarchy within the Hun Tun community. The site is internally differentiated in how it was built, with two central courtyard groups exhibiting a higher level of construction quality and effort in comparison with the peripheral three groups. Not surprisingly, the material assemblages within Hun Tun are also internally differentiated. In Group A, “Pedregal” face vessels were recovered as part of a ritual cache at the base of a staircase, as well as greenstone, obsidian, obsidian cores, a glyphic vessel, fragments of polychrome vessels, and a conch shell whistle (Dodge 2009, 2011) (Figure 3).

Along the north wall of the largest structure of Group A, a well-constructed capped circular chultun was identified, which was filled with a thick lens of clay (Figure 4) (Dodge 2011). This clay deposit measured approximately 3m³ in volume, consisted of a solid deposit with no limestone layering, and was found exclusively along the bottom of the chultun. The lack of limestone inclusions and the thickness of the deposit suggests that this clay was not used to make the chultun impermeable, but rather it was placed there either for storage or for stabilizing a chultun about to be permanently closed (Dodge 2011). A sample of this clay was processed, shaped, dried and fired into several experimental vessels and was found to have been of excellent quality for ceramic production (Sharon Hankins 2012 personal communication). It is possible that this group at Hun Tun may have served as a processing or distribution point for clay used in ceramic production, or may have been a ceramic production point itself, although no corroborating evidence has been uncovered to support either hypothesis to date. Petrographic and chemical analysis of the clay and possible associated ceramic assemblages will be conducted in the upcoming years to test these possibilities.

Groups B and C conversely, are low platform rammed earth courtyard groups that are associated in particular with lithic assemblages consistent with the debris produced from retouching and sharpening of tools (Figure 5) (Arndt 2011). These assemblages are likely



Figure 3. “Pedregal” face vessel. Photo by Robyn Dodge.



Figure 4. The opening to the chultun in relation to structure A1 in Group A. Photo by Robyn Dodge.

connected with the working of the soil and harvesting of plant material in the terraces that are located in the immediate vicinity of these groups, as chert and limestone bifaces were encountered abundantly in the terraced area.

The groups discussed here show evidence of economic and status differentiation, based on different types of economic activities. In particular, the presence of a large quantity of high-quality clay kept in a storage facility within the largest and most architecturally visible



Figure 5. Sample of lithic tools found in terraces. Photo by Robyn Dodge.

courtyard group in Hun Tun may indicate not only the value of this resource to the residents of Hun Tun, but also the position of the residents of this courtyard within the polity's economic system. This interpretation is supported by the presence of prestigious goods in Group A, while the domestic spaces associated with Group B and C demonstrate areas of more mundane household chores such as food and lithic production. The domestic activities occurring in Groups B and C were likely focused inwardly, towards the production of goods to the Hun Tun community. Conversely, the occupants of Group A consistently had the most direct access to the network of prestige goods that was likely influenced and structured by La Milpa, through their possible involvement in the production of high quality ceramics that may have been made for exchange and use outside of Hun Tun.

Reproduction of Domestic Economic Behavior in Site Cores

An analysis focused on domestic economic relationships may also elucidate the inter-site dynamics of a polity from the standpoint of the regional center. In particular, domestic economy may be included in a discussion of the creation, maintenance, and reproduction of a community identity in ancient Maya society (Anderson 1983; Canuto and Yaeger 2000; Yaeger 2000). We suggest that certain practices most common to domestic economic contexts may have been appropriated and/or aggrandized by the leadership of the large regional center of La Milpa, through consumption patterns, ritual events, or landscape

modification in order to ensure the support of neighboring communities, on which La Milpa undoubtedly depended. The incorporation of elements familiar or commonplace in a domestic economic setting into the fabric of La Milpa's day-to-day existence, which included both mundane and extraordinary events, may have served to promote a sentiment of inclusion between La Milpa and its supporting communities, and galvanize the affiliation between them (Isbell 2000; Yaeger 2000). We present one possible example of such a process.

La Milpa is the largest of known sites in the RBCMA (Valdez and Sullivan 2006), and is Belize's third largest Maya site (Figure 6). Occupation at La Milpa began in the Late Preclassic period and experienced its heyday in the Late Classic period, between AD 550 and 850, based on the considerable architectural projects that characterized this period (Hammond and Bobo 1994; Hammond and Tourtellot 2004). These projects include the construction and expansion of most, if not all, monumental structures of the site core and the potential reorientation of Plaza A's architectural configuration, undoubtedly a massive investment of labor and resources (Trein, et al. 2014). At this point in the Late Classic, La Milpa was a regional center with a large social-political and economic footprint in the area. However, at around AD 850, all architectural construction and maintenance projects at the site core seem to cease to a great extent, and the site seems to have been largely abandoned (Hammond and Bobo 1994; Hammond and Tourtellot 2004; Hammond, et al. 1998; Kosakowski 1999; Sagebiel 2005). Some small-scale habitation and visitation may still be recognizable in the Postclassic period, although it is uncertain whether this occupation was continuous from the Late Classic (Hammond and Bobo 1994; Moats and Nanney 2011). Most of the La Milpa data discussed in this paper centers on Structure 3 and its environs in Plaza A (Figures 6 and 7). Structure 3 is a pyramidal temple of approximately 20 meters in height, and is one of the largest structures at the site. While Structure 3 has a Late Preclassic phase, it is in the Late Classic that it undergoes its largest construction phase, parallel to many structures at La Milpa as mentioned (Trein

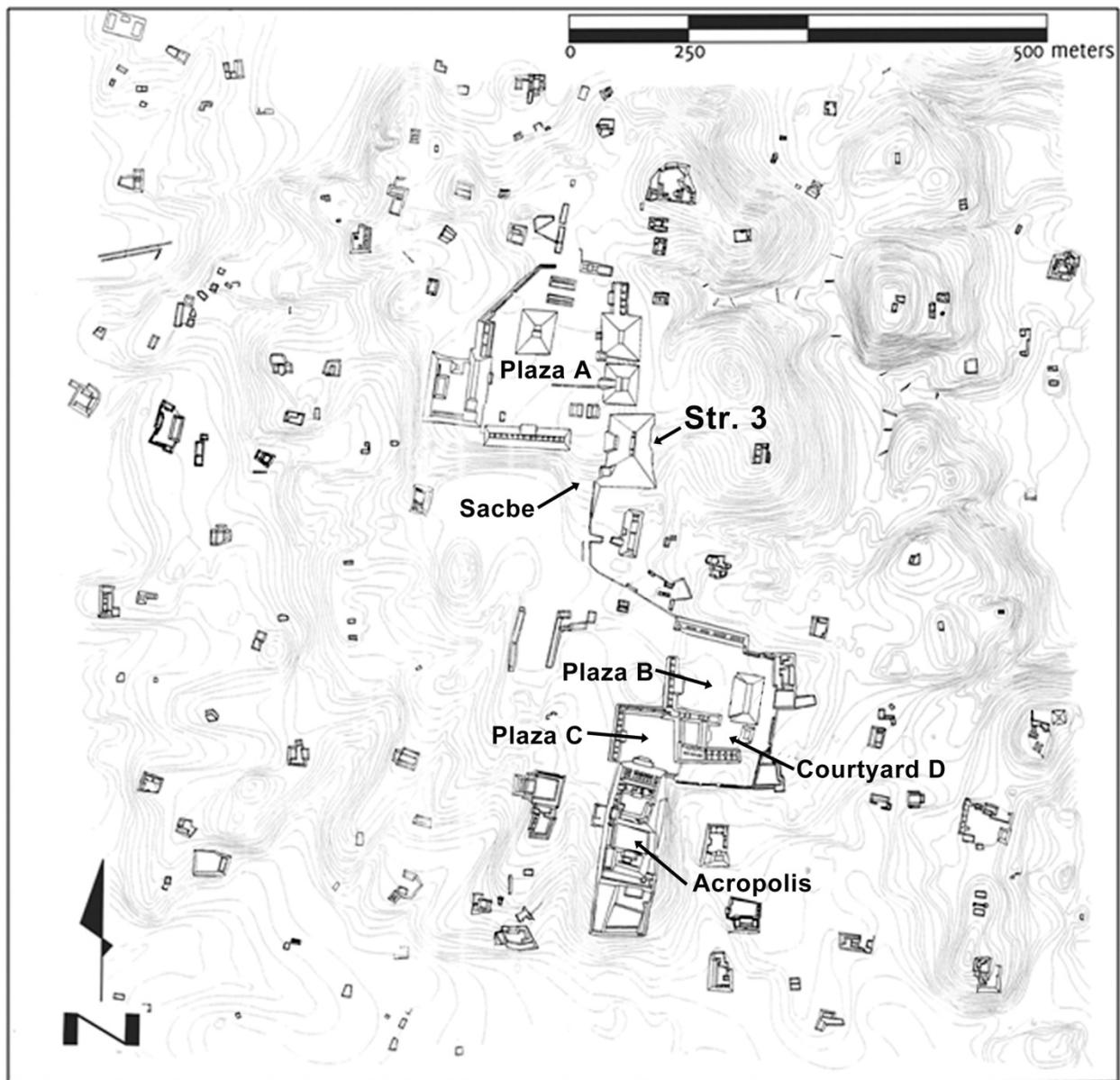


Figure 6. Map of site core of La Milpa with area labels. Adapted from map in Hammond and Tourtellot 1993 (Hammond and Tourtellot 1993).

2011). Structure 3 frames a set of distinct spaces within its immediate surroundings, including the northern head of an intra-site sacbe; an open area to the west of Structure 3 that leads into the interior of Plaza A; a flat area to the northeast; a modified bedrock outcrop to the east, and a topographically dynamic area to the southeast, with exposed bedrock (Trein 2013, 2015; Trein, et al. 2014). The lines of sight and sound from each of these spaces to the other are broken in some way or another by natural topographic or

architectural obstacles, with the exception of the northeast flat area and the modified bedrock outcrop further to the east, which are readily visible to one another (Figure 7). These two communicable areas – the sectors to the northeast and far east of Structure 3 – are examined in this paper.

The area to the east of Structure 3 is higher in topographic elevation, and was found to have been modified in the Late Classic to serve as a small terrace, as evidenced by the

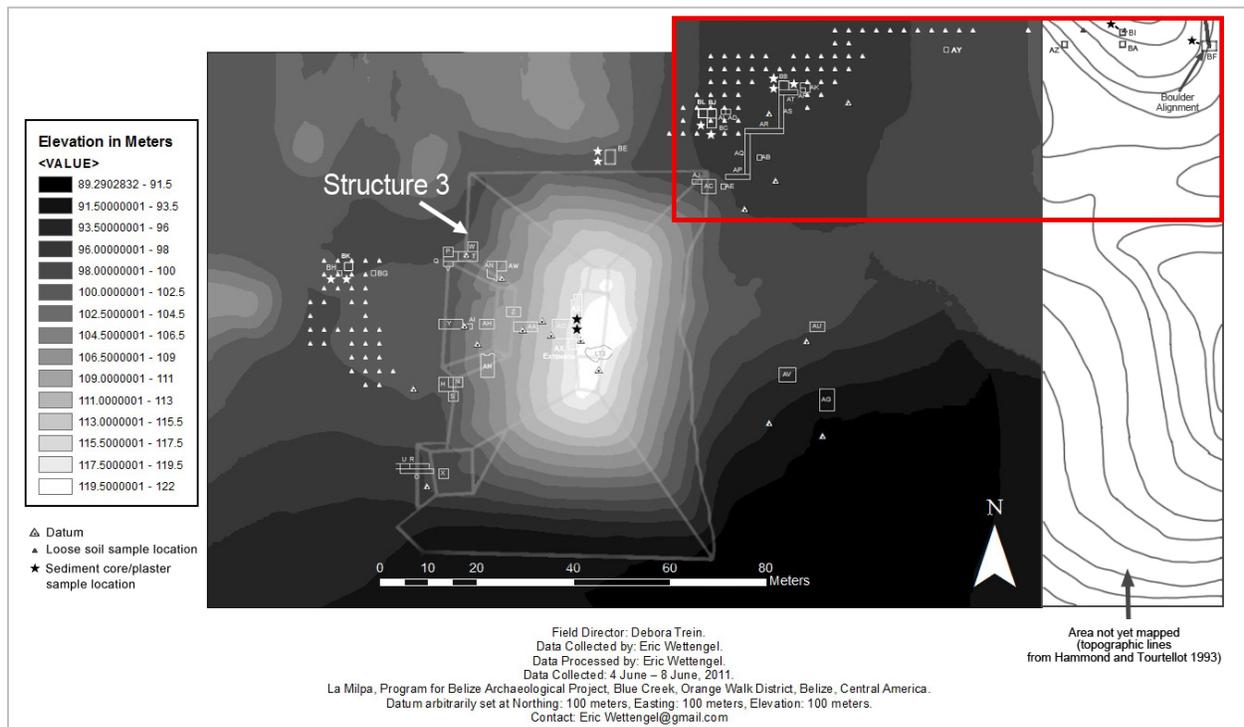


Figure 7. Topographic map of the Structure 3 area, with information on previous archaeological investigations. The area highlighted, to the northeast and east of Structure 3, is discussed in the text. Map by Eric Wettengel.

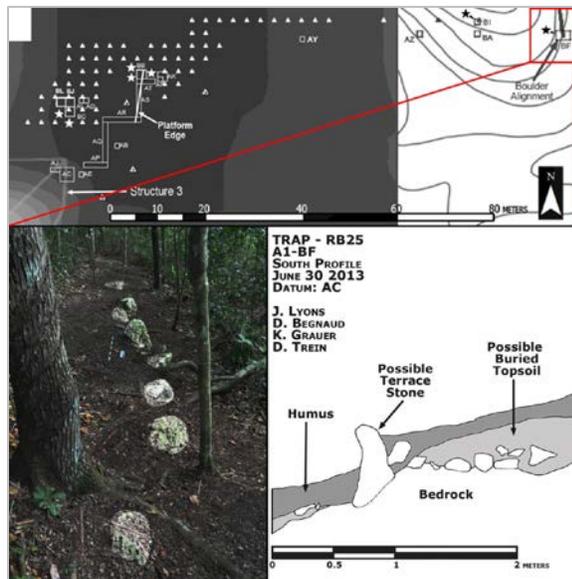


Figure 8. The terrace to the east of Structures 2 and 3. Photo and maps by Debora Trein.

presence of terraced architecture and a buried sediment profile in association with Tepeu 2 and 3 ceramics (Figure 8) (Trein, et al. 2014).

This terrace is relatively isolated in nature, with no evidence for terracing either to the west,

towards Structures 2 and 3, or to the east, where the topography presents itself as a steep fall with no indication of terracing or other modifications. Preliminary carbon isotope analysis has indicated that the Late Classic period levels on the terrace exhibit a strong C4 signal in contrast with the weaker C4 signals observed in samples down the slope and other areas around Structure 3 (Figure 9) (Timothy Beach personal communication). Strong C4 signals can be tied to several tropical grasses, but particularly for this region and time period it is most regularly interpreted to be a proxy for maize cultivation (Webb, et al. 2004; Wright, et al. 2010).

Terraces associated with maize cultivation are often associated with residential areas (Beach and Dunning 1997; Beach, et al. 2002; Chase and Chase 1988, 2014; Dunning and Beach 1994; Healy, et al. 1983). However, the terrace described above is found closest to a low-level Late Classic platform that extends from the back of Structures 2 and 3 towards the east. This platform area is characterized by the highest artifact density in the area surrounding Structure 3 (Figure 10). Over 50,000 artifacts

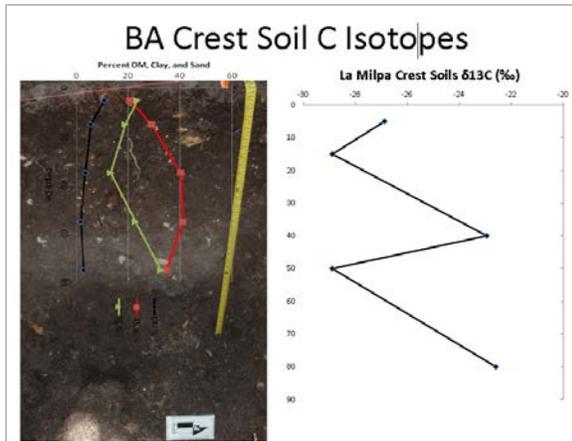


Figure 9. Carbon isotope signature of unit A1-BA, located on the inside of the terrace, courtesy of Timothy Beach.

have been recovered from the level of the Late Classic occupational surface of the platform, organized spatially according to material. Ceramics and artifacts of relatively rare character, such as pyrite mosaic mirror pieces, mother of pearl, green stone, and bone beads have been largely identified on the platform occupational level, whereas chert and obsidian artifacts were observed immediately off the platform to the east. The presence of potentially sharp materials on the edge and off the platform surface may be indicative of an effort by the users of the platform space to maintain a safe working surface.

In addition, artifacts found on the platform surface exhibited a significant degree of post-depositional wear, which may be suggestive of trampling caused by the high level of utilization of this platform space. Possible functions of this area, as indicated by the material culture recovered, include its use as a space for the final stages of production and exchange of goods, such as a marketplace; a place for the production and maintenance of items that may have been used in the construction and maintenance of the core structures and their associated material culture; and a prepping space for the ritual events that were occurring in the plaza space and on the temple itself (Hutson 2010; Hutson and Terry 2006; Inomata 2001; Inomata and Stiver 1998; Manzanilla and Barba 1990; Robin 2002; Shaw 2012). All these interpretations potentially entail the visitation and utilization of a space closely associated with public monumental architecture by a wide variety of

agents from varying social and geographic backgrounds including, importantly, people from the lower rungs of the ancient Maya social hierarchy. This is particularly the case for exchange points such as marketplaces, and areas of production of tools used in the construction and maintenance of the architecture in this area (Hendon 1997; Joyce 1993; Lohse and Valdez 2004; Pugh 1998).

It has long been argued that ancient Maya cities contained carefully managed areas of plant life (Atran, et al. 1993; Chase and Chase 1988; Healy, et al. 1983; Scarborough, et al. 1995; Scarborough and Valdez 2003; Tourtellot 1993). These cultivated areas may have been variously composed of agricultural crops for consumption; orchards; and plants for medicinal, aesthetic, or other botanical purposes (Chase and Chase 1988). In the case of maize, this crop held a horizon of meaning to the ancient Maya, as a highly important means of subsistence, a staple of the domestic economy of ancient Maya households, and as a significant supernatural entity in the ancient Maya ideological system (Huff 2006; Just 2009; Miller and Samayoa 1998; Stross 1992; Taube 1996). It is likely that the small terrace to the east of Structure 3, and the possible maize cultivation that was occurring at this locale, was part of a project by the La Milpa authority to attain and maintain a level of agricultural self-sufficiency in a time where La Milpa's population was growing. Nevertheless, in the context of the isolation of this small terrace, its spatial proximity to the largest and most ritually-significant structures of the site core, and its spatial association with a platform supporting intense activity, it may be interesting to consider this terrace and its milpa as being also involved in the political-ritual events occurring in the Plaza A area, under 200 m to the west, which would have underlined the ideological facet of maize. Additionally, the cultivation of maize in an area adjacent to a platform heavily used by agents from possibly various social and geographic backgrounds may have also functioned as a place-making strategy, in addition to its subsistence and ritualistic functions (Huff 2006). As a ubiquitous feature within the ancient Maya household space (Robin 2002), maize and associated milpas may have offered a familiar sight to members of the La

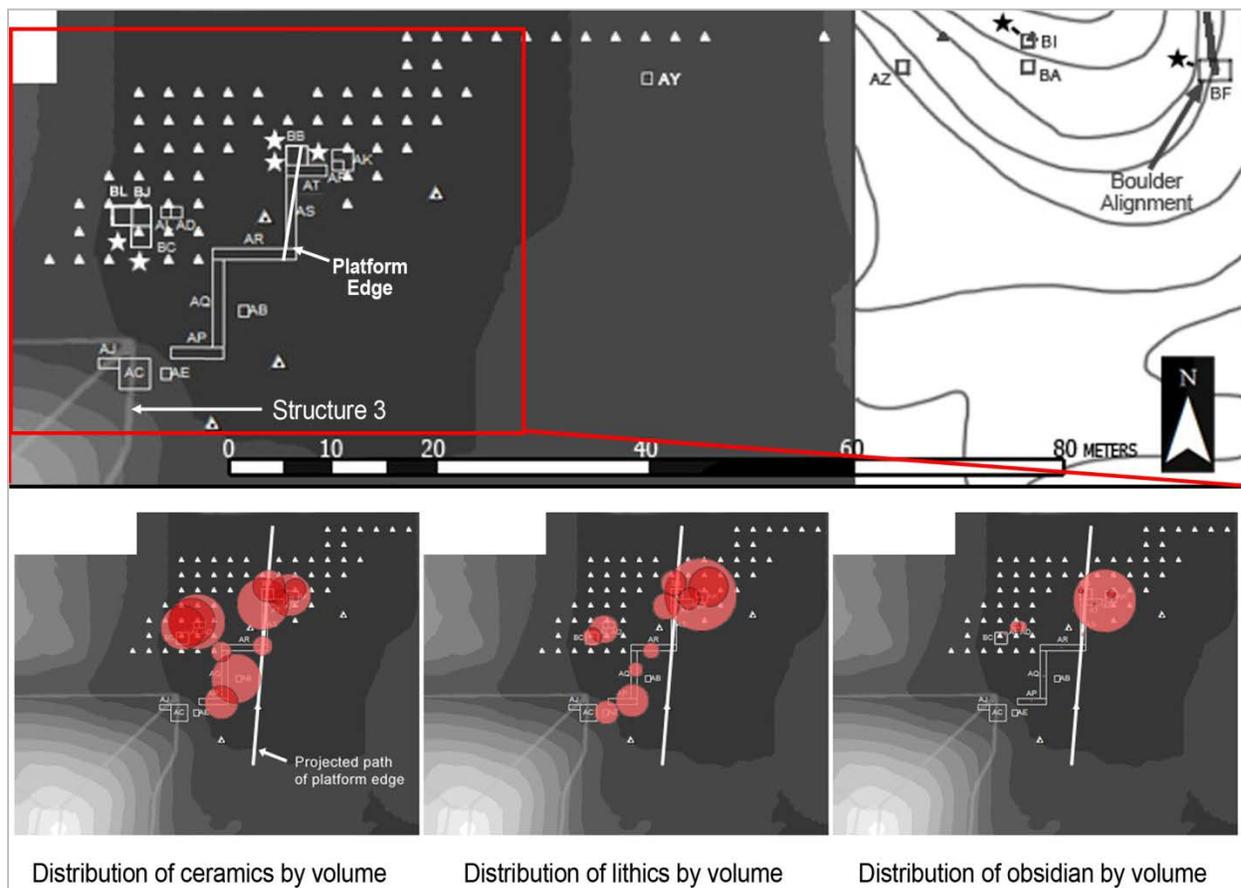


Figure 10. The low lying-platform to the northeast of Structure and 3. Photo and maps by Debora Trein.

Milpa polity moving through this space, some or most of whom possibly farmers themselves. The presence and practice of maize cultivation in direct association with some of the largest, and most significant, monumental structures in this area may have thus served partially to integrate common everyday materials and activities (and therefore people) within the community narrative of the La Milpa polity through the design of La Milpa’s public spaces.

Final Thoughts

Our objective in this paper was to present some ideas of how the concept of “domestic economy”, as a set of behaviors and its material manifestations could be employed to examine the nature of the articulation between different communities on the regional scale. We hope the data presented here demonstrated that aspects of domestic economy may have been variously employed as part of ongoing negotiation

strategies within a community as well as between centers small and large. The variability of domestic and non-domestic products at different household groups at Hun Tun can be used to understand the social standing of these units within the larger regional socio-political structures. Likewise, the performance of practices strongly associated to household economies such as maize cultivation within a public monumental context may speak to the ritual importance of this crop as well as to the social significance of incorporating household practices and spaces to the planning and construction of public monumental landscapes. Continued research will aid us in further shedding light onto the nature of the specific ties between ancient Maya communities within RBCMA. While some interpretations are preliminary, we expect that future findings will aid in clarifying and fine-tuning our current

understandings of the archaeological remains of this area of the Maya Lowlands.

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15 TRADING PLACES: NEW INTERPRETATIONS OF THE LATE PRECLASSIC PORT FACILITY AT CERRO MAYA

Robin Robertson and Debra S. Walker

When excavated in the 1970s, the rapid rise of the Late Preclassic site of Cerro Maya (Cerros) was presumed to be a function of its involvement in maritime trade based on its pivotal location on Corozal Bay between the mouths of three navigable rivers and access to the open ocean. Recent analysis suggests the site was intentionally founded as a port by colonists who built a monumental dock for the one-on-one exchange of surplus domestic production within the context of a waterfront village of perishable structures. Evidence for differential wealth accumulation only appeared after a series of storms upset the egalitarian balance, enabling a kin group to construct specialized production and trade facilities to further increase their resources. By the time the monumental architecture of the site core was under construction, the dock had been decommissioned for some time, the village had been buried with ceremony and the site had come under the sway of a greater regional authority.

Introduction

The ruins of Cerro Maya are situated on a narrow spit of low lying, swampy, mosquito ridden land in Northern Belize called Lowry's Point. Excavated in the 1970s by David Freidel (cf. Robertson and Freidel 1986) and in the 1990s by Debra Walker (2005), most major construction is Late Preclassic in date. The final Late Preclassic layout consists of public buildings covering 5.5 hectares and a dispersed settlement that includes two ball courts and a canal (Figure 1). Based on stratigraphic excavations, settlers first occupied the waterfront village, an area along the coast that consisted primarily of perishable structures located to the east of a large monumental stone platform that has been interpreted as a dock. An associated jetty or breakwater, also built of stone, lies approximately 4m to the east of the platform.

Built of medium to large roughly faced limestone blocks almost immediately on arrival of people at Cerro Maya, the dock represents a significant investment of time and labor. In his dissertation, Maynard Cliff (1982: 392-393) suggested the dock was 70m long, running westward underneath Feature 5A. However, only 38m of the northern retaining wall was excavated (Figure 2). Originally the dock was 7.5 to 8m wide and extended north into Corozal Bay for 5m. It most likely stood 0.65m above present mean high tide. Excavation documented that the dock intruded into the sediments of Corozal Bay for at least 30cm and that these lacustrine sediments of inter-fingered clay and sand deposits contained uneroded, large Late Preclassic sherds banked up against the long

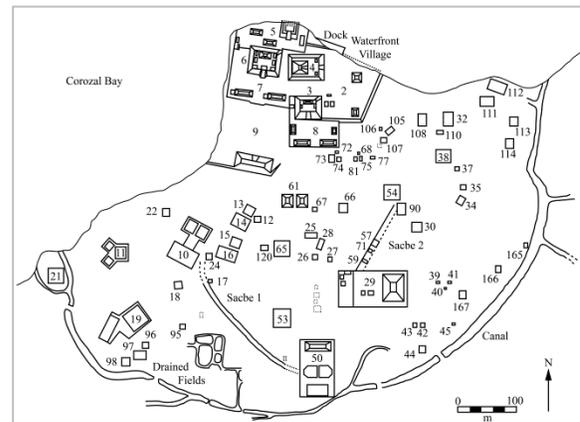


Figure 1. Cerro Maya map indicating the location of the dock and waterfront village beneath the Main Plaza (redrafted by Debra Walker).

northern retaining wall (Figure 3). While questions have been posed about rising sea level and the location of the mouth of the New River in other contexts (McKillop 2002; Barrett and Guderjan 2006), Scarborough (1991: 21) persuasively argued that Cerro Maya was located on a constricted mouth lagoon. Although an important increase in global sea level may have begun shortly before the Common Era, it postdates the initial construction of the dock. Local evidence strongly suggests the facility was on the coast during the Late Preclassic occupation. With an estimated surface area of approximately 525m², the dock was not something undertaken casually or without cost.

Only three similar platforms located on or near a body of water have been identified as docks thus far in the region. Two of these were built in the Late or Terminal Preclassic, Nohmul



Figure 2. Plastered surface of the dock in Ops 34c-e.

(Pring and Hammond 1975), and Rosita associated with the Blue Creek polity (Barrett and Guderjan 2006). Like the Cerro Maya dock, both were oriented parallel to the coastline rather than projecting into the water. Perhaps more significant, both docks are located on the Rio Hondo, one of the principal rivers that drain northern Belize.

Throughout the use of the Cerro Maya dock, there does not appear to have been any other monumental construction in the waterfront village. People traveling through Corozal Bay to the New River and its tributaries would have seen a large, gleaming white platform oriented to the sea with bustling activity on it. Much like a billboard, the dock's impressive visibility and dominance of the low coastline would have provided a clear attractant for canoe borne individuals as it affirmed the capabilities and relative richness of the Cerroseños in one particular enterprise: trade.

In the early days, this trade most likely took place on the dock itself. The large,

uninterrupted surface was ideal for stacking, and displaying merchandise. Visitors could have tied up their canoes, come ashore, examined the variety of items on display made by individual household crafters and, somewhat later, by artisans, made their selections and completed the exchange, all the time remaining on the platform. Necessaries and not so necessities were available and easy to see (Table 1).

Initial Dock Construction

Elsewhere in the Maya region, from the Middle Preclassic period onward, monumental architecture was generally accretional. Once initial construction efforts were accomplished, they were usually modified with additional structures or with platforms built in the vicinity. In addition, monumental public architecture was a component of Maya settlements of all sizes, including small farming sites such as Chan in the Belize Valley (Robin 2012). Not only is the Cerro Maya Late Preclassic dock rather late for an initial monumental construction when compared with other sites, it was the only stone structure at the site for quite a long time. The next building was only a single preserved line of stones that appears to define a brewery, subsequently renovated into a storage facility.

Most likely Cerro Maya was founded by settlers who came from the north with the specific intention of building a port facility (Robertson in preparation). A similar situation during the Late Preclassic is unknown for the Maya area. These immigrants appear to have been people of limited economic means given their early modest perishable dwellings and hearths found stratigraphically below the *tierra quemada* and plaster floors built later when the dock was in use. The intersection of architecture (or lack thereof) and exotics from the waterfront village tells a story of developing social stratification and increasing complexity in both local and long distance trade.

Overview of the Data

A dozen structures, building renovations and activity areas were documented by the Op 34 excavations at the east end of the dock (Table 2). The work originally described by Cliff (1982) has been revised after a detailed review of notes and reanalysis of contexts aided by the

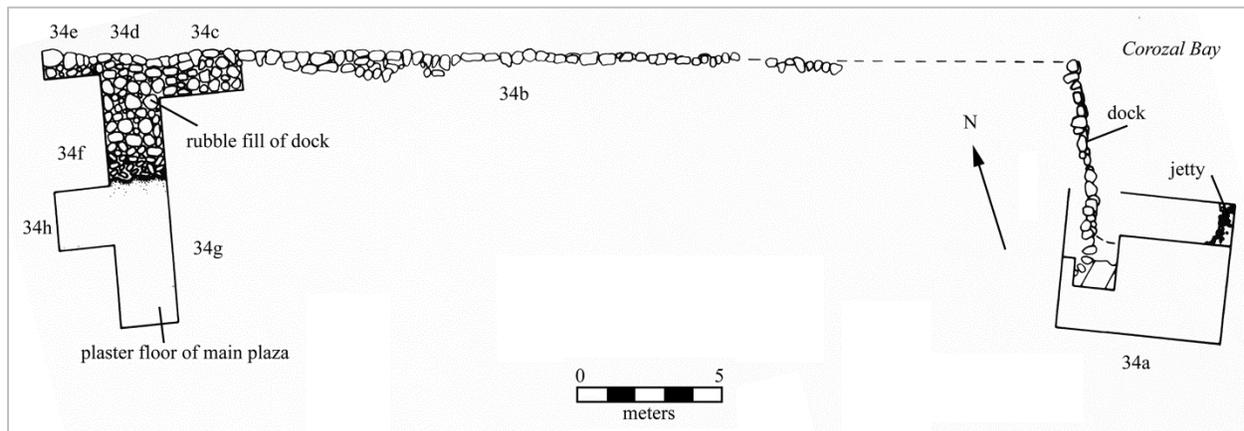


Figure 3. Plan of Op 34 excavations of the dock.

Table 1. Goods likely traded on Cerro Maya Dock.

Local	Exotic
honey and wax	jade
cacao	obsidian blades
vanilla	pumice
achiote and other condiments	specular hematite mirrors
nance and other fruits	calcite
alcoholic beverages	quartzite
prepared food	Colha chert tools
fish, fresh and dried	black chert
salt	ochre and other pigments
worked bone jewelry	worked shell jewelry
cotton	conch and other marine shell species
<i>Pomacea</i> and <i>Melogenia</i> shell foods	<i>Spondylus</i> , <i>Dentalium</i> , <i>Oliva</i> shells

newly completed CROC digitized database¹. A functional analysis of the ceramics and artifacts has identified both residential and commercial structures in the excavated area. Because the forensic techniques now available to determine function had not been developed or even contemplated when the dock and its facilities were excavated some thirty-seven years ago, no systematic soil samples were taken to provide supporting evidence.

Nonetheless, the stratigraphic sequence of domestic structures reveal a pattern of unusual offerings, indicating these buildings were ritually terminated at the end of their useful life,

a tradition already known from monumental architecture at the site and elsewhere (Robertson-Freidel 1980; Garber 1983, 1989; Scarborough and Robertson 1986; Table 3). Although the domestic versions of these termination ceremonies are far less elaborate, they include smashed jade, specular hematite mirror fragments and ceramics, but in lower frequencies. However, the white earth, burned areas, boiling stones and armatures that define subsequent termination rites in the monumental architecture are missing. In the domestic rituals, shell beads are prominent but absent from the architectural rituals. Within the sequence of domestic structures, the offerings became richer through time and appear to be restricted to the houses of an increasingly well-defined elite (Table 4).

Structures Sub 5-9th to Sub 5-7th

A *tierra quemada* floor, Sub 5-9th, was built after the dock and situated on the eastern side of the unit, opposite, but oriented to, the dock. It was followed by two other residential structures, Sub 5-8th and Sub 5-7th. These last two structures were ritually terminated prior to new construction.

The earliest jade discovered at Cerro Maya is associated with the end of use of Sub 5-8th. It is a small fragment accompanied by the earliest *Spondylus* shell, a disc-shaped bead (Figure 4). Auzipuria and McAnany (1999), drawing on the data from K'axob and Tikal, propose that by the Terminal Late Preclassic, shells, particularly *Spondylus* and *Oliva*,

Table 2. Sequence of Op 34a excavation squares a through l.

	a	b	c	d	e	f	g	h	i	j	k	l
	EVENT											
	Floor 1A-17 (Activity Area)						Main Plaza Construction			Burial of Village		
Str 2A-Sub 7 (Ramp)	Floor 1A-7-1 and Activity Area						GBSC	Str 2A-Sub 5-1st & Floor 1A-5-1 (Residence)				
	Floor 1A-18-1 (Activity Area)						Floor 1A-19 (Activity Area)					
Abandoned Dock	Floor 1A-21-1			Structure 2A-Sub 23 (Warehouse Rubble Patio [F32] & Floor)								
	Storm D (Major)											
	Midden 1-10 cm											
Mooring	Plaza Floor 1A-2-1 (Propitiation)		Storm F		Structure 2A-Sub 24-1st (Residence)							
	Storm G (Major)											
	F1A-22-1		Storm H									
	Plaza Floor 1A-2-2						Structure 2A-Sub 24-2nd (Residence)					
	Structure 2A-Sub 14						Floor 1A-14-1 (Warehouse)			Structure 2A-Sub 24-3rd (Residence)		
	Floor 1A-14-2 (Brewery)						Structure 2A-Sub 24-3rd (Residence)					
										Midden 4 cm		
										Unknown		Structure 2A-Sub 5-7th Floor and Patio (Residence)
										Structure 2A-Sub 5-5th B Floor		
	Midden 1-3 cm								Structure 2A-Sub 5-9th Floor (Residence)		Midden	
	Storm L (Major)											
	Floor 1A-2-3											
Dock Constructed	Inter-fingered Clay Deposits						Jetty					
	Hearth/Burned Floor											
	Early Village Deposits											
	Light gray to white gravelly marl											
	Base Clay											

Table 3. Criteria for distinguishing Domestic versus Public Termination Rituals.

Domestic Floors	Public Architecture
smashed jade beads and ear flares	smashed jade beads and ear flares
specular hematite mirror fragments	specular hematite mirror fragments
drinking set (later floors)	drinking set
whole shell beads	bone beads
manos and metates	small limestone boiling stones
net weights (<i>mariposas</i>)	architectural armatures
	white marl
	painted plaster

Table 4. Op 34a Ritually terminated floors.

Event	Jade	Obsid Frags	Shell	Specular Hematite	Stone Tools	Stone	Sherd Lids	Mugs	Net Wts.	Other
Burial of Village	1 tubular bead (4 frags), 2 UI bead frags, 4 frags, 1 ear flare frag	1 blade	Mother of Pearl & <i>Strombus</i>		2 from Colha, Quartzite Metate		4	19		
Sub 5-1st	5 UI beads (11 frags), 1 sub-spherical bead frag, 1 tubular bead (2 frags), 3 barrel beads (15 frags), 1 collared bead (3 frags), 11 jade frags, 2 ear flares (4 frags)	13 blades, 2 frags	1 UI Bead, Mother of Pearl	3 frags	1 from Colha	Calcite, Limestone Disk	3	1		fish vertebrae necklace w/ brocket deer bar & bone pendant
Sub 24-1st	3 UI bead frags, 2 tubular bead frags, 5 frags	3 blades	1 UI, 1 <i>Dentalium</i>	2 frags	2 from Colha		3	3		red painted plaster
Sub 24-2nd	1 UI bead frag, 1 frag, 1 ear flare frag	8 blades 4 pieces	1 UI, 1 <i>Dentalium</i> , 1 <i>Spondylus</i>	1 frag	1 from Colha, 1 other			3	2	digging stick weight
Sub 24-3rd	1 frag	3 blades, 1 piece	1 <i>Dentalium</i> , 1 <i>Spondylus</i>		1 from Colha, 2 other					
Sub 5-7th		1 piece	<i>Oliva</i> tinkler				1			ground stone pendant
Sub 5-8th	1 frag	1 piece	<i>Spondylus</i> bead							



Figure 4. Offering at the end of use of residential Structure Sub 5-8th prior to renovation.



Figure 5. Offering at the end of use of residential Structure Sub 5-7th prior to renovation.

diacritically mark status and authority. While the *Spondylus* bead in this deposit is somewhat earlier, its presence speaks to the importance of marine trade early in the Cerro Maya sequence, and to the importance not only of the household, but of the site as a whole even without monumental construction other than the dock.

The offering at the end of use for the subsequent Sub 5-7th is an *Oliva* shell tinkler and ground stone pendant, items that were most likely part of the ritual regalia of a member of the household (Figure 5). Again, *Oliva* appears earlier at Cerro Maya than similar shell jewelry elsewhere. Significantly, finds from Sub 5-9th, which predates both Sub 5-7th and 8th, are unremarkable. Perhaps there was little to offer or the rite involved undetected perishable materials. In contrast, the jade and *Spondylus*

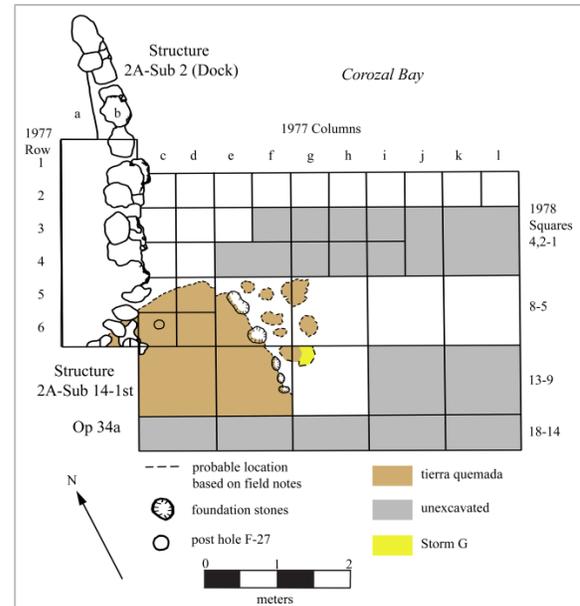


Figure 6. Plan view of Structure Sub 14, the warehouse facing North. Note remains of sand deposit from Storm G.

offering at the end of Sub 5-8th indicates that by then, the residents had differential access to exotics and the ability to make an offering, albeit small, to insure the success of a house renovation.

Warehouse Structure Sub 14

Following the end of use of Sub 5-7th, two things happened. First, the lower floor of an apparent warehouse, Sub-14, was laid, and, second, a new residence, Sub-24-3rd, was built atop the Sub-5 locus. The Sub 14 warehouse had a stone foundation consisting of a 1.5m north-south alignment of medium sized limestone boulders (Figure 6). Cliff (1982:411) interpreted this alignment and associated posthole as part of an open front, stone foundation building that faced north toward the dock. Although no exotics were recovered, the remnants of a stone foundation differentiates this building from contemporary domestic structures, an observation confirmed by the finds. The building had two *tierra quemada* floors, the earlier one of which was capped with marl containing substantial amounts of charcoal, burned bone and some highly calcined pottery. Two pottery types associated with fermenting liquids were prominently present on this lower floor. Bobche Smudged, comprising 25% of the lot inventory, was probably used for fermenting



Figure 7. Bobche Smudged fermentation jars (a), three handled jugs (b) and a miniature version of the Poknoboy Striped cooking vessels (c) found on the floor of the brewery (Structure Sub 14-2nd).



Figure 8. Examples of stone tools (a) antler flaking tools (b) and Ciego Composite (c) excavated on the floor of the warehouse, Structure Sub 14-1st.



Figure 9. Offering at the end of use of residential Structure Sub 24-2nd prior to renovation.

alcoholic beverages (Robertson 1983: 137-138) and a number of Cabro Red: Thick Walled Variety three strap handle jars may have been

used to store or serve these beverages. It seems this lower floor represents a production center for alcoholic beverages, otherwise called a brewery. Food may have been prepared there as well, given the frequency of Poknoboy Striped large cooking vessels. This food and drink was likely sold to traders conducting their business on the dock (Figure 7).

When the upper floor was laid, the building was converted into a warehouse for storing several commodities. A group of stone tools, a bone antler and an awl were recovered from the floor and just above it, indicating chipped stone production. In addition, salt production can be inferred by the large concentration of Ciego Composite: Chamah Washed pottery fragments that comprise one half to two-thirds of the pottery from this context (Figure 8). These frequencies of a single use type purportedly used to evaporate salt from sea water are unprecedented elsewhere at the site. The brewery apparently was replaced by a storage facility for salt laden vessels and stone tools or blanks, and perhaps other perishable goods.

Although only a small portion of Sub 14 was excavated, evidence, including its location next to the dock, suggests its construction and the work that took place within it required labor beyond that of a single family unit. Individuals who managed the facility likely profited greatly from the new warehouse, in contrast to the earlier, more egalitarian household level production of trade goods. This notion gains some traction with the roughly simultaneous residential developments nearby.

Residential Structure 2A-Sub-24

Three sequential renovations were made to structure Sub 24, the residence adjacent to the brewery and subsequent warehouse. Presumably located there so the occupants could keep a close eye on production, yet maintain separate living quarters, the floor sloped steeply down to the juncture with the storage facility. The earliest floor, Sub 24-3rd, apparently was contemporary with the brewery. At the end of its use, Sub 24-3rd was terminated with a small offering that included a jade fragment, three obsidian blades, a broken honey brown chert scraper, jade and a *Spondylus* bead and, notably, a *Dentalium* shell

bead (A. Andrews personal communication 1978).

Sub 24-2nd was built in tandem with the shift from brewery to warehouse. Offerings associated with the end of this residence are richer than those of the previous household, including among other things, another rare *Dentalium* shell and a *Spondylus* shell bead as well as a specular hematite mirror fragment (Figure 9). The warehouse was clearly profitable for the owners. A limestone disc with a central hole, interpreted as a digging stick weight, and two *mariposas* or net weights in the offering reinforces the domestic nature of the structure. This offering included the earliest example of the probable smashed remains of a jade ear plug assemblage. At some point, residents of Sub 24-2nd stopped using the storage facility while they continued to occupy their dwelling. No apparent ceremony is associated with the end of use of Sub-14 as a small plaster floor (1A-2-2) probably associated with public space was built on top of it.

About the time the storage facility was abandoned, the site was devastated by Storms G and H in fairly quick succession². Storm G was more ferocious than the much earlier Storm L that occurred soon after the dock was built. The storm wrack banked up against the dock and 5-10cm of sand covered the area adjacent to it for at least 1.5m inland. Not to be deterred, the Cerroseños subsequently built a mooring on the northeastern side of the dock, perhaps to repair the damaged platform, or to provide additional protection from the weather.

Repairs were also made to the coastal residence with the construction of a final floor in Sub 24-1st. Having survived two storms, the occupants laid a floor larger than either of the two directly below it, covering an exposed area of 2.5m north-south and extending from the east wall of Op 34a for about 2m. More of Sub-24-1st lies to the east of Op 34a and remains buried by overburden. At the end of its useful life, the richest disposal of goods up to that point took place. Among other items, this offering included specular hematite mirror fragments and a *Dentalium* shell, the third from Sub 24. *Dentalium* is a Pacific shell found rarely in the Maya lowlands. Only 5 were recovered at Cerro Maya. That residents of Sub-24 could afford to



Figure 10. Propitiation ritual on Plaza Floor 1A-2-1 after Storm G.

dispose of three of the five in sequential renovations associated with a single residence seems to affirm a kinship link among the residents of the three houses, as well as to confirm elite status on the residents.

As Sub-24-1st was constructed, a hard white plaster floor, 1A-2-1, was laid over the sand from Storm G. Damaged in places, it covered 6m², including much of Op 34a and extended into the southern wall of the unit. Soon after, Storm F hit Cerro Maya, the remains of which are present in a limited area overlapping the edges of Floor 1A-2-1. Subsequent activities atop Floor 1A-2-1 covered the area with domestic trash, but before the trash was deposited, the residents conducted a ceremony that differed from the earlier ones associated with domestic renovations. The rite was localized to a 2m² area immediately east of the dock. Remains of this activity included the usual jade, obsidian and mirror fragments, but in much larger quantities, as well as a drilled shark tooth, a conch shell bead and a *mariposa* (Figure 10). *Mariposas* are rarely included in Cerro Maya ritual contexts; of 65 Late Preclassic net weights, only four were recovered from ritual contexts and all of these are in Op 34a. The presence of marine materials (shark tooth and shell beads) and the net weights may indicate the ceremony was held to propitiate a deity after the devastating onslaught of wind, waves and rain.

Unfortunately, the ceremony did no good. A final Storm D impacted the site. A sand lens 6 to 19cm in depth was deposited against and on top of the southeast corner of the dock and extended several meters inland. After storm D, there is no evidence that the dock was ever cleared again, most likely because it was no longer in use. The residents of the waterfront

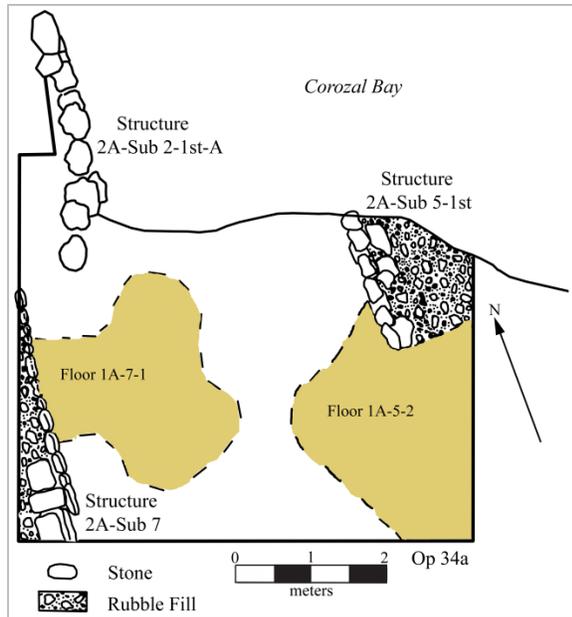


Figure 11. Plan of Sub 7 and 5.



Figure 12. Offering at the end of use of elite residential Structure Sub 5-1st offering.

village at Cerro Maya simply gave up trying to fight repeated storm damage.

Storage Structure Sub 23

After Storm D, domestic construction ceased near the dock for a time. Stone reinforced structures appeared along the shoreline, such as Sub 3 about 30m east. The site was thriving. A far more substantial, roughly circular platform with a cobblestone floor, designated Sub 23, replaced earlier buildings near the de-commissioned dock. Consisting of an almost continuous layer of

slightly overlapping limestone cobbles set in marl, the platform covered a minimum of 8m², extending into both the eastern and southern walls of Op 34a. While the floor on top of the cobble pavement was mostly eroded or destroyed by a layer of small ballast laid down as preparation for a later structure, the location and sturdiness of Sub 23 sets it apart from contemporary residences. It probably functioned as a more elaborate storage or trading space when compared to the earlier warehouse, built to keep inventory as dry as possible in the event of another storm. On this occasion, construction seems to have been preceded by an offering, albeit a rather modest one of jade, a *Spondylus* bead, an obsidian blade, two sherd disks and a drinking mug deposited in the grayish brown matrix beneath the platform.

Activity Areas 1A-17, 1A-19 and 1A-21

Two or three informal activity floors found to the north were at least partly contemporary with Sub 23. These floors most likely served as locations for craftsmen engaged in finishing stone tools, producing shell ornaments, and perhaps drying fish and preparing food. As each of these floors was built, used and superceded by the next, no exotics mark the changes. If there were associated rituals, the materials used are not identifiable and thus the events, if they occurred, remain hidden.

Ramp Structure Sub 7 and Sub 5-1st Residence

With construction of Sub 5-1st to the east and Sub 7 to the west, the organization of trade at Cerro Maya changed again (Figure 11). The precise orientation due north and parallel positioning of these two structures indicate they were constructed at the same time, involving considerable labor and expense, but on whose part?

Sub 5-1st is one of the earliest stone foundation residential structures identified at Cerro Maya. The associated floor covered an exposed area of at least 6m² and extended into the western and southern walls of Op 34a, covering most of the cobblestone floor. The structure was the residence of an important family, one probably involved in managing trade

during the final occupation of the waterfront village. When they moved elsewhere, they conducted the richest ceremony in the village involving the destruction of considerable material wealth (Figure 12).

Sub 7 was situated parallel to this structure on the western side of Op 34a. It was constructed of three courses of large, roughly shaped faced stones set in marl mortar. The retaining wall was faced with at least one layer of upright limestone slabs. To the north, the preserved wall lay 35cm above the decommissioned dock, sloping upward to 69cm to the south and downward to the north into the waters of Chetumal Bay.

Further inland, the ramp sloped upward from the village and ended at the plaza 4m south of Structure Sub 4 (Figure 13). Sub 4 is a large, two level, east facing public platform that was eventually buried by the massive main plaza directly in front of Structure 4A (Cliff 1986: Figure 3.6b). Sub 4 was constructed with a 90cm high sloping apron on the first terrace and a second, more elaborate 1.4m high terrace with a sloping wall, apron molding, plinth and outset panels on either side of an outset stairway. Because only the front of the structure was exposed, building dimensions are unknown and the possibility of a staircase on the northern side remains. The ramp may have guided canoe based visitors from Corozal Bay to the small plaza on the northern side of Sub 4.

If this is the case, the *raison d'être* of Sub 4 may have gone beyond the strictly religious originally proposed (Cliff 1986:53). It may have facilitated and symbolically integrated a range of activities, among which was the management of trade by the increasingly powerful elite residing in Sub 5-1st. As their wealth and concomitant power accumulated, they were well positioned to take the great leap forward. That leap would require a new set of facilities that would become the monumental architecture visible today.

Burial of the Waterfront Village beneath Plaza 2A

Fairly quickly after the ceremony ending its useful life, Sub 5-1st was partially dismantled and a layer of marl mixed with light gray clay was deposited over the remaining foundation wall and the area beyond it to the west and

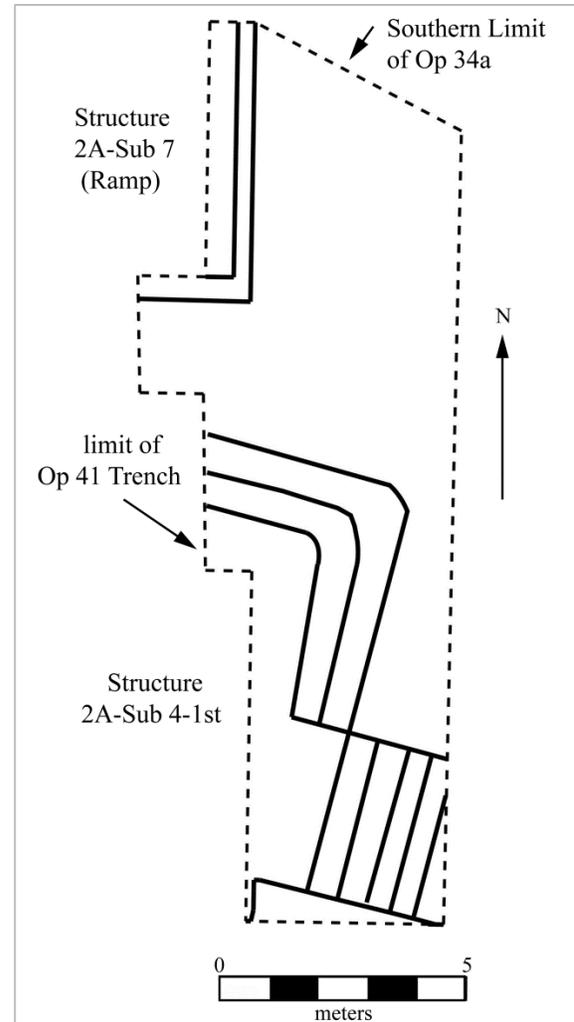


Figure 13. Sketch of the relationship between the ramp (Structure Sub 7) leading up from the water to the inland Structure Sub 4.

south. This layer of marl and light gray clay is found in Op 41 as far as 35m away and at the end of the exposed dock, some 38m in the other direction. In all three instances, ceremonial activity is indicated by the remains of quartered and halved vessels smashed in place located directly on top of this layer (Cliff 1986: Figure 3.6a). Preliminary analysis suggests the expanse of this intentional deposit may be much greater, marking the burial of the entire village area.

Special treatment was reserved for Sub 5-1st and Sub 4, but not for the ramp itself, as the Cerroseños smashed precious jade beads and ear flare assemblages, obsidian, mother of pearl, tools, a *metate* fragment, specular hematite and a substantial number of drinking vessels in the



Figure 14. Examples of the reconstructed drinking vessels associated with the termination of Structure 2A-Sub 4.

most lavish rituals thus far conducted (Figure 14). These two buildings seem to have required attention that the burial of the residential village did not; pottery alone was sufficient for that task. Immediately afterward, the construction pen walls of the subsequent Main Plaza with its monumental architecture were built on top of the widespread light gray clay and marl layer.

Discussion

Current evidence dates construction of the 40-70m long stone platform (dock) to about 150 BCE. The earliest monumental construction so far discovered at Cerro Maya faced the sea in a manner designed to attract traders and provide a place for one-on-one exchanges. Comparatively little effort was invested in nearby residences for some time after the dock was built. The focus of the colonists appears to have been on generating revenues through trade.

As repeated storms destroyed portions of the site, the devastation differentially affected each family's individual recovery rate. This in turn affected their ability to produce domestic surpluses, setting up unequal capacities to accumulate the resources needed to procure precious imports. A cycle of increasingly limited access to these desirable goods based on these unequal capacities began, favoring those families whose goods survived the storms and who continued to possess the ability to produce

surpluses and employ others in the specialized production of goods.

The use of jade and *Spondylus* shell as items of stored value in rituals of sanctification and displays of power in certain areas of the village documents the beginnings of discernible socioeconomic stratification. Elites were distinguishing themselves with these destructive displays. The centralized production of the brewery and the construction of the later warehouse for the storage of goods to be exchanged evince the ongoing concentration of riches in the hands of a few, resulting in a progressive cycle of differential accumulation of wealth documented in the increasingly rich domestic termination rituals taking place in this part of the village.

Repeated damaging storms eventually caused the dock to be abandoned. At the same time, or soon thereafter, the construction of a cobblestone floor with its adjacent specialized production areas for a number of commodities signifies a distinct two tiered economy. The infrastructure for procuring and exchanging exotics managed and controlled by elites now existed alongside the surplus domestic production of staples for household level exchange. These elites invested their accumulated wealth in the first residence with a stone foundation on the coast. These same elites probably commanded the labor to build a relatively elaborate pyramidal structure inland

that served as both a religious focus and an economic nexus along with the ramp that led people inland from their canoe moorings.

Ultimately, the waterfront village, along with this stone residence and the inland pyramid were subsequently buried with ceremony, continuing the pattern established in successive residential renovations near the dock. Settlement dispersed to house mounds and the construction of the monumental architecture visible at the site today with its iconographic ties to El Mirador began.

The initial settlement at Cerro Maya provided little evidence for social stratification. Houses were approximately the same size and produced similar artifact inventories, consisting of utilitarian domestic items found in Late Preclassic households throughout the Maya area. Upon arrival the site founders quickly built a facility to conduct water borne trade at the southern end of Chetumal Bay. The lack of other major architecture at the same time depth and the immediacy of construction suggests these settlers were colonists from a larger city and were most likely beholden to those who sent them. Within a short time, however, Cerro Maya was productive enough to develop and nourish an elite of its own that eventually commenced major expansions such as the construction of 5C-2nd and the other monumental architecture at the site.

The complex iconography displayed on this architecture, in addition to parallels in ceramics and other artifacts, hint that the attention of El Mirador may have facilitated this construction (Freidel and Acuña 2014, Hansen 1990, Reese-Taylor and Walker 2002). There are, however, other potential candidates for early allies. Several large Late Preclassic sites have been identified just north of the Rio Hondo and are currently being explored (cf. Lopez Camacho in prep). Their proximity introduces a note of caution with respect to the identity of the polity that facilitated the rise of Cerro Maya, a site of long lasting importance in the region (Reese 1996; Walker 1990).

¹ www.flmnh.ufl.edu/cerros/

² Each of the storms was designated by the letter associated with the stratigraphic episode in which it

occurred, documented by Cliff (1982). Storm L was the earliest documented in Op 34a and Storm D was the latest.

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16 **ANCIENT MAYA SUBSISTENCE: THE DOMESTIC ECONOMY OF THE MILPA CYCLE AND DEVELOPMENT OF THE MAYA AND THEIR FOREST**

Anabel Ford

To understand the development of complex societies and civilizations in the Mesoamerican tropics, one must appreciate the foundation of the domestic economy in the essential compatibility of agriculture within the context of the forest. The cultural history of the Maya forest is embedded in its natural history. Maya subsistence is multifaceted, building beneficial qualities into the landscape with the cyclic management of plants creating a domesticated landscape across generations, centuries, and millennia. With the archaeological example of El Pilar we have the basis to model the Maya milpa cycle where maize yields provide for the needs of the high population and the cycles of reforestation promote significant economic quality to land cover under intensive cultivation. This model of subsistence and land use management, based on the Maya traditions of today, conserves the water cycle and prevents erosion, as well as enhances soil quality and provides a rich array of natural resources that benefit the families' domestic economy.

Introduction

Known for its great economic values that serve many aspects of the ancient Maya domestic economy, the Maya forest resources have provided colonial and national economies of the past as well. In the 17th and 18th centuries a dye base from logwood was essential to British manufacturing before the synthesis of aniline; in the 19th century enormous lumber harvests of mahogany and cedar fueled European furniture industries, and of the early 20th century the natural latex of the chicozapote tree brought wealth to the chewing gum boom. These extractive exploits transformed after WWII. With the growth of the global agricultural economy, the tropical forests became targets of new international development schemes imposing temperate strategies of pasture and plow that have their origins in a completely different ecology. These monocultures have changed the Maya forest, putting at risk plants and animals and an entire landscape that was home to the ancient and contemporary Maya.

Yet over the Classic Period, nearly two millennia ago, the Maya forest sustained the development of the great Maya civilization. The nature of subsistence strategies and the type of domestic economy of the growing complex society has baffled researchers accustomed to temperate contexts. Residential settlements of the Maya are not nucleated, as identified, for example, in the Fertile Crescent; rather they are widely dispersed, acting as a centrifugal force

against the central hierarchy. Early research on the local swidden system, what is known as the milpa cycle (Ford et al. 2012), eschewed it as an extensive land use system only functional under low population and small demand. The argument was that because the native traditions are simple and inadequate, shifting cultivation could not support a civilizational hierarchy.

What if the assumptions of land use are wrong? It is logical that the indigenous milpa system is linked to the past land use. Contemporary Cholan has been shown to be the language of the Maya hieroglyphs intimately connected with Maya speakers today (Macri and Ford 1997). Scholars have marshaled evidence that the Mayan language used in the lowlands today is one of the commons and of conservation, reflected in their terminologies (Atran 1993, 1999). Such an example is K'anan K'aax referring to well managed forests, but it means much more in the context of the native speaker, implying a learning experience and a caretaking opportunity. Indeed recent research in agroforestry and economic botany has demonstrated the subtlety of the Maya farmers land use strategies with home infield and varied outfields (Campbell et al. 2006; De Clerck and Negreros-Castillo 2000; Diemont et al. 2011; Rico-Gray 1990; Ross 2011). Following that logic, ethnographers have documented the complexity of land use and settlement patterns associated with the milpa cycle (Terán and Rasmussen 1995; Zetina and Faust 2011).

Based on the foundation that the Maya milpa cycle can be linked to the past, the El Pilar project has developed a land use model that indicates the potential of the milpa cycle to support the maize requirements of large populations (Ford et al. 2011). What remains to be considered is how the Maya milpa cycle can support large populations, and manage forest and land cover on which the success of Maya society is contingent. To accomplish this goal, data on the milpa cycle and the land use model for El Pilar are matched to forest habitats to identify the land cover types and their habitats. With an evaluation of the distribution forest habitats and land cover based on the geography of El Pilar, a model of forest cover is proposed. We will see that as the milpa cycle opens areas of forest for the annual field crops, it provides the opportunity to direct the reforestation process towards the important perennials that make up the forest today. In short, the milpa cycle process at once could provide for the annual crops as well as the perennial resources, co-creating a forest that is a garden providing the vital requisites for their domestic economy.

Connecting the Traditional Milpa-Forest Garden Cycle

Understanding the Mesoamerican and Maya milpa is to understand that the maize field is but one of the stages of a recurring cycle that initiates with the investment in the cleared maize-dominated plot, and succeeded by investments in the building of the useful woody perennials, to culminate with maturation as a closed canopy forest garden. The long-standing use of this cycle by Mesoamerican and Maya farmers is, in fact, reflected in the etymology of the word milpa. Traced to its Nahuatl roots, the word milpa was spread by the Spaniards who based it on the central Mexican word millipan, where milli means ‘cultivate’ and pan means ‘place’ (Bierhorst 1985: 213, 259), thus literally meaning a ‘cultivated place.’ The open field is Kol in Mayan.

Generally seen as a threat to tropical forest conservation (Bridgewater 2012: 154; Brown and Pearce 1994: 27; Ooi 1993: 12), slash-and-burn, or swidden, has been cast as primitive strategy, contrasted with the permanent field systems of plow and irrigation used to

manage monocropping developed in Europe at the time of the conquest. These generalizations do not acknowledge the permanent and perennial nature of the traditional farming systems, especially in Mesoamerica (Wilken 1971; 1987) and do not acknowledge the importance of conservation embedded in the milpa system (Atran 1999; Ford and Nigh 2009). For the Maya, the landscape itself is the starting point (Diemont et al. 2005, 2006). Domestic crops, along with native plants, are managed in unison spatially and temporally, creating a system historically adapted to and embedded in the tropical setting (Altieri 2002; Brookfield 2001; Wilken 1971).

Fallow, a period of “rest,” and its reduction is often seen by ecologists as negative, an unsought result of population growth and land pressure that leads to a loss of biodiversity and soil fertility (Schmook et al. 2004; Van Vliet et al. 2013; among others). There is no “rest” in the milpa cycle. The stages after the open maize field are a strategic process of reforestation in the milpa cycle and can be seen as an agricultural intensification strategy achieved by directing the succession of secondary growth towards desired economic ends.

If the milpa-forest garden cycle is understood as a multicrop, poly-cultivation system cycling from open fields of planted crops, to woody perennials for fruits and lumber built up over several decades, the value of the system takes a new perspective. Field plots are spatially diverse and the system is temporally dynamic, starting with fire clearing for the maize dominated field, and progressing through successive stages of reforestation (Diemont et al. 2006; Ford and Nigh 2010; Levy Tacher and Rivera 2005; Rättsch 1992). The stages are skillfully tended to establish a useful repertoire of plants that serve the short-term needs of the household and the long-term needs of the family. The field plots are steered through succession. The plots are managed for maintaining the water regime, enhancing soil fertility, and developing organic content (Ford and Nigh 2010; Nigh 2008); all that bear on the long term value of the landscape for the domestic needs.

Perennial woodlands are the cornerstone of the milpa cycle. First, selected woody plants and trees are cut and burned, clearing the field

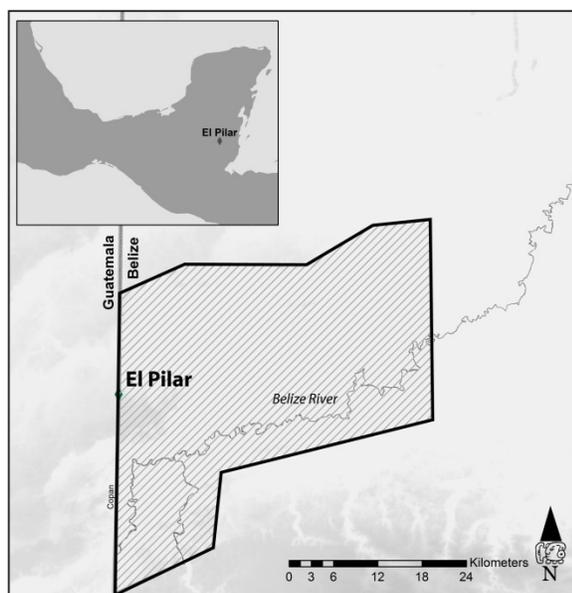


Figure 1. The El Pilar Research Area.

but preserving specific trees and stumps that will resprout, considering the future reforestation. After the dry season burn, sun-loving domesticated crops (maize, beans, squash among a selection of over 90 crops) are planted and volunteers are nurtured while the field's canopy is kept open (Diemont et al. 2005; Nigh 2008; Quintana-Ascencio et al. 1996). A diversity of crops is cultivated annually over a period on average of four years, while fruit and hardwood tree sprouts grow protected by ground cover in the shade of the tall maize, moving toward the next stage: reforestation. Each plot cycles from an open field into a managed forest with the major investments in the initial reforestation period. The maize cycles are staggered so that at any one time cultivated plots are at different points in the cycle making for a patchwork of land cover that insures the conservation of the land. The objective of the cycle is to increase the economic make-up of the mature forest garden and the Maya forest as a whole (Levy Tacher and Rivera 2005).

At each stage, there is investment in and use of the economic value of the landscape. The phases are strategically managed with utility in mind; a product of conservation practice (Atran 1993; Atran and Medin 1997; Atran et al. 1999; 2000; Rättsch 1992) based on the skilled selection of species. Planting and plant selection favor first short- and then long-lived economic

native perennials represented among the valuable plants of the Maya forest (Campbell et al. 2006; Gómez-Pompa 1987; Gómez-Pompa et al. 1972; Levy Tacher and Rivera 2005: 71; Schulze and Whitacre 1999). This is not slash-and-burn but select-and-grow.

The stages of the milpa cycle match the ecological stages of vegetation succession characteristic of tropical forest dynamics (Kellman and Tackaberry 1997:146-151; Nigh 2008; Finegan 2004). The economic plants that make up the Maya forest today (Campbell et al. 2006; Schulze and Whitacre 1999) owe their resilience to the pernicious process of human plant selection that has endured across the millennia (Ford and Nigh 2009; Ross 2011) with deep roots in the Maya forest (Atran 1993).

A Map of Ancient Maya Settlement and Population of the El Pilar Area

How does this land use play out on the landscape? Developed in the context of our Maya forest GIS, we have created a predictive model of Maya settlements patterns of the El Pilar area covering 1300 sq km in the upper Belize River area (Figure 1). Settlement densities of primary residential units are defined based on the systematic transect surveys of the Belize River Archaeological Settlement Survey and these patterned densities are then used to estimate population in the area (Ford et al. 2011).

Site distributions within the overall El Pilar area were diverse, associated with geographic characteristics of soil fertility, drainage, and topographic slope (Ford et al. 2009; Ford et al. 2011). The overall residential unit density was significant (Table 1) with areas of major settlement concentration where there was high fertility and good drainage, the high probability zones found scattered in the east, south, and the northwest of the study area (Figure 2). Other zones, particularly in the middle of the study area, are dominated by the poor soil and drainage and indicate virtually no settlement (Table 1, Figure 2). The highest concentrations of residential units that make up 20% of the study area (Table 1) were dispersed in a mosaic of fragmented large and small patches across the area (see Figure 2). Noteworthy, 38% of the land area is virtually

Table 1. Probability Class, Late Classic Residential Units, and Population Distributions for the Study Area.

Settlement Probability Class Characteristics	Late Classic Residential Units	Area (km ²)	Population	Density	Percent Population	Percent Area
1: Poor Drainage and Fertility	0	485	0	0	0%	38%
2: Moderate Drainage and Fertility	5,403	243	30,255	124	17%	19%
3: Moderate Drainage and Fertility	1,753	76	9,818	129	5%	6%
4: Good Drainage and Fertility	7,643	225	42,800	190	23%	18%
5: Good Drainage and Fertility	17,808	256	99,727	390	55%	20%
Total	32,607	1,284	182,600	142	100%	100%

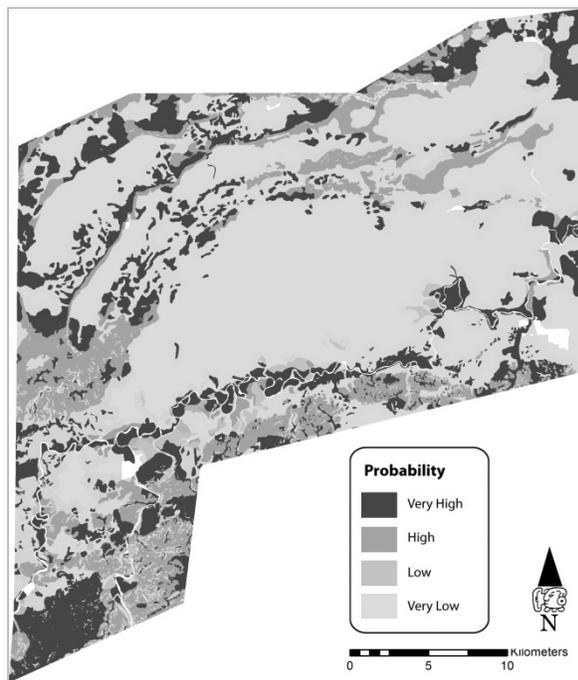


Figure 2. Predictive Model of Maya Settlement Probability for the El Pilar Area.

unoccupied (Table 1), providing a natural resource reservoir and forest cover that has concentrations among the occupied areas.

Essentially, and not surprisingly, occupied areas are those found in the well-drained uplands while unoccupied areas are characteristically wetlands (Table 1). The field validated

predictive model of residential unit distribution (Ford et al. 2009; Ford et al. 2011) provides the basis for interpreting the potential of the milpa cycle as to its ability to meet maize requisites, but also to evaluate its potential to manage the forest cover for conservation and daily needs of the ancient Maya domestic economy.

Imagining the Landscape of the Maya at El Pilar

The domestic economy of the Maya included agricultural as well as natural resources that maintained the household life. While not exhaustive, the natural resources would include housing construction materials, products for daily household uses (kitchen, sleep, entertainment), materials for the production of tools and facilities (stone, clay), and animals and their products (wildlife, bees). These resources would be found in specific areas of the landscape and would be familiar to the inhabitants of the area, their cultural ecology. The dependence on these essential resources would be understood, for example thatching for houses or oil for light, and would require management, including soil, water, and plant diversity. Thus, a landscape that can support the maize needs of a population is not the only requisite for subsistence and the management of the domestic economy.

Table 2. Characterization of Ancient Settlement and Environment for the El Pilar Study Area.

Forest Type	Reidential Unit Density (per km ²)	Soil Depth	Clay Content* (index 1-10)	Rock Content* (index 1-10)
Dry Upland	70	40.7 cm	4.1	3
Upland Standard	35	45.4 cm	4.9	2.2
Mesic Upland	23	53.5 cm	5.8	2.0
Hillbase	22	105.3 cm	9.0	0.3
Sabal	0	145 cm	10	0
Transitional	0	145 cm	10	0
Tall & Low Scrub	0	145 cm	10	0
Mesic Bajo	0	145 cm	10	0

Based on Schulze and Whitacre 1999:190, 250 * 1999:240**

Table 3. Key Example Maya Forest Trees.

Trees	Common Name	Primary Uses	Pollen Syndrome
<i>Brosimum alicastrum</i>	Ramon	Fruit, Fodder	Wind
<i>Swietenia macrophylla</i>	Mahogany	Construction	Insect
<i>Manilkara zapota</i>	Chicozapote	Construction, Fruit Latex	Insect
<i>Pouteria reticulata</i>	Sapotillo	Construction	Insect
<i>Sabal mauritiiformis</i>	Bay Leaf	Thatching	Insect
<i>Cecropia peltata</i>	Trumpet	Succession	Wind

Consider an example of the requirements of perennial trees: specific twigs and stems for kitchen utensils, small woody branches for cooking fuel, forked limbs for roof construction, straight trees for house building, and study trees for lintels. Many perennial trees serve multiple purposes for flowers, fruit, fumigants, latex, and fodder. While many serve in building, to complete the basic construction, roofing materials would be needed, principally palm thatch and binding vines. Only certain palm leaf is suitable for thatch and binding vines only grow in the shade of the closed canopy. Therefore, management of the open fields for annual crops and succession of the perennial forest for the varied needs of the domestic economy are essential.

The strategy of clearing for crops for a short period and allowing the land to reforest over a long period has been seen as productively inefficient and destructive of vegetation. Standard evaluation of the milpa system considers only crop production and terms the forest succession component as “fallow,”

implying recuperation and otherwise useless or “barren” lands (see McElwee 2009). These disparaging assumptions have prevented an appreciation for the value of the strategic products found within the succession components. This has negated experimentation with the potentials of the indigenous land use systems and their ability to provide cultivated and natural resources required for daily life. To consider the possibilities of the milpa cycle, we must not only ask how the landscape can support the maize requisites of a given population, as we have shown (Ford et al. 2011; Ford and Clarke 2015), but also ask how the balance of forest cover could be envisioned to supply the critical need of the domestic economy.

Using the data developed for the population - maize model reported in 2011, this paper looks at the diversity of the landscape around the maize dominated fields, focusing on the cycle of reforestation along with the areas that would have been dedicated to long term forest management in the occupied uplands as well as the unoccupied wetlands. To create a

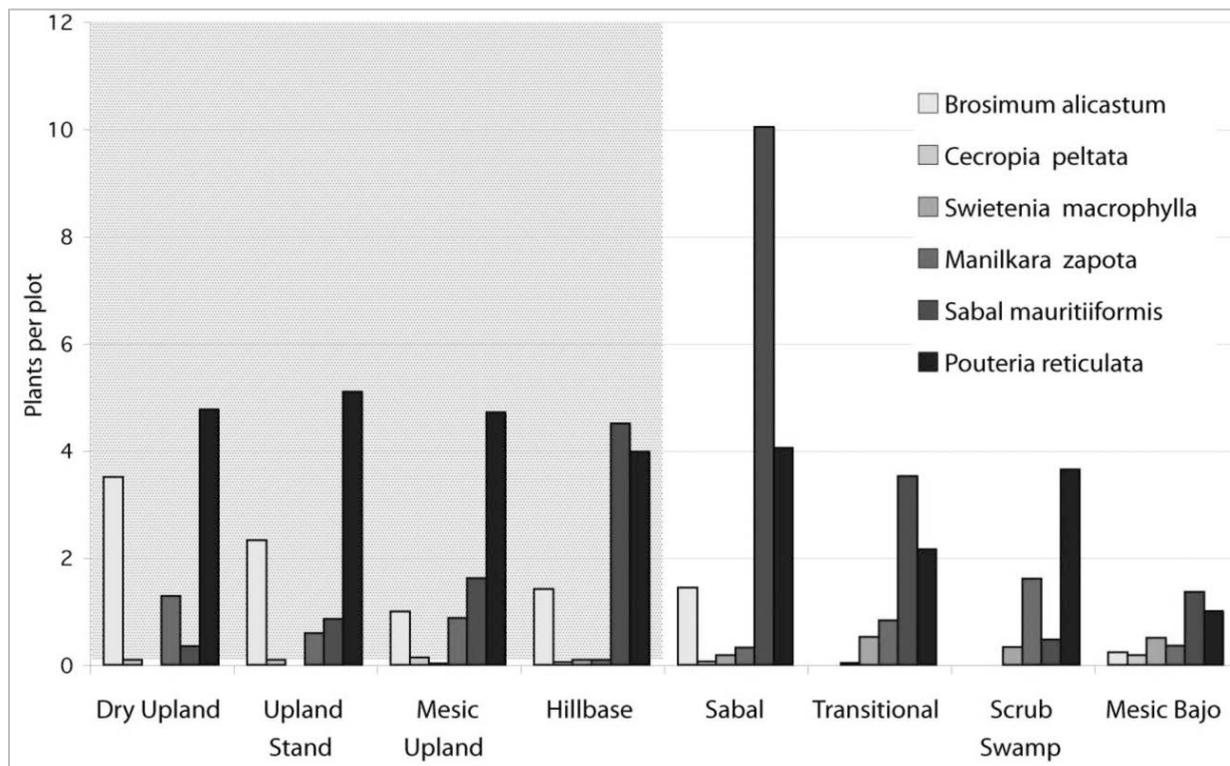


Figure 3. Maya Forest Tree Distribution in Occupied (shaded) and Unoccupied Zones (unshaded).

managed forest, one needs to appreciate how land opened as fields are subject to reforestation to be managed as forest gardens. The proportions of these lands will depend on the maize yield; the greater the maize yield, the smaller proportion of land needed to be directly and intensely managed as part of the milpa cycle. The remaining lands of occupied uplands and unoccupied wetlands would have been indirectly managed for their natural resources. In order to understand the potential forest resources, we rely on Schulze and Whitacre (1999) who evaluate the upland and wetlands habitats around Tikal.

The Maya Forest Resources

Schulze and Whitacre (1999) provide an overall description of the soil and perennial components of the Maya forest following a drainage gradient from dry uplands to mesic swamp in the area of Tikal, 50 km from El Pilar, sharing the geography and vegetation of the Maya forest. Expanding on the data provided by Schulze and Whitacre by associating their habitat data with the archaeological data (Ford

1986, 2003, Puleston 1974), we can examine an example of the native forest resources of the occupied and unoccupied areas (Table 2).

The landscape gradient defined by Schulze and Whitacre (1999) from uplands to wetlands is associated with the settlement gradient, residential unit zones at tops of hills and ridges support the greatest densities of settlements while those zones that grade closer to the wetlands support the lowest densities (Table 2). The wetlands were without settlement, but that is not to say that they were useless. These forests have the potential to provide some of the key economic resources used by the Maya and play a vital role in the land use of the ancient Maya as we will see.

Examples of geographic components of the Maya landscape include soil depth, rock content, and clay index (Table 2). Over 100 perennial trees are enumerated (Schulze and Whitacre 1999) by individuals and include observations of adults and juveniles frequency and density by species (Appendix I). We select a representative subset: four canopy trees (*Brosimum alicastrum*, *Swietenia macrophylla*,

Manilkara zapota, Pouteria reticulata), one palm (*Sabal mauritiiformis*), and one pioneer tree (*Cecropia peltata*). The trees are all good construction hardwoods; *B. alicastrum* or ramon, *M. zapota* or chicozapote, and *P. reticulata* or sapotillo provide fruits, and *M. zapota* provides latex. *S. mauritiiformis* is the bay leaf palm and today is preferred for roof thatching, while *C. peltata*, called trumpet tree, is a mark of recuperating lands in early succession, providing critical shade cover as other economic trees grow and attract animals important as protein (Table 3). These native trees represent key species of the Maya forest across the variable habitats and are recognized by traditional Maya for economic values. Only the wind pollinated examples would be visible in the paleoenvironmental record (Ford and Nigh 2009).

There are clear Maya settlement patterns that separate occupied from unoccupied areas (Table 2, Figure 3). Deep clay soil zones are avoided for settlements while shallow rocky soil zones are preferred. This observation bolsters our predictive model that indicates sites are located in the well-drained zones. It also gives a perspective on the areas where vegetation would be most impacted by ancient occupation. The upland settlement densities range from 22-70 residential units per km² making for significant competition with trees for space while there are virtually no settlements in the wetland zones, thus favoring the natural woodland distributions.

The patterns of tree distribution today provides a view on the natural distribution of native trees found in areas occupied and unoccupied by the ancient Maya. The most dominant tree in all habitats, uplands and wetlands, is sapotillo. It is found in greatest proportions and densities in all habitats regardless of drainage, but since it is insect pollinated it would be invisible in fossil pollen reconstructions. Sapotillo is only topped by the bay leaf palm in the areas transitional to the wetlands. The natural distribution of these species in wetlands would not be greatly impacted by the ancient Maya settlement patterns.

Ramon, touted for its nutritious seed and valuable forage, occurs principally in the uplands and is virtually absent in the wetlands.

Its natural distribution would be significantly impacted by ancient Maya settlement, yet it is a regular component of traditional gardens today. Mahogany distribution is noteworthy; its preferred habitats are those of the wetlands and is rare in the uplands. While mahogany is managed in traditional home gardens today, it would have been easily managed outside settlement areas in the wetlands. Chicozapote is more generalized than mahogany and while not occurring in great density, it is found consistently in the all habitats. Furthermore, this would be able to grow in the unoccupied areas. The habitat preference of mahogany and distribution of chicozapote would not be seriously affected by Maya settlements.

Trumpet tree, a signal of reforestation, is a pioneer species that quickly volunteers in open spaces and is greatly appreciated by birds and other animals. The wide leaves provide good shade needed by seedlings and they contribute to the organic matter of the soil. While it is hardly a major presence is a high stand forest as it is part of early succession occupying forest gaps, it is recorded in upland and wetland habitats. Today, it quickly establishes itself in gaps created by tree falls and hurricane blow downs. A generalist by habitat and distributed mainly by birds and bats that course through the canopy, trumpet tree is pollinated by wind and is evident in the ancient pollen cores. Present in forest canopy of the uplands and wetlands, it will represent the early reforestation phases and serve as a marker of forest regeneration. This pioneer trumpet tree would be expected to be in greater densities in prehistory with the practice of the milpa cycle where canopy openings and early succession would be an emphasis in the agricultural system.

Residential Land Use Models: Fields and Forests

Using maize yields from ethnographic examples, we can bracket maize production and field openings production to calculate the land needs for open fields and the reforestation cycle as we have show (Ford et al. 2011). What is not required for the field reforestation cycle would be designated for long-term managed forest in the uplands and the wetlands.

Table 4. Maize Yields for the El Pilar Population under Different Production Regimes of the occupied 734 km² Well-Drained Upland.

Location	Yield kg/ha	Total Land Needed for Maize	Infield/Outfield	Milpa/Managed Succession	Long-Term Forest Management	% Long-Term Forest
Low Yield Petén Itzá	855 kg	156 km ²	4/16 yrs	4/16 yrs	134 km ²	10%
Average Yield Yukatan	1144 kg	117 km ²	39/78 yrs	4/27 yrs	292 km ²	23%
High Yield Lakantun	2800 kg	48 km ²	39/9 yrs	4/275 yrs	569 km ²	44%

*554 km² defined as wetlands to make up the total 1288 km²

Table 5. Maize Yields and Forested Land of the 1288 km² El Pilar Area*.

Maize Yield	Upland Maize Infield	Upland Maize Outfield	Upland 8-yr Building Cycle	Upland 8-yr Mature Cycle	Upland Developed > 20 yr	Upland Long-Term	Wetland Forest	Total Area
Low Yield 855 kg/ha	3%	12%	18%	18%	0%	10%	38%	100%
Average Yield 1144 kg/ha	3%	9%	9%	9%	10%	22%	38%	100%
High Yield 2800 kg/ha	3%	4%	0.5%	0.5%	11%	44%	38%	100%
Settlement Density	124-390	124-190	124-190	124-190	124-190	124-190	0	142

* Figures in round numbers.

To estimate the forest clearings for maize, we rely on three Maya examples to bracket the range of yields and demonstrate the variables of land use that impact forest cover. Maize yields will vary based on skill, labor investment, and scheduling. Petén Itza data (Cowgill 1960, 1961) of 855 kilograms per hectare provides a low yield example. Yukatekan Maya data on yields (Redfield and Villa Rojas 1962; Steggerda 1941; Villa Rojas 1945) provide an average of 1144 kilograms per hectare. For high yields, the case of the Lakantun (Nations and Nigh 1980) are an amazing example with a high yield of 2800 kilograms per hectare.

Based on the low, medium, and high yields of maize, we can project the field requirements for the proffered well-drained uplands of El Pilar area and thereby appreciate

the proportions of forest lands dedicated to natural resources. Even low milpa cycle yields have been shown to provide for the high populations of the El Pilar area (Ford et al. 2011; Table 4). It is from these data we can interpret the proportion of forest cover and the variations that each main model present.

The well-drained uplands are where the highest concentration of the ancient Maya population with 124-390 persons/km² (Table 1) lived. All field cropping needs of the Maya could be resolved within these upland zones. Land use is divided between infields and outfields. To the extent milpa cycle outfields were required, the directly managed forest succession provided for varied land cover across the landscape. Areas in succession would support select bushes and trees in the early

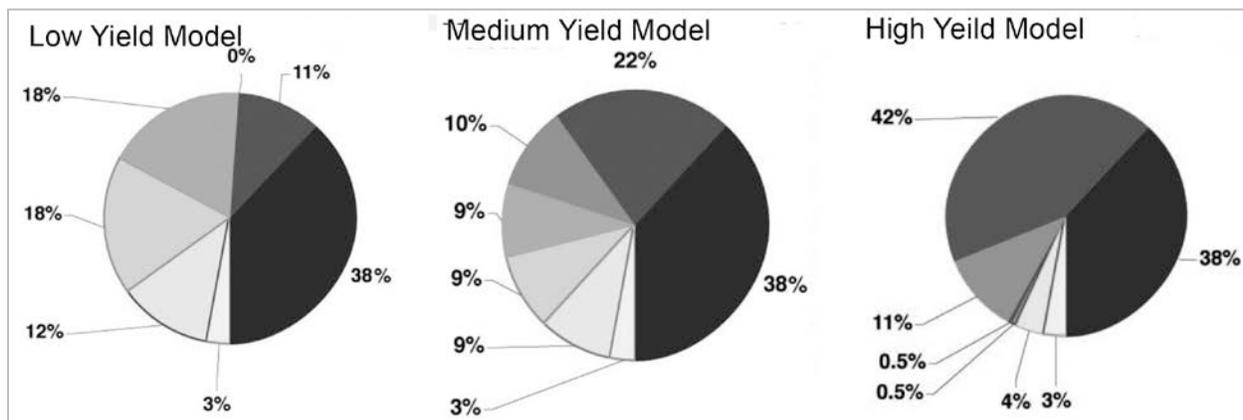


Figure 4. Field to Forest Models for the El Pilar Area based on Maize Yields.

- Legend**
- Upland maize infield
 - ▨ Upland maize outfield
 - ▩ Upland 8 yr building cycle
 - ▧ Upland 8 yr mature cycle
 - ▦ Upland developed
 - ▤ Upland long-term
 - ▣ Lowland Forest

building phases and closed canopy in later mature phases. Long-term managed forests developed older growth benefits of taller and larger trees and more varied understories. The wetlands with lowland forests would support natural forest cover managed and extracted for domestic uses (Table 2, Appendix I).

Forest cover is projected as extensive in the three examples (Table 5). While in all cases, 38% of the area is in unoccupied wetland forests which offered a suite of natural resources that were outside the heavily managed resources of the occupied areas; all areas could have provided natural forest resources that the Maya could have used. Even the low yield maize case offers considerable land in cover: 48% in long-term forests and 36% in the building and mature phases of the cycle. The total of low and high forest cover is than majority of land cover from 60-82% for the average and high yield cases. In all examples, there is no evidence of deforestation (Figure 4).

The Maya milpa cycle depends on its melding with the character of the forest cycles.

Tree falls, hurricane damage, and fires are natural components of forests. Initially working with these natural factors, the Maya were equipped with both stone tools and the ability to use fire to develop the forest cycles to their own ends. Planting of field crops was important, but directing the reforestation was equally important. All economic activities involved skill, investment, and scheduling in order to build a landscape that produced utility at every stage. This is the well cared for forests that the Maya know as K'anán K'aax.

Summary

Forest management in the context of the milpa cycle has long historical roots (Atran 1993; Toledo 1990; cf. Conklin 1957). Botanists and agroecologists recognize the inherent values of the economic species of the Maya forest that make up the trees of the reserves of contemporary forest gardens. Some of the trees have played critical and global roles, such as mahogany and chicozapote, and some have been referred to as ancestors, such as avocado, cacao, mamey, nance, and guayaba (Schele and Mathews 1998:122). These important forest trees were long understood by the people native to this place. The means of which the Maya forest became an orchard garden is a direct relationship to the milpa system and the reforestation process embedded in its management. The question of the forest's value and the importance of the selection process owe its resilience to the historical and prehistorical application of the milpa cycle.

Appendix I. Maya Forest Tree Family/Species by Habitat based on Schulze and Whitacre 1999.

Family	Species	Dry Upland	Upland Stand	Mesic 1 Upland	Mesic 2 Upland	Hill-base	Sabal	Transitional	Tall Scrub Swamp	Low Scrub Swamp	Low Scrub Swamp	Mesic Bajo	N
Anacardiaceae	<i>Astronium graveolens</i>	0.03	0.05	0	0.14	0.18	0.12	0.22	0		0	0	23
	<i>Metropium brownei</i>	0	0	0	0	0	0	0.04	1		2.12	0.05	54
	<i>Spandias mombium</i>	0.03	0.05	0.16	0.14	0.5	0.47	0.26	0		0	0.5	74
Anonaceae	<i>Annona sp.</i>	0	0.05	0.1	0.11	0.05	0	0	0		0	0	11
	<i>Maimae depressa</i>	0.53	0.32	0.03	0.19	0.05	0.09	0.04	0.06		0	0	45 32
Apocynaceae	<i>Aspidosperma cruenta</i>	0.35	0.73	1.19	2.09	0.91	0.68	2.52	1.5		0.24	0.05	0
	<i>Aspidosperma megalocarpum</i>	0.21	0.14	0.13	0.26	0.32	0.26	0.3	0.06		0	0.32	66
	<i>Cameraria latifolia</i>	0	0	0	0	0	0	0	0		1.18	0	20
	<i>Stemmadenia donnell-smithii</i>	0.09	0.14	0.06	0.18	0.18	0	0	0		0	0	29
	<i>Thevetia ahouai</i>	0	0	0.04	0.05	0.2	0.47	0.2	0.58		0.14	0.2	26
Arecaceae	<i>Bactis major</i>	0	0	0	0	0	0.4	0.4	1		0	0.2	24
	<i>Chamaedorea pacaya</i>	0.19	0	0	0.11	0	0	0	0		0	0	31 33
	<i>Chamaedorea sp1</i>	2.33	2.88	1.57	3.05	1.27	1.2	0.3	0.42		0	0.2	0
	<i>Chamaedorea sp2</i>	0.04	0.06	0.09	0.14	0	0	0	0	0	0	0	12
	<i>Chamaedorea sp4</i>	0.26	0.24	0.17	0.19	0	0	0	0	0	0	0.7	30 42
	<i>Cryosophila stauracantha</i>	6.3	14.6	17.7	20.3	16.32	28.15	14.48	9.75		0.53	3.45	23
	<i>Guassia maya</i>	0.06	0.23	0.1	0.09	0	0	0	0.06		0	0	16 77
	<i>Sabal mauritiformis</i>	0.35	0.86	1.1	2.14	4.5	10.03	3.52	0.81		0.12	1.36	7
Araliaceae	<i>Dendropanax arboreus</i>	0.12	0	0.19	0.19	0.09	0	0.04	0		0	0	25
Bignoniaceae	<i>Tabebuia sp.</i>	0.03	0	0.03	0	0.09	0.21	0	0		0	0.27	17
Bombacaceae	<i>Quararibea funebris</i>	0	0	0.05	0.04	0.05	0.09	0	0		0	0.05	9
Boraginaceae	<i>Cordia gerascanthus</i>	0	0.05	0.03	0.16	0	0.03	0	0		0	0	13
Burseraceae	<i>Bursera simaruba</i>	0.06	0.09	0.05	0.14	0.14	0.06	0.3	0.69	0.24	0.24	0.14	58 16
	<i>Protium copai</i>	0.38	0.59	0.55	0.49	0.5	1.35	1.09	0.25		0	0.18	8 15
Celastraceae	<i>Wimmeria concolor</i>	0.62	0.95	1.05	1.12	0.09	0.03	0.26	0		0	0	0
Chrysobalanaceae	<i>Hirtella americana</i>	0.03	0.14	0.1	0.16	0	0	0.09	0		0	0	18
Clusiaceae	<i>Calophyllum brasiliense</i>	0	0.23	0.1	0.16	0.09	0.21	0.48	1.06		0.29	0.36	67
	<i>Clusia sp.</i>	0.12	0.05	0.04	0.09	0	0	0.13	0.19		0.29	0	21
Combretaceae	<i>Bucida buceras</i>	0	0	0	0	0	0	0	0.69		1	1.23	55
	<i>Terminalia amazonia</i>	0	0	0.03	0.04	0	0.24	0.52	0.69		0.12	0	36 33
Euphorbiaceae	<i>Croton pyramidalis</i>	0	0.05	0.03	0	0.27	0.07	2.8	6.5		13	1	8
	<i>Croton reflexifolia</i>	0	0	0	0	0	0	0	0.03		0.29	0	19
	<i>Drypetes lateriflora</i>	0.76	0.18	0.05	0.14	0	0	0	0		0	0	51 15
	<i>Gymnanthes lucida</i>	1.03	0.14	0	0.02	0.07	0	0.9	1.83		0.5	0	7
	<i>Margaritaria nobilis</i>	0	0	0	0	0	0	0	0		3.93	5.4	35
	<i>Phyllanthus nobilis</i>	0	0	0	0.04	0	0.07	0	0.08		0.5	0.1	35 25
Fabaceae	<i>Sebastiania longicuspis</i>	0.12	0.68	0.77	1.79	0.13	0.07	0.2	0.08		0	0	0
	<i>Haemotoxylum campechianum</i>	0	0	0	0	0	0	0.26	1.94		6.59	2.27	9
	<i>Swartzia cubensis</i>	0.03	0	0.13	0.05	0	0	0	0		0	0.1	12
	<i>Glicidia sepium</i>	0	0	0	0	0	0	0	0.17		0.07	0	23

Appendix I. Maya Forest Tree Family/Species by Habitat based on Schulze and Whitacre 1999.

	<i>Lonchocarpus castilloni</i>	0.06	0	0.1	0.07	0.07	0.2	0.2	0.5	0	0.6	29
	<i>Lonchocarpus guatemalensis</i>	0	0	0	0.02	0.05	0.03	0	0	0	0.64	17
	<i>Lonchocarpus latifolius</i>	0	0.05	0.03	0.02	0.09	0.5	0.22	0.69	0	0.77	57
	<i>Vatairea lundellii</i>	0	0	0.03	0.05	0.18	0.12	0.17	0	0	0.23	21
	<i>Acacia cookii</i>	0.24	0.36	0.42	0.42	0.55	0.85	0.39	0.31	0	0.27	8
	<i>Acacia sp.</i>	0.03	0.14	0	0.05	0	0.12	0.04	0.31	0.47	0.32	34
	<i>Inga edulis</i>	0	0	0	0	0	0	0	0	0	0.91	20
	<i>Pithecellobium belizensis</i>	0	0	0	0	0.14	0	0	0	0.12	3.41	80
Flacourtiaceae	<i>Cesearia bartletti</i>	0.09	0.09	0.23	0.49	0.09	0	0.04	0	0	0	43
	<i>Cesearia corymbosa</i>	0	0	0	0	0	0	0.09	0	0	0.59	15
	<i>Laetia thamnia</i>	0.21	0.18	0.29	0.18	0.05	0.03	0.17	0.13	0.06	0	41
	<i>Xylosoma sp.</i>	0.03	0	0.03	0.04	0	0.03	0.13	0.19	0.12	0.05	17
	<i>Zuelenia guidonia</i>	0	0.05	0.03	0.07	0.09	0.12	0.09	0	0.06	0.05	16
Lauraceae	<i>Licaria peckii</i>	0	0	0.13	0.19	0.09	0.18	0.87	0.06	0	0.14	49
	<i>Nectandra coriacea</i>	0.94	0.14	0.32	0.07	0	0.03	0.04	0	0	0	61
	<i>Nectandra salicifolia</i>	0	0	0	0.05	0.4	0.33	0	0	0	0	17
Malphiaceae	<i>Byrsonima bucidaeifolia</i>	0	0	0	0	0	0	0	0.38	1	0	23
Malvaceae	<i>Hampea trilobata</i>	0	0	0	0	0	0	0.04	0.5	0.12	0.05	12
Meliaceae	<i>Cedrela mexicana</i>	0.06	0.05	0.06	0.02	0.05	0.06	0	0	0	0	12
	<i>Guarea glabra</i>	0.03	0.05	0.13	0.05	0.55	0.18	0	0	0	0.14	34
	<i>Swietenia macrophylla</i>	0	0	0	0.05	0.09	0.18	0.52	0.19	0.47	0.5	47
	<i>Trichilia minutiflora</i>	2.24	1.91	0.77	0.98	1.27	0.44	0.26	0.06	0	0	27
	<i>Trichilia moschata</i>	1.74	0.86	0.77	0.53	1.23	0.38	0.48	0	0	2.14	9
Moraceae	<i>Brasimum alicastrum</i>	3.5	2.32	1.16	0.82	1.41	1.44	0	0	0	0.23	36
	<i>Cecropia peltata</i>	0.09	0.09	0.13	0.12	0.05	0.06	0.04	0	0	0.18	32
	<i>Coussapoa oligocephala</i>	0.12	0.09	0.06	0.04	0.05	0.12	0.09	0	0	0	17
	<i>Ficus sp.</i>	0.06	0	0.06	0.04	0.05	0.09	0	0	0	0.23	17
	<i>Pseudalmidia oxyphyllaria</i>	0.71	0.95	1.81	3.42	0.95	0.18	1.48	0	0	0	36
	<i>Trophis racemosa</i>	0	0	0	0.05	0.23	0.5	0.13	0	0.06	0.32	37
Myrsinaceae	<i>Ardisia paschalis</i>	0.22	0.06	0.52	0.27	0.4	0.27	0.8	0.17	0.21	0	52
Myrtaceae	<i>Calyptanthes chytraculia</i>	0	0	0	0	0	0.09	0	0	0.06	1.09	28
	<i>Calyptanthes sp.</i>	0	0	0	0	0	0.35	0	0	0	0.05	13
	<i>Eugenia sp.</i>	0.15	0	0	0.09	0	0.09	0.09	0	0	0.14	19
	<i>Myrtaceae sp.</i>	0.26	0	0.22	0.22	0.53	0.2	1.1	2	3.93	0.4	1
	OPPLV1	0	0	0	0	0	0	0.09	0.63	1.76	0.36	50
	<i>Pimenta dioica</i>	0.59	0.64	0.32	0.4	0.23	0.47	0.43	0.19	0	0.05	11
Ochnaceae	<i>Ouratea lucens</i>	0	0	0	0.19	0.09	0.03	0.26	0	0.06	0	21
Piperaceae	<i>Piper cf. aduncum</i>	0.15	0.06	0.09	0.51	0.6	1.73	0.1	0	0	0	70
	<i>Piper psilorrhachis</i>	11	8.59	5.61	4.92	2.47	0.53	0.2	0	0	0	91
	<i>Piper sempervirens</i>	0.11	0.88	0.04	0.19	0.53	0.07	0.1	0	0	0	45
Polygonaceae	<i>Coccoloba acapulcensis</i>	0.06	0	0	0.02	0.05	0.06	0.7	0.94	0.47	0.14	48
	<i>Coccoloba cozumelensis</i>	0	0	0	0	0	0	0	0.25	0.29	0	9
	<i>Coccoloba reflexiflora</i>	0	0	0	0	0	0.03	0.48	1.56	6.06	0.18	14
												4

Appendix I. Maya Forest Tree Family/Species by Habitat based on Schulze and Whitacre 1999.

Rhizophoraceae	<i>Cassipourea gualanensis</i>	0	0	0	0	0	0.47	0.13	0.13	0	0.05	22
Rubiaceae	<i>Alibertia yucatanensis</i>	0	0	0.35	0.09	0.07	0.93	0	0	0	0.1	19
	<i>Guettarda combsii</i>	0	0	0.03	0.04	0	0.03	0.3	0.25	0.53	0	40
	<i>Rubiaceae sp.</i>	0.03	0.05	0.19	0.16	0.18	0.29	0.09	0.06	0	0	38
	<i>Simira salvadorensis</i>	0.12	0.18	0.16	0.09	0.36	0.82	0.48	0.31	0.06	0.82	94
Rutaceae	<i>Amyris elemifera</i>	0.03	0	0	0	0.09	0.06	0.04	0.31	0	0.23	16
	<i>Zanthoxylum procerum</i>	0.09	0	0.1	0.21	0	0	0.09	0	0	0	22
												27
Sapindaceae	<i>Blomia prisco</i>	1.76	1.5	1.39	1.86	0.5	0.18	0	0	0	0.05	4
	<i>Cupania bellizensis</i>	0.03	0.23	0.16	0.28	0.55	0.24	0.13	0.06	0	0	57
	<i>Exothea paniculata</i>	0.09	0	0.06	0.07	0	0	0.04	0	0	0	10
	<i>Matayba oppositifolia</i>	0	0.05	0.06	0.18	0	0.09	1.22	1.5	0.06	0	70
	<i>Talisia floresii</i>	0	0	0	0	0.05	0.09	0.17	0.13	0.35	0	16
	<i>Talisia olivaeformis</i>	0.47	0.45	0.19	0.05	0	0.18	0	0	0	0.05	45
	<i>Thouinia paucidentata</i>	0.35	0.09	0	0.02	0	0	0	0	0	0	16
												22
Sapotaceae	<i>Manilkara zapota</i>	1.29	0.59	1.13	0.63	0.09	0.32	0.83	1.63	1.59	0.36	9
	<i>Mastichodendron</i>	0.09	0.14	0.06	0.02	0.09	0	0	0	0	0	12
												17
	<i>Pouteria amygdalina</i>	0.21	0.68	1.1	1.56	0.32	0.12	0.43	0.19	0	0	3
												10
	<i>Pouteria campechiana</i>	0.74	0.73	0.61	0.49	0.27	0.03	0.13	0	0	0	0
												25
	<i>Pouteria durlandii</i>	0.09	0.18	0.61	0.7	1.91	2.62	2	0	0	0.23	7
												95
	<i>Pouteria reticulata</i>	4.76	5.09	4.71	3.98	4.05	2.15	3.65	1	0	0.32	5
Simaroubaceae	<i>Simarouba glauca</i>	0.03	0.05	0.06	0.07	0	0.09	0	0	0	0	12
Ulmaceae	<i>Ampeiocera hottlei</i>	0	0	0.03	0.02	0.18	0.12	0.04	0	0	0	13
Verbenaceae	<i>Aegiphila manstrosa</i>	0	0.05	0.1	0	0	0.03	0	0	0	0	12
	<i>Rehdera penninervia</i>	0	0	0.06	0.07	0	0.09	0.04	0.06	0	0.05	12
	<i>Vitex guameri</i>	0.03	0.05	0.13	0.05	0.05	0.09	0.35	0.31	0.06	0	27

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17 **DOUBLOONS, DOLLARS, SHILLINGS, AND COPPERS: COINS AND MONETARY UNITS OF THE ENGLISH SETTLEMENT ON THE BAY OF HONDURAS**

James F. Garber

Belize has a long and colorful history on its path to nationhood. This often involved a complex interaction of cultures and political entities that included England, Spain, Guatemala, the United States and the Maya. As a result of these complex interactions, the money and monetary units utilized were equally varied and complex. This paper examines the monetary units and coins of the days of the earliest English pirates and Baymen up to the Battle of St. George's Caye.

Introduction

The first known Englishman to set foot in what is now Belize was Bartholomew Sharp (or Sharpe) a pirate perhaps best known for his exploits on the west coast of South America (Pickering 2006). Sharpe's crew had captured Spanish priest Father José Delgado and his party making their way up the Belize coast for the purpose of exploring an overland route from Guatemala to Yucatan (Bulmer-Thomas and Bulmer-Thomas 2012:28). Sharpe's men patrolling the shore captured them just south of Belize City at Manatee Lagoon after seeing their campfires on land. Delgado and his party were taken to St. George's Caye, Sharp's base. It is difficult to imagine what an English pirate and a Spanish priest would have in common but according to Delgado's accounts, the two got along well and was on the Caye for about a month. In all likelihood, Delgado did not speak English and Sharp did not speak Spanish. Sharp had received Anglican religious training and thus the two probably communicated in Latin. Although these two men came from quite different realities, one thing they would have had in common was money – in particular both would have had access to and familiarity with the same type of coins and monetary units.

Although the Spanish, English, Dutch, and Portuguese were the primary European actors in the New World, the coins of the Spanish monetary system dominated the New World throughout the 1500s, 1600's and 1700's. Thus, to understand the coins used by the English Baymen of what was to become Belize, one must have understanding of the Spanish monetary system and its units.

Spanish Monetary System in the New World

In 1497, under the reign of Ferdinand and Isabella, the *reale* became the basic monetary unit of Spain. Additionally, 34 *maravedíes* = 1 *reale*. In gold, the *ducado* (based on the Venetian *ducat*) which equaled 375 *maravedíes*.

Spanish coins of the New World were made of three basic metals; copper, silver, and gold. Depending on the denomination value, they were known by several different names but basically coins of copper were referred to as *maravedí* in Spanish and *coppers* in English. The term "copper" is still used today by older Belizeans to refer to one cent Belize coins, now made of aluminum but once made of copper. The monetary unit of the silver coins was the *reale*. The highest value of the silver coin was 8 *reales*. The smaller denominations were 4, 2, and 1 *reales*. At times there were fractional denominations. Depending on the value, the Spanish silver coins had several names in English including *shilling*, *dollar*, *cob*, *bit*, and *picayune*. The term "shilling" is sometimes still used in Belize to refer to a twenty-five cent coin. This is a carry over from earlier times when a two *reale* Spanish coin had the value of a Jamaican *shilling*. The British colonial monetary systems of the New World used English names but the coins themselves were usually Spanish.

The pre-Colonial coins of Belize and the surrounding areas were typically from the reigns of one of the following Spanish kings: Phillip III (1578-1621); Phillip V (1621-1665); Charles II (1665-1700); Phillip V (1700-1746); Ferdinand VI (1746-1759); Charles III (1759-1788); Charles IV (1788-1808); and Ferdinand VIII (1808-1821). Within the reigns of these kings



Figure 1. Coin Types: a) Pillar 1536-1752; Shield 1532-1734; c) Pillar and Waves 1651-1773; Milled Pillar 1732-1772; Milled Bust 1771-1825.

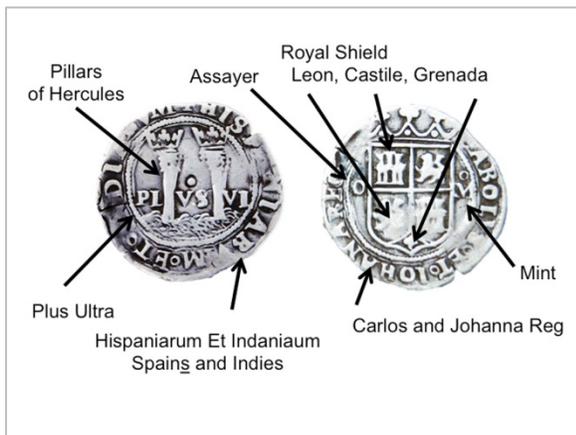


Figure 2. Pillar coin.

there were several different types of silver coins. Some of them include the name of the king and the date they were minted, others only include the name of the king and yet others are identified by style (Sellschopp 1971). The silver coins of this era can be divided into five basic types as follows: Pillar 1536-1734; Shield 1572-1724; Pillar and Waves 1651-1773; Milled Pillar 1732-1772; and Milled Bust 1771-1825 (Figure 1). The elements found on a typical Pillar Type coin are shown in Figure 2.

The “pillars” are found on all but the Shield Type. These pillars are a depiction of the legendary Pillars of Hercules. The story of Hercules has its origin in Greek times and continues into the modern era. According to legend, the pillars were located on each side of the Strait of Gibraltar at the mouth of the Mediterranean Sea (Figure 3). Hercules was



Figure 3. Map of Mediterranean, arrow points to Strait of Gibraltar.



Figure 4. Sculpture of Hercules and Pillars.

chained to the two pillars and pulled them together to prevent sea monsters from the Atlantic entering the Mediterranean and harassing the civilized world. This story, with its origins in ancient Greek times, is present in many cultures around the world and its presence and popularity can be noted in the art and iconography of the Western world for over 2000 years. The story is told in written and oral legend, sculpture (Figure 4), painting, pottery, TV series, Hollywood films and even an episode of the Three Stooges. The story was an important one during the times of New World exploration. According to legend, the pillars were inscribed with the Latin words “Nec Plus Ultra” meaning “Nothing Further Beyond”. This was to serve as warning to sailors that there



Figure 5. Pillars of Hercules and Plus Ultra scroll.

was nothing beyond the Strait of Gibraltar other than dangerous waters and sea monsters. The pillars served to mark the edge of the world.

The discovery of the New World radically changed this perception and thus under the reign of Charles V the inscription was changed to “Plus Ultra” meaning more beyond (Figure 5). This was an important symbol to all of those times and spoke of the New World that lay beyond. So important was this concept that Englishman Francis Bacon, often regarded as the father of modern science, included the pillars on the frontispiece of his important 1620 work *Instauratio Magna* (Great Renewal) (Figure 6). At the base of the depiction is a Latin passage that in English reads “Many will pass through and knowledge will be greater”. Thus, the meaning of the pillars transformed from being a marker of an edge to a gateway to a New World of knowledge, opportunity, and prosperity.

Spain had claimed the New World as theirs and thus it was important for them to incorporate the pillars into their symbol system. Because Spanish coinage was being used throughout the New World as well as international trade markets, it was an important opportunity to send an important symbolic message regarding Spain’s relationship and claims to the New World. On the back of the Milled Pillar Type (see Figure 1) two “worlds”

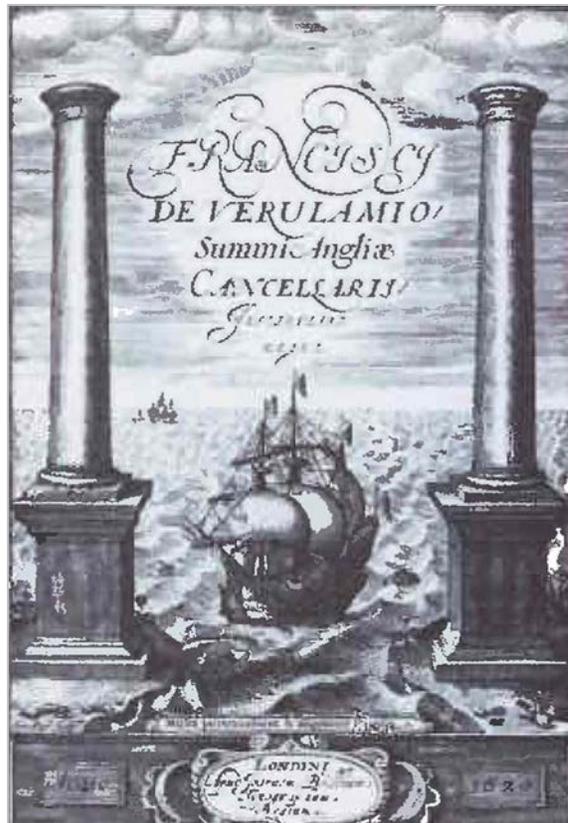


Figure 6. Frontispiece of *Instauratio Magna* by Francis Bacon.

are depicted between the pillars. One is the Old World the other the New. On the top border is the Latin motto “Ultra Que Unum” meaning both are one, a statement that the New World is part of Spain.

Macuquina or “Cob” coins

The coins of this type are frequently referred to as ‘cob’ coins. The overwhelming majority of these are irregular in shape due to the way they were made (Sedwick 1995). To make these coins a chunk of silver or gold was clipped off a bar. The piece was then trimmed to the proper weight and then hand struck between two dies. These were made in Spain as well as Spanish mints in Mexico, Columbia, and Peru. The silver cobs were various denominations of reales including 8,4,2,1 and sometimes fractions. The gold cobs were known as escudos. Sixteen reales equaled one escudo. It is the two escudo coin or “double” that gave rise to the term “doubloon” which eventually was used to describe any gold coin. The cob



Figure 7. Spanish 8 Reale “Dollar” or “Piece of Eight” cut into 8 pieces.

coins were usually of either the Pillar and Waves (1651-1773) or Shield (1572-1734) types.

Conclusion

Spanish 8 reale coins were used around the world and became known as the “Spanish Dollar”. So popular was this unit of silver that many countries ultimately minted their own coins of the same size and silver content. These coins of various countries could then be freely exchanged 1 to 1 because of the same silver content. Examples include: US silver dollar; Britain 1 Crown; France 5 Francs; Belgium 5 Francs; Italy 5 Lire; El Salvador 1 Peso; Guatemala 1 Peso; Cuba 1 Peso; Dominican Republic 1 Peso; Mexico 1 Peso; Peru 1 Sol; Brazil 960 Reis; and others.

The Spanish 8 reale coin or “dollar” was sometimes cut into 8 pieces or bits (Figure 7). Thus, these coins were sometimes called “pieces of eight” and from this we get the expression 2 bits, 4 bits, 6 bits a dollar. So universal was the Spanish Dollar and its familiar two pillars and scroll (two lines over an S) that it became known the world over as the dollar sign.

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SECTION TWO: GENERAL RESEARCH PAPERS



a



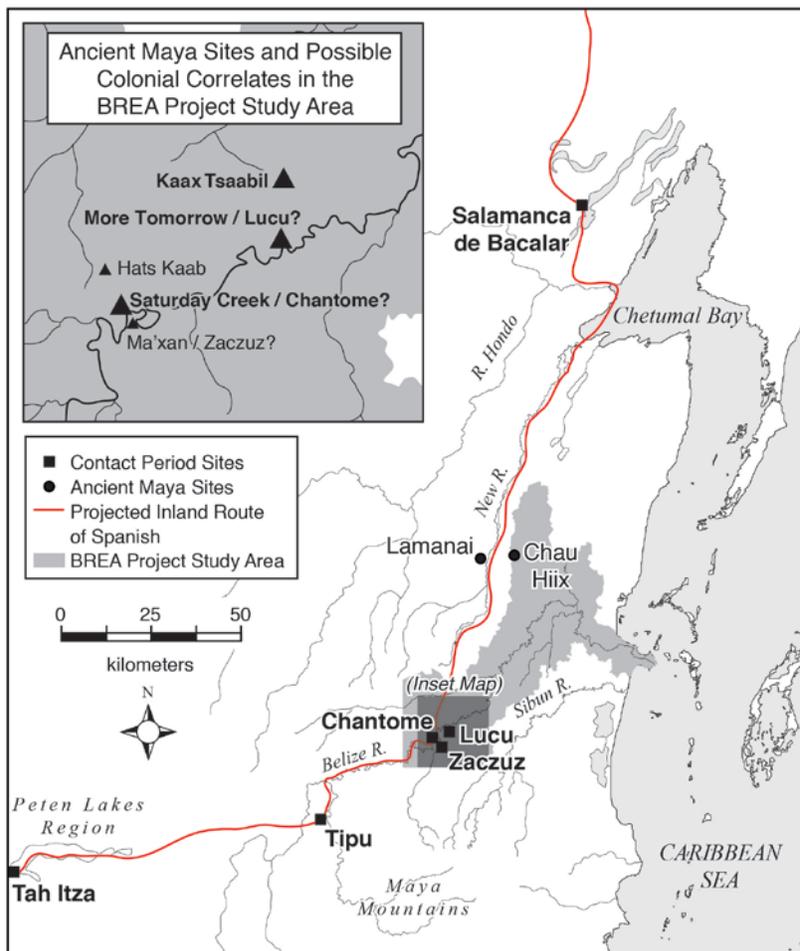
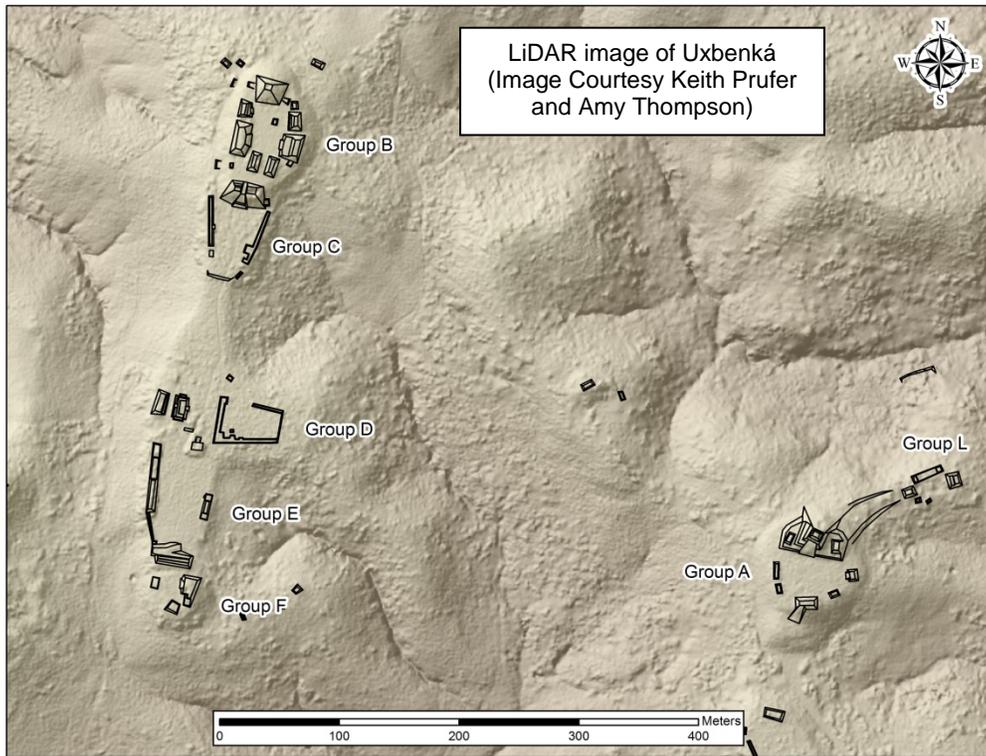
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c



Shell Gorget from Buenavista
(Images Courtesy Jason Yaeger)



18 TWO EARLY CLASSIC ELITE BURIALS FROM BUENAVISTA DEL CAYO, BELIZE

Jason Yaeger, M. Kathryn Brown, Christophe Helmke, Marc Zender, Bernadette Cap, Christie Kokel Rodriguez, and Sylvia Batty

Excavations at Buenavista del Cayo in 2014 revealed two elite burials in the site's Central Plaza. Both contained ceramic vessels dating to the Early Classic period. The upper burial was placed in a formal masonry chamber that was reentered in antiquity. Most of the contents were removed at that time, and the chamber was refilled. The elaborate architecture coupled with the presence of small bone fragments, *Spondylus* shell beads, and small pieces from mosaic jewelry suggest that the tomb originally contained an important person(s), perhaps royalty. Below this chamber was an elaborate crypt that was discovered intact. The individual interred therein was buried head to the south. The crypt's contents included several ceramic vessels, including a slab-footed tripod vase with lid and a basal flange dish. The individual was laid to rest with an assemblage of marine shell jewelry, including an elaborate marine shell gorget decorated with a bas-relief carving of the head of an ancestor and an incised name tag text. The latter identifies the owner as the *ajaw* ('king, lord') of a place called Kokom, also known as the Dotted Ko place. These discoveries allow us to conclude that (a) Buenavista is ancient Kokom, (b) it was the seat of a royal dynasty, and (c) it was embroiled in military conflict with nearby Naranjo.

Introduction

The upper Belize River valley (Figure 1) was one of the regions in the Maya Lowlands that witnessed the early development of sociopolitical complexity. The presence of three-tier settlement hierarchies, monumental architecture including E-Groups and triadic complexes as tall as 28 meters, and carved stelae all suggest a high degree of political complexity by end of the Late Preclassic period at sites across the region, including Blackman Eddy, Cahal Pech, Actuncan, Pacbitun, and Xunantunich (Brown et al. in press).

These material indicators of sociopolitical complexity suggest the presence of powerful rulers whose authority derived in large part from institutions of divine kingship. In light of that, the paucity of royal burials in the upper Belize River valley dating to the Late Preclassic and Early Classic periods is striking. Although Late and Terminal Classic high status interments identified as likely royal burials have been discovered at Blackman Eddy (Garber et al. 2004), Baking Pot (Audet 2006), Cahal Pech (Awe 2013), Buenavista (Helmke et al. 2008), Pacbitun (Healy et al. 2004), and Xunantunich (Audet 2006), their Early Classic equivalents are much rarer. Early Classic royal burials have recently been documented at Cahal Pech (Awe 2013), suggesting that the larger centers in the Belize valley may have also achieved centralized authority and political complexity by this time (also Helmke and Awe 2012). Indeed, a recent

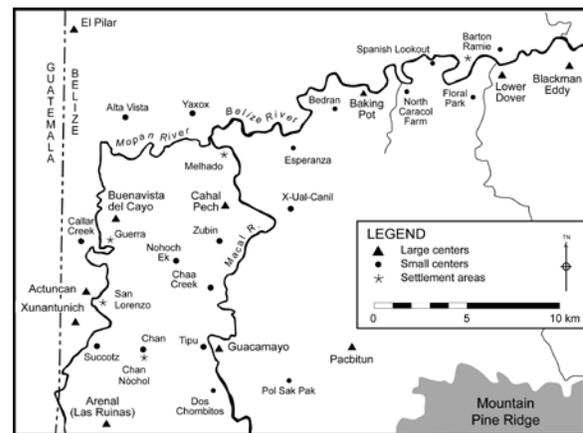


Figure 1. The upper Belize River valley, showing sites mentioned in the text.

Late Preclassic burial chamber found within the E-Group at Xunantunich Group E suggests the advent of kingship prior to the Early Classic period (Brown 2013).

Our 2014 excavations in the Central Plaza of Buenavista del Cayo (hereafter Buenavista) recovered two burials that we argue held important individuals, likely members of the polity's royal family, thus adding to the corpus of early royal burials in the Belize River valley. A carved shell pectoral in one of the burials bears a name tag text that includes an Emblem Glyph allows us to identify the archaeological site of Buenavista with the ancient polity of Kokom, which allows us to place Buenavista into the larger regional history as revealed by the epigraphic record.

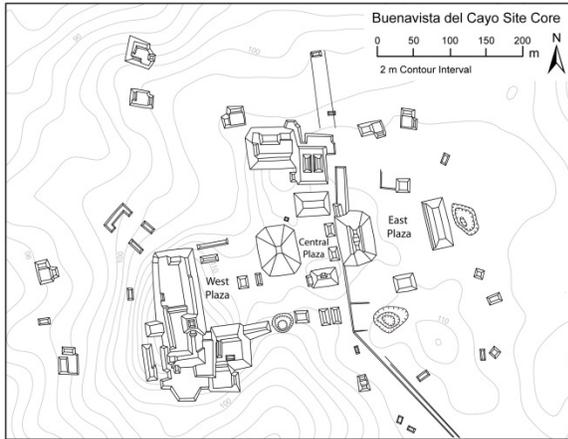


Figure 2. Buenavista del Cayo.

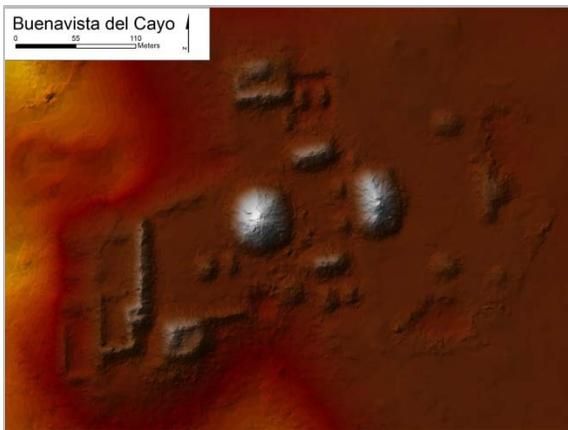


Figure 3. Buenavista del Cayo, DEM derived from LiDAR.

2014 Excavations of the Central Plaza (Operation 384)

Buenavista's Central Plaza sits at the heart of the site (Figure 2, Figure 3). Although it is the smallest of the site's plazas, it is framed by the two tallest structures, the pyramidal Structures 1 and 3, which rise 21 m and 17 m above the plaza's surface respectively. The presence of these structures and several stelae documented by Joseph Ball and Jennifer Taschek (2004) suggest that the Central Plaza was the most ceremonially charged public space at Buenavista.

Christie Kokel Rodriguez supervised Operation 384 in the Central Plaza. These excavations had the goals of defining the plaza's chronology and identifying deposits related to ritual feasting activities in the plaza. Our excavations began with a 2 m by 2 m unit that was placed approximately 8 m west of the base



Figure 4. Feature 384-1.

of Structure 3 along the structure's central axis. Because this unit revealed no deposits on the plaza surface, we extended the excavations westward with another 2 m by 2 m unit. In this unit, we encountered the northern portion of a masonry chamber. This chamber was labelled Feature 384-1.

Feature 384-1

Feature 384-1 was a four-sided masonry chamber oriented north-south and measuring 1.1 m by 2.5 m. It was faced with cut limestone blocks that were roughly coursed and spaced with chinking stones. The walls are preserved up to a height of 90 cm (Figure 4 and Figure 5). Our excavations revealed no evidence of a roof or vault.

As we excavated the interior of Feature 384-1, it became clear that the feature was a tomb that had been re-entered and refilled in antiquity. The chamber contained a light grey matrix that was relatively loose. This fill comprised of thousands of chert flakes, many of them late-stage reduction flakes and thinning flakes. The ancient Maya often covered high status burials with a dense layer of chert or



Figure 5. Features 384-1 and 384-2.

obsidian flakes (Coe 1988), a practice that extended into the Belize valley at sites like Baking Pot (Audet 2006). In the case of Feature 384-1, however, the flakes were not in a dense layer over the chamber, but interspersed throughout the fill, leading us to infer that a dense capping layer of chert flakes was removed when the tomb was entered and then redeposited when it was refilled. The fill also contained some large ceramic sherds that refit, apparently the fragments of vessels broken during the re-entry. The fill in the center of the chamber was looser, and there was a concentration of limestone rubble near the center in the upper levels of the fill. This suggests to us that the fill of the chamber settled sometime after deposition, either because of compaction or because the crypt below it collapsed. Regardless, the Maya filled in the depression that this collapse created with limestone rubble to level off the Central Plaza.

We did not find a formal plastered surface to mark the base of Feature 384-1, but the bottom of the chamber was clearly demarcated by scattered artifacts that sat in a loose, sascabrich matrix (Figure 4). These were mapped and collected as multiple concentrations. The upper concentrations were comprised mostly of large ceramic sherds, including fragments of basal flanged Balanza Black vessels dating to the Early Classic (Tzakol III) period. The many refits suggest that these sherds were the broken and scattered fragments of vessels that were originally placed in the burial. We also found many smaller artifacts that were not removed when the tomb was re-entered, possibly because they were trampled into the matrix at the base of

the tomb. These included nearly two dozen marine shell beads and other marine shell artifacts, including several crafted from *Spondylus*. We also found several very small, sub-centimeter fragments of jade and ferrous mineral that likely once comprised part of one or more mosaic objects, likely jewelry worn by the occupant(s). We also found scattered bone fragments, suggesting the body (or bodies) had undergone significant decomposition of the muscles and connective tissue prior to disinterment.

The indications of mosaic jewelry and the *Spondylus* beads suggest that the burial in the tomb was a wealthy person, an inference supported by the large masonry chamber and the presence of the thousands of chert flakes. These latter two observations are consistent with our expectations for a royal tomb. The vessels indicate an Early Classic date for the burial. Unfortunately, we have no way of securely dating the re-entry and removal of the individual(s) buried in the chamber, but the careful infilling of the chamber after the disinterment suggests that it occurred while the plaza was still being actively used, probably during the Late Classic period.

The basal courses of the walls of Feature 384-1 sit on a stratum of red clay (10YR5/6) with brownish yellow and dark clay mottles at the top of the stratum (visible in Figure 5). We found very few artifacts in this clay stratum, with one notable exception being a Middle Preclassic figurine head. We believe this represents the ancient ground surface upon which the plaza and chamber was built, although without further excavations, we cannot rule out the possibility that this is a sterile layer of clay fill.

Feature 384-2

Below the west wall of Feature 384-1, we encountered another feature, Feature 384-2 (Figure 5). This feature was an elaborate crypt. Its sides were made using limestone slabs that were set vertically. It was roofed with a simple vault and topped large slab capstones that ran perpendicular to the crypt's axis. The clay stratum mentioned above surrounds the feature, and the presence of light grey matrix along the exterior of the crypt walls, separating the crypt

from the surrounding clay, indicates that the crypt was placed into a pit that had been excavated into the clay.

Removal of the crypt's roof revealed the remains of a poorly preserved individual who was placed head to the south, as is typical in the upper Belize River valley (Figure 6). The individual was buried with five ceramic vessels, an assemblage of marine shell jewellery, three small pieces of jade, and several small pieces of poorly preserved ferrous mineral, perhaps pyrite.

The bones of the individual, the associated artifacts, and the architecture of the crypt itself were very badly disturbed. Soil movement, likely caused by swelling of the surrounding clay stratum when it became saturated with water, had pushed against many of the slabs that formed the edges of the crypt, forcing them inward, particularly along the crypt's west side. This compressed the crypt's contents and pushed them upward, fragmenting the bones and many of the artifacts. The postdepositional displacement was so extreme that fragments of the cranium were found on top of one of the stone slabs that formed the edge of the crypt, and one of the ceramic vessels was broken into over 70 pieces.

As a result of the high degree of fragmentation, the bones were very poorly preserved. Because the remains have not been subjected to formal bioarchaeological analysis yet, we do not have data for inferring the age or sex of the individual. Through careful excavation, we were able to infer that this was a primary burial, and that the individual was laid to rest head to the south. Unexpectedly, one of the individual's legs was displaced medially approximately 20 cm. We believe that this displacement was the result of the aforementioned soil movement shifting half of the pelvis southward. We further infer that this happened shortly after the individual was buried, given that the bones around the knee joint were still found in articulated position and the bones of both feet were found where expected.

A Pucate Brown basal flange dish was placed near the person's torso, just west of the body, and four additional vessels were placed near the individual's lower legs. Three miniature vessels were placed west of the legs,



Figure 6. Feature 384-2.

and an elaborate Balanza group slab-footed tripod bowl with lid was placed just east of the legs. The bowl was decorated with two rows of applied cacao beans encircling the vessel near the basal break. Its lid had two panels incised with *pop* mat designs and a central handle in the form of a modelled effigy head of a monkey. There were no preserved contents in the bowl, which was highly fragmented, like the rest of the assemblage. The vessels are typical of Tzakol III of the Early Classic period, probably, dating to around AD 375-450.

The other objects laid to rest with this individual comprise a remarkable assemblage of marine shell jewelry that, given its association with the skeleton, was likely being worn at the time of burial. On either side of the skull we recovered a composite earflare, each consisting of four pieces of marine shell still articulated in situ: a rectangular panel, likely of conch, measuring 5.5 cm by 3.5 cm; followed by two interior rings, each approximately 3.5 cm in diameter; topped off with a flaring flange of *Spondylus* some 6.5 cm across. A *Spondylus* shell with two holes was also found near the shoulder, perhaps also an object of personal adornment.

More marine shell objects were placed around the ankles. These included two shell adornos carved into 8-pointed stars; two composite objects that resemble the pistil of a flower, presumably the interior elements of a floral earflare set; five marine shell disks, approximately 6 cm in diameter; several other pieces of worked marine shell; and a perforated *Neprhonais* shell.

The Shell Gorget

The most elaborate piece of shell jewelry was a carved shell gorget, measuring 13 cm by 9 cm (Figure 7 and Figure 8). It was found on the individual's chest as if it had been suspended from the neck (visible in Figure 6). The modification of the shell is so great that few landmarks or diagnostic indicators are left, making it difficult to assess the species.

The concave side of the gorget has two distinct sections, a short text comprised of five incised glyphs on one side and a bas-relief carved portrait on the other (Figure 9). Two biconically drilled holes served to suspend the gorget. The location of the holes indicates that the text was on the upper half of the object and the portrait on the lower half, and the fact that the holes interrupt the lines of two glyphs suggests that they were drilled after the text was carved. The margin of the gorget is crenellated with 10 notches. On the convex side, the 10 tabs each bear a stylized incised design that appears to be a stylized monkey face in profile.

The text on the gorget is in the name tag genre. The first glyph block names the object with a *k'an* cross glyph, the logogram **K'AN**. We can reconstruct the gloss of *k'an* as 'gorget,' based on a series of entries in dictionaries of 16th-century Yukatek compiled in the *Cordemex Dictionary* (Barrera Vásquez 1980: 378). Among these entries, we find glosses such as 'necklace' and 'collar,' as well as 'neck ornament' and even 'yellow shell' (see Yaeger et al. n.d.).

The logogram for **K'AN** is preceded by two dots that appear to record an unusual variant of the phonogram **u**, providing the third-person possessive pronoun. It is followed by four glyph blocks that form the nominal string designating the name and title of the original owner or patron of the gorget, as is the norm with name tags. As we discuss in more depth elsewhere (Yaeger et al. n.d.), the next two glyphs form the name Naah Uti' K'ab.

The last two glyphs in the nominal phrase form a title. The final glyph is a rather typical Early Classic **AJAW** logogram, which is glossed as 'king, lord.' In combination with the glyph block that precedes it, it forms a so-called "problematic" Emblem Glyph (Houston 1986) because the *k'uhul* prefix is missing, as is



Figure 7. Shell gorget.

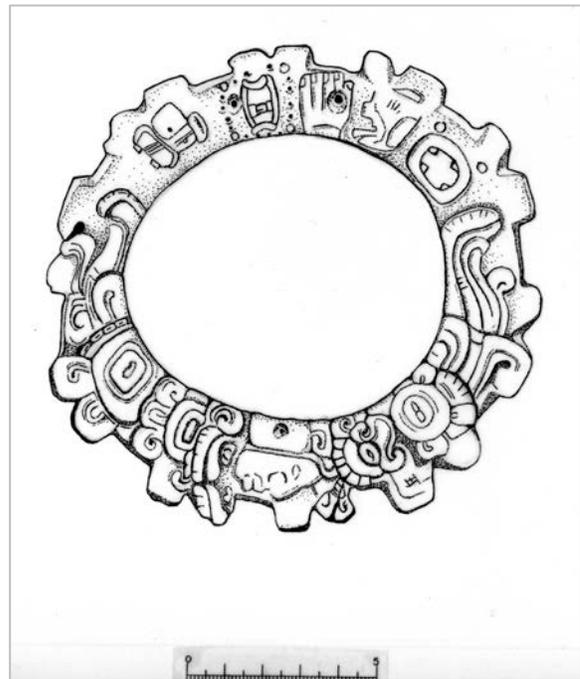


Figure 8. Shell gorget. Drawing by Margaret Greco.

common in Early Classic Emblem glyphs. Given this reading, the preceding glyph denotes the domain ruled by the *ajaw*, or at the very least, the name of the royal house. The main sign of that glyph is a turtle carapace encircled by a series of dots, of which those in the corner are larger. We interpret the turtle carapace as an early variant of the more common **ko**

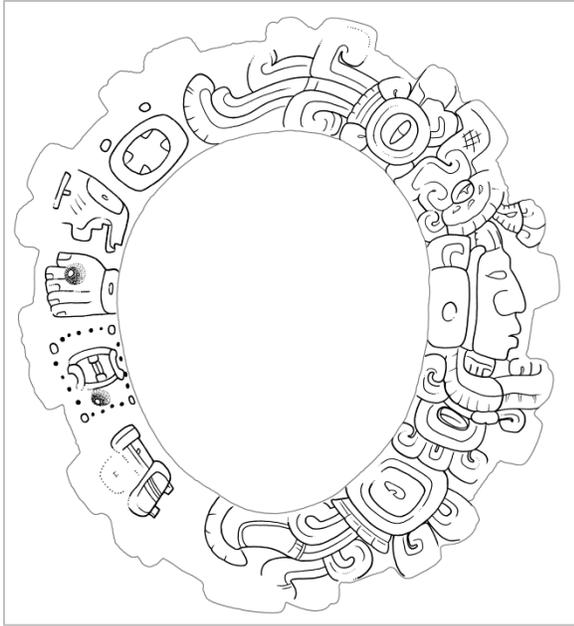


Figure 9. Text and image on the shell gorget. Drawing by Christophe Helmke.

phonogram, infixed within an unusual allograph of the **mo** phonogram. If this interpretation is correct, the complete title would be read *kom ajaw*, or ‘King of Kom’. Given attested patterns of sign abbreviation in Mayan writing, this same spelling would be read *kokom ajaw*, *komom ajaw*, and even *komkom ajaw* (see Zender 1999: 130-142 and 2014). For reasons elaborated elsewhere, we read this glyph as *Kokom* (Yaeger et al. n.d) and argue that it is the same place referred to in Late Classic texts from the region as the “Dotted Ko” place (Ball 1993: Fig. 7; Houston et al. 1992).

Our paleographic analysis of the text reveals that this particular representation of the **AJAW** logogram is consistent with examples dated to between AD 379 and 625 (Lacadena 1995: 119-123, 195-200, 202-203; Helmke and Nielsen 2013: 137, 150, 154-155), and based on current evidence, this form of the **K’AN** logogram dates to after AD 475 and before 633 (see Lacadena 1995: 291, Fig. 6.4).

The central motif, an ancestral head in profile looking downward, is well known from a range of gorgets similar to this one and also from the Early Classic stelae of Tikal, including Stelae 4, 29, and 31 (Jones and Satterthwaite 1982). It also makes an appearance on Stela 45 at Naranjo (Tokovinine and Fialko 2007). These

monuments date to between AD 292 and 445, and the presence of a small crescent-shaped element among the regalia of the figure on the gorget suggests that the iconography dates to the earlier part of this time range.

Given these stylistic dates, we are left with two possible scenarios for the creation of the gorget. In the first scenario, the imagery was carved first—perhaps as early as the late 3rd century AD—and the text was added later, sometime after *ca.* AD 475, based on the style of the **K’AN** logogram. We believe it is more likely, however, that the text and imagery were carved together, sometime around *ca.* AD 450. The lidded tripod bowl and the basal flange dish found in the crypt are typical of Tzakol III and therefore suggest a date between *ca.* AD 375 and 500, which generally agrees with the stylistic and paleographic analyses.

The Dotted Ko Place as Buenavista

As mentioned above, the text on the shell gorget names a place we read as *Kokom* and equate with the previously identified Dotted Ko toponym. This place was first identified on sherds from a Late Classic Chinos Black-on-cream vase recovered at Buenavista by Joseph Ball and Jennifer Taschek (Figure 10a). The text records the title of the original owner of the vase, and it includes a toponym that was nicknamed the “Dotted Ko” place, spelled **[ko]mo-[ko]mo** (Ball 1993: Fig. 7; Houston et al. 1992: Fig. 14; see Figure 12a). The vase was likely produced in workshops tied to the royal court of Naranjo. An unprovenienced black-on-orange bowl (K2730) bears a text that names an individual bearing the Dotted Ko title that is said to be within *elk’in huk tzuk*, ‘the eastern seven province’ (Figure 10b), confirming that the Dotted Ko place—that is, *Kokom*—was in the greater Naranjo area (see Beliaev 2000; Helmke et al. 2011; see Figure 12b).

Inscriptions from Naranjo provide some more details about the relationship between Naranjo and *Kokom*. Stela 22 includes an account of the military exploits of Naranjo’s ruler, K’ahk’ Tiliw Chan Chaahk, noting that he burned *Kokom* on 27 March 696 (Schele and Freidel 1990: 188-189; Martin and Grube 2000: 76; Grube and Martin 2004: II.44; Helmke and Kettunen 2011: 42; see Figure 10c), and a few

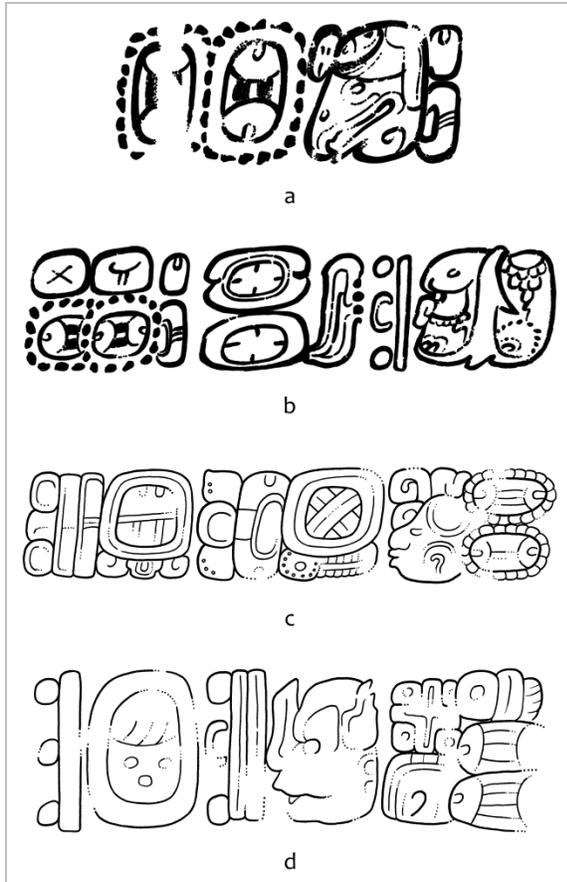


Figure 10. Citations of the Dotted Ko Place, after Yaeger et al. n.d.

decades later, he subjugated the site, as indicated by a Star War event on 20 April 726 recorded on Stela 18 (Grube and Martin 2004: II.58; Helmke and Kettunen 2011: 63; see Figure 10d).

These facts led David Stuart and Stephen Houston to suggest that the Dotted Ko place might have been located “somewhere between Naranjo and the Belizean border, if not into Belize itself” (Stuart and Houston 1994:56), further stating that “[i]t is tempting to identify this place as Buenavista or its environs, although it could also be a site in Guatemala. Present evidence is insufficient to prove either hypothesis” (Houston et al. 1992:118).

The name tag on the shell gorget strongly supports the former hypothesis, that modern Buenavista del Cayo is ancient Kokom. One can postulate multiple scenarios to account for the presence of the shell gorget in the burial. For example, the gorget could have been made for somebody else and sent to Buenavista as a gift,

much the way we believe the Buenavista Vase—which bears the Naranjo emblem glyph in a phrase naming the vase as the personal drinking vessel of K’ahk’ Tiliw Chan Chaahk—was gifted to the rulers of Buenavista as part of Naranjo’s efforts to build and maintain an alliance with Buenavista (Houston et al. 1992; Reents-Budet 1994; Taschek and Ball 1992). We see this as improbable, however. Royal possessions like the Buenavista Vase were certainly given as gifts, and their value was enhanced when they bore a text naming their original royal owner, but we find it highly unlikely that an item of royal regalia like the shell gorget would be given as a gift.

As another alternative, the shell gorget could have been taken as a trophy of conquest and buried with the victorious ruler of Buenavista. This is one scenario hypothesized for the presence of the jade gorget found in Nakum Burial 1, which bears a name tag that may refer to the king of Yaxha. In this case, however, the text is several centuries older than the object, and it is also possible that Nakum and Yaxha were once ruled by the same dynasty (Žračka et al. 2011). We cannot discount that the shell gorget arrived at Buenavista as a trophy, but we find it unlikely as well, particularly given the near contemporaneity of the gorget’s carving style and the burial in which it was placed.

Instead, given the shell gorget’s discovery in situ in an elite burial, and the approximate contemporaneity of the carving and the burial, we feel that the parsimonious interpretation is that the shell gorget was made for the individual interred in the burial. If so, the buried individual is Naah Uti’ K’ab, and Kokom refers to Buenavista. This inference would be strengthened, of course, by the discovery at Buenavista of a reference on a less portable object, such as a stone monument or a mural painting.

Independent archaeological evidence from Buenavista is consistent with the warfare events recorded in Naranjo’s inscriptions, adding weight to the conclusion that Buenavista and Kokom are the same place. In 2011 and 2012, the Mopan Valley Archaeological Project targeted Structure 40 for excavation. Structure 40 is an ancillary structure associated with the royal palace that lies on far western edge of the

site core. We placed a total of 13 excavation units on Structure 40, exposing 48 square meters (described in more depth in Yaeger et al. 2013).

The final version of Structure 40 showed evidence of heavy burning. The superstructure of Structure 40-1st was poorly preserved, but we could determine that it had rooms demarcated by low walls of limestone blocks that supported a pole and thatch building. We recovered fired daub and large amounts of ash and charcoal directly on top of the building's final plastered floor, several centimeters thick in some places. An earlier version of the superstructure also showed signs of burning. The evidence of burning, its position in the stratigraphy, and the paucity of limestone blocks all led us to conclude that both identified subphases of Structure 40-1st burned and then were partially dismantled. We found evidence of burning on other architectural surfaces that were exposed in the building's final phase, including the masonry facing on the east and west side of its substructure. Several nearly complete vessels found intermixed in the ashy lens inside the building included a nearly complete Mount Maloney Black bowl with a lip form diagnostic of the Late Classic II period (the Hats' Chaak period, dated to AD 670-780 at Xunantunich [LeCount et al. 2002]). While we cannot date archaeological events like these burning episodes as precisely as we can date events recorded in the epigraphy, it bears noting the presence of two closely-spaced burning events that occurred during the same time frame as the burning and later sacking of Kokom by Naranjo as recorded on the latter site's monuments.

Conclusions

The discoveries of Features 384-1 and 384-2 at Buenavista and the analysis of their contents yield several important implications for the history and political dynamics of the upper Belize River valley.

First, they indicate that Buenavista was the seat of a royal dynasty beginning in the Early Classic period. This conclusion is supported, in part, by the two burials excavated in the Central Plaza. Feature 384-1 was a large, formal chamber capped with a layer of thousands of chert flakes, as is typical of royal burials. Furthermore, the contents recovered from the

base of the chamber suggest it once held a rich burial, although the fact that it was re-entered by the Classic Maya and the contents removed leaves us unable to be certain that it originally held a royal burial. It is clear that the later inhabitants of Buenavista remembered the location of this tomb and reverentially removed the individual(s) and carefully refilled the chamber. This act of ancestor veneration suggests that an important person, plausibly of royal status, was laid to rest at this location.

Feature 384-2 lacked the elaborate architecture of a royal tomb and the layer of chert flakes. However, it did contain a marine shell gorget with a text that named its owner or patron as an *ajaw*, and it contained a ceramic vessel incised with the *pop* mat, a symbol of rulership.

If we accept the parsimonious inference that the shell gorget in this lower burial was carved for a ruler of Buenavista, we come to two important conclusions. First, the rulers of Buenavista were divine kings who used an Emblem Glyph title and derived their authority in part from their descent from deified ancestors like the one depicted on the gorget. In other words, Buenavista was ruled by a royal dynasty.

Second, the toponym that precedes the word *ajaw* in the Emblem Glyph refers to Buenavista. As we have argued in detail elsewhere (Yaeger et al. n.d.), we believe this glyph is an early variant of the Dotted Ko toponym, which we read Kokom. Regardless of the reading, if this is an alternative way of writing the Dotted Ko place, we can now place Buenavista into the region's political history.

In particular, we can conclude that Buenavista sometimes formed part of Naranjo's domain. Given that the Early Classic lords of Buenavista proclaimed themselves as rulers of an autonomous polity—at least nominally—through the use of an Emblem Glyph, it seems likely that Buenavista was founded and grew first as an independent polity. It was increasingly entangled in the political machinations of nearby Naranjo, however, as that center grew and competed with Caracol (Helmke and Awe 2012). The statement that the Dotted Ko place was within *elk'in huk tzuk*, suggests that the rulers of Naranjo—K'ak' Tiliw Chan Chaahk in particular—sought to maintain

Buenavista as part of their broader dominion. The fact that Buenavista was burned by Naranjo in AD 696 and then sacked in AD 726 suggests that Buenavista's rulers did not offer unflinching loyalty to Naranjo, however, and that their fealty had to be imposed by force of arms. K'ak' Tiliw Chan Chaahk's strategy for subjugating the site of Ucanal was apparently equally complex, involving diplomacy and gifting on the one hand and conquest on the other (Houston et al. 1992). While additional excavations promise to reveal more details regarding Buenavista's political history and its relationship with Naranjo and other nearby polities, it seems that Buenavista—much like Xunantunich (LeCount and Yaeger 2010) and perhaps other centers in the valley (Helmke and Awe 2012)—oscillated between autonomy and subordination as it was impacted by and in turn shaped the political strategies of the rulers of Naranjo.

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19 THE SOCIAL LIVES OF STRUCTURES: RITUAL RESIGNIFICATION OF THE CULTURAL LANDSCAPE AT ACTUNCAN, BELIZE

Borislava Simova, David W. Mixter and Lisa J. LeCount

Across the Maya Lowlands, dedication ritual served a vital role in endowing public and private structures with meaning and function. Through ritual, structures acquired the soul-force, or *k'ulel*, necessary to sustain activity within their walls. However, we suggest that ritual could also actively reinvent places within the cultural landscape. In fact, many structures live several ritual lives: the first associated with their original intended function, and subsequent ones associated with changes in their occupational history, particularly after they are abandoned. As such, the cultural landscape of a Maya city is constantly cast and recast as the cultural associations of its constituent parts are actively modified through ritual. The resignification of past cultural landscapes may be seen archaeologically in the adoption of new ritual patterns within old structures, aimed at challenging or extending meanings of durable structures within a shared language of ritual. Analyses of structure histories and veneration practices from three areas of the site of Actuncan, including an elite residential structure, a palace compound, and the plaza of the triadic temple group, elucidate how changing veneration practices modify Actuncan's cultural landscape from Classic period rule of divine kings to the post-royal occupation of the Terminal Classic period.

Introduction

Ritual plays an essential role in a Maya structure's life-cycle, particularly in imbuing it with the life force, or *k'ulel*, necessary to sustain activities within its walls. Ritual could also scatter or refocus this energy to kill or change the qualities of the life force to match the structure's changing function (Mock 1998). Many structures live (at least) two ritual lives: one associated with their original intended function, and a second following a change in occupational status, particularly after a hiatus or complete abandonment. Through the ritual reinvention of structures, the cultural landscape of a Maya city is constantly cast and recast as the cultural associations of its constituent parts are actively modified over time. We consider three loci of ceremonial activities across the site of Actuncan, Belize (Figure 1), and how the material remains of rituals at each speaks to the manipulation of structures' animating forces in concert with shifting uses of those spaces. These areas include an elite residential structure, Structure 73, a palace compound consisting of Structure 19 and Group 8, and the plaza of a triadic temple group, Plaza A (Figure 2). We elucidate how the changing nature of ritual practices at structures played an important role in the resignification of Actuncan's cultural landscape during the transition from the Classic Period rule of divine kings to the post-royal occupation of the Terminal Classic period.

In this article we examine ritual as a means of signification and resignification. As a

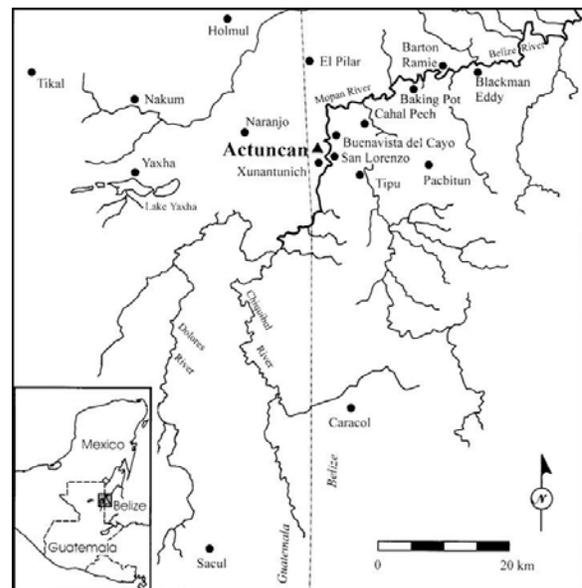


Figure 1. Location of Actuncan within the Mopan River Valley (LeCount 2004: Figure 1).

patterned practice set apart from daily activity through form and content, ritual engages supernatural forces to affect change in the natural world. Maya spaces are given meaning as places of cultural and social significance and as animate beings with their own soul-force through ritual dedication. Animation is maintained and augmented through continued ritual investment in the location (Schele and Mathews 1998). Houses, temples, and civic structures are thus endowed with *k'ulel* by their dwellers or proprietors; however, just as structures can be brought to life, *k'ulel* can be

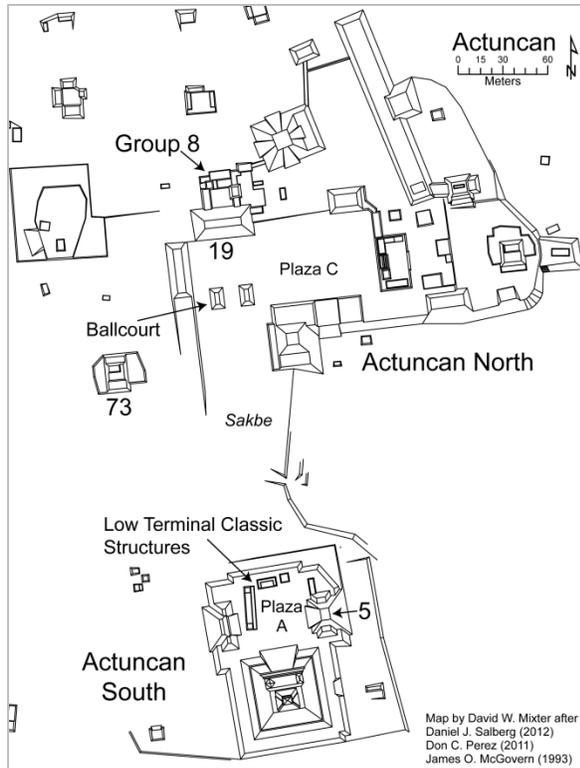


Figure 2. Map of Actuncan, Belize.

ritually killed or modified when structures are abandoned or their significance changed. Resignification is the process by which the formerly established importance of places is harnessed and reshaped to match the changing needs and values of the local populace. It involves recognition of the powerful spiritual and sociopolitical forces vested in places, as well as a conscious modification of their former meanings. In this paper, we specifically discuss the resignification of places once vested with exclusive royal and elite power into places empowered through shared authority and ceremony. Through this action, Actuncan's community was able to selectively incorporate vestiges of royal power from the site's apogee into a new post-royal civic order in the Terminal Classic period.

Structures, Ritual, and Resignification

The construction of place is an important component in the manifestation of political power, offering a durable index of labor and symbolic investment. The manipulation of landscapes for the advancement of political agendas is well-recognized within

Mesoamerican societies (Schortman and Urban 2011, Stockett 2010, Reese-Taylor and Koontz 2001). The ability of abandoned landscapes to be manipulated for political goals is a key tool in local processes of identity construction and social change (Yoffee 2007, Stanton and Magnoni 2008). Reuse of ruins can take multiple forms, ranging from recycling of construction material to revival of function. Reese-Taylor and Koontz (2001) suggest that activities and performances situated in a space contextualize its form and meaning. Ritual deposits, as a manifestation of the actions that construct a place's meaning, provide firm anchors into understanding diachronic shifts in the meaning of structures.

Here, we use the term resignification, understood in a linguistic sense as the attachment of new meanings to a sign, as a framework for examining ancient Maya ritual performances associated with prominent, long-lived structures. Judith Butler (1997) most notably uses resignification to mark the process in which the language of dominion is subverted through its use in new contexts that augment or contradict the established symbolic values of terms. Her approach highlights the use of language and semiotics in gender politics. Resignification offers an alternative to the development and use of new terms to describe novel social situations. Rather than carving out recognition and acceptance, new labels can marginalize a novel situation by excluding it from deep, culturally meaningful categories, especially if the latter remain unchallenged in the process. By contrast, resignification extends the use of existing symbolically loaded terms to new situations, in the process creating space to negotiate existing meanings. Inclusion of the novel situation under an existing term lets it partake in some of the values attributed to the term while challenging people to reevaluate the boundaries of its meaning.

If we view civic-ceremonial architecture as the prime signifier of a dominant discourse, the activities performed within them represent contemporary, politically accepted readings, interpretations, and applications of the architecture's meaning. The dominant, symbolic content of structures is something that must be negotiated over time, as the physically persistent

presence of buildings intersects with new social actors. The alteration of interaction with a space can be viewed as an attempt to extend the use of a signifier (structure) to new meanings as well as a challenge to the established values signified by the structure. Unlike demolition, in which the signification of buildings is rejected in its totality, ritual abandonment, effacement, and reuse offer an opportunity to engage with old meanings, enabling the resignification of the structures. In Butler's words, it is not "an efficacious insurrection nor a painful subordination," (Butler 1997:392). It is a discourse that engages the past to negotiate new meanings in the present. Due to the presence of the durable physical form, some aspect of the past symbolic form retains salience and, therefore, must be addressed in the process of establishing new social relationships with buildings and landscapes.

To approach the resignification of structures at Actuncan, we examine material traces of rituals performed in rooms and on platforms that were left exposed to the public for extended periods of time. These deposits are durable, spatially contained remains of the activities of past individuals or groups within the community. Their contents and style have communicative properties pertaining to a cohesive group aesthetic or understanding (Wobst 1977, Reese-Taylor and Koontz 2001). To the local community, these deposits represented the remains of familiar rituals applied to new contexts within old structures. As ceremonial acts engaging life forces, they provide a means of influencing the dominant discourse communicated by monumental, civic-ceremonial, or elite architecture.

Actuncan and the Setting of Ritual and Resignification

Actuncan is a ridge top site, located on the western bank of the Mopan River. A long lived site, Actuncan was originally occupied around 1000 B.C. and totally abandoned during the Early Postclassic period (A.D. 1000-1250) (McGovern 2004; LeCount and Blitz 2001, 2012; LeCount and Keller 2011; LeCount 2013). Actuncan was constructed in two parts over adjacent ridge tops. The primary ceremonial center, Actuncan South, was connected to the

civic and residential center, Actuncan North, by a monumental road, or *sakbe*. Markers such as large polychrome stucco masks, a carved stela featuring early iconography, and architectural complexes including a triadic temple group and E-Group point to the early adoption of divine kingship at the site during the Terminal Preclassic period (100 B.C. to A.D. 300).

In the fifth century A.D., construction of monumental architecture ceased and elite residences were abandoned, suggesting that the power situated in Actuncan began to falter. Instead, the nearby centers of Buenavista del Cayo and Xunantunich experienced construction booms and emerged as competing capitals in the valley. Over time, Xunantunich solidified its control over the region. By the end of the 8th century, Xunantunich's power began to wane, allowing for competing centers of authority to emerge. During the Terminal Classic period (A.D. 780-1000), as the rest of the valley experienced population declines, Actuncan's long-settled population witnessed the recentering of local power at the site (Mixter *et al.* 2014). This revitalization was marked by construction of a new civic center, Group 4 (LeCount *et al.* 2011), and the ritual resignification of various buildings to fit a new post-divine model of authority.

In this paper, we focus on architectural changes and ritual deposits at structures that were implicated in the restructuring of Actuncan's political landscape, specifically those located along the site's only *sakbe*, a critical location for processional ritual during Actuncan's apogee from the Late Preclassic to Early Classic periods. During this long span of local divine rule, Structure 19, the largest range structure at the heart of Actuncan's civic-ceremonial center, was a setting of public ritual enactment. It is from this location that ritual processions likely emerged, making their way to the triadic temple group of Actuncan South, which was the most prominent and oldest symbol of kingly power. Moving along the *sakbe* toward the raised triadic temple, these processions would have passed through Plaza C and the site's only ballcourt. Upon arriving in Plaza A, the towering triadic temple fronted by stelae and at least one altar, would have loomed over the procession. To the east, Structure 5,

with its elaborate plaster polychrome masks depicting Maya deities and cosmologies, would have offered a reminder of the royal ancestral lines. The plaza itself bore witness to long-standing ceremonies in which internments of objects and ancestors served to ensoul the great buildings and solidify the power of local kings (Becker 1992). Even Structure 73, a large elite house, is implicated in the spectacle of regal processions, due to its proximity to the *sakbe*, prominent position between the two sections of the site, and elevated domestic status during this time. With the decline of local, divine rulership in the Late and Terminal Classic periods, these vestiges of royal power were engaged through ritual in new ways, harnessing their life forces toward new community roles.

Locations with Meaning

Structure 73- An Elite Residence

To understand how ritual plays into this transformation of the landscape, we examined its remains, placing its form and contents — primarily dense deposits of fragmented ceramics and ornaments — in the context of social interactions with the structures. The first structure considered is Structure 73, which as mentioned above, is located in a prime location between Actuncan North and Actuncan South, a few meters from the *sakbe*. It has a long and complex occupation history marked by several discreet episodes of ritual deposition. Testing and trench excavations in 2011 and 2013 have just begun to uncover its intricacies (Simova 2012, 2014). The earliest known structure was an imposing example of ashlar masonry with a massive apron molding, suggesting extensive elite investment in construction (Figure 3). By the Early Classic, this prominent structure was covered by an elite residence whose raised platform served to visually and physically distinguish and isolate the domestic activity space. In the Late Classic, the structure was expanded to its terminal form with a larger central platform, low terraces to each side and a small superstructure on the northwest corner of the central platform. Multiple burials were incorporated into the structure's fill indicating that ritual activities on the platform began assimilating members of the community beyond



Figure 3. South façade of Structure 73a and western wall of Structure 73b (right).

those associated with house ancestors. Perhaps in recognition of these burials, Terminal Classic activities following abandonment took an inclusive and reverential form, featuring repetitive community feasting events.

The earliest known ceremonial activity at the structure was an Early Classic termination deposit encountered in front of the terminal superstructure. This deposit rested on the thick marl surface of an early platform, part of which was left exposed for hundreds of years along with the termination deposit. Three hundred and sixty-two sherds, including a Teotihuacan style cylinder vase and basal flanged bowls, were examined from the test pit excavation of this deposit (Figure 4). Sherds were generally large and the ones from the upper levels of the deposit had highly eroded surfaces suggesting long exposure to the elements. What was most notable about the deposit was the presence of diverse vessel forms, some of which display irregular execution of standardized vessel



Figure 4. Ceramic deposit from the Early Classic termination of Structure 73.

shapes. Large bowls and jar rims and the footed vessel in particular indicate expedient production for ritual use and a desire to reproduce the forms of valued, finely crafted vessels (Simova 2013). Generally, termination deposits, which reference the ritual scattering of life forces, indicate a break with previous occupations and signal either the abandonment of the structure or new construction (Mock 1998). However, at Structure 73, occupation of the mound continued in an altered form while the Early Classic termination deposit was left exposed. By maintaining the visibility of this deposit through continued construction and acts of reverence, the Maya publicly reinforced the end of the building's function as a residence and perpetuated the resignification accomplished through new ritual acts. The treatment of the deposit therefore is integral in our understanding of the resignification of the structure in the Late Classic period.

Late Classic modifications to the platform include multiple fragmented and comingled human interments, exceeding the number of burials encountered in most residences at Actuncan. One comingled burial, Burial 15, occurred in a simple cist grave located within the fill just east of the structure midline. Burials 16, 17, and 19 also were found fragmented and disturbed within the fill matrix. Even though they lacked prepared graves, according to

Carolyn Freiwald they generally exhibit a consistent north-south orientation like that observed in Burial 15, with cranial fragments located to the south. Additional human bone fragments and teeth were encountered in small concentrations throughout the fill. Because of the high number of individuals found in the fill, we suggest that these burials represent a larger segment of the community than merely a single household. At Structure 73, the customary practice of incorporating burials and human remains in domestic structures may have been expanded to include a breadth of community members because of its prominent location near the *sakbe* and significance marked by the exposed Early Classic termination deposit.

After its role as a burial location broadened its import to the entire community, Structure 73 was transformed into a location for inclusive ceremonial activities in the Terminal Classic period. The last known activities centered on Structure 73 are evidenced by large quantities of artifacts recovered across the southern portion of the mound on top of collapse debris. The quantity and nature of the artifacts within these Terminal Classic deposits suggest to us repetitive ritual activities similar in form to ones encountered in other abandoned and collapsed public places, such as Structure 5 of Plaza A discussed below. Over 5,500 jutes were recovered just from the top of the stair collapse

as well as in between and over layers of collapse debris. Other evidence of feasting, including a *comal* rim and ground stone *mano* and *metate* fragments were found scattered over collapse across the mound. Exceptionally dense and varied chipped-stone tools and debris were also encountered, including abundant spear points (Figure 5).

These data evidence a revered and frequently engaged place with deep roots in the period of royal power. Structure 73's cultural meanings were resignified multiple times through repeated reengagement beginning with the Early Classic ritual termination event. After domestic activities were abandoned following this event, the space was resignified through Late Classic period interments that incorporated a larger group of stakeholders. Finally, the location was recast as an important ceremonial venue within the more communally-oriented Terminal Classic center.

Structure 19 and Group 8- A Royal Compound

The second locus of ceremonial activity we examine is the Late Classic ruler's compound, composed of Structure 19 and Group 8. Structure 19 is a long structure with multiple, linearly arranged rooms, that faces to the south and overlooks the ballcourt and *sakbe* (Figure 6b). Its initial construction dates to the Terminal Preclassic period, when it was built as a range structure to house civic and administrative functions. After a hiatus in use, it was modified in tandem with the construction of Group 8 into the residential compound for a vassal noble of nearby Xunantunich (Mixer *et al.* 2013). In its terminal form, a broad staircase likely led from Plaza C to five vaulted masonry rooms at the summit (Jamison 2012). The remains of the three eastern rooms were excavated in 2012. Each room was fronted by a single doorway and featured plastered wall blocks and a bench along the back wall. When the structure was abandoned, the roof vaults of Rooms 2 and 3 were torn down and their interior space was infilled and capped. In contrast, the easternmost room, Room 1, had no indication of infilling. It is in this room that a small termination deposit was found primarily banked up against the east edge of the bench, but also partially extending out to the front of the room.



Figure 5. Lithics from Structure 73-1st Terminal Classic deposits.

The material, consisting of ceramic fragments and one carved shell ornament, was covered only by a small amount of collapse and humus, and the ceramics encountered were fairly large, indicating primary deposition, but also generally poorly preserved. Proximity to the weathering plaster of the floor and bench resulted in a crusty white coating on some, while others acquired pockmarked surfaces from their exposure to the elements. Diagnostics from this deposit include several Belize Group, Mount Maloney bowl, and Alexander jar rims. There is no evidence that the Maya incorporated rare, exotic or otherwise exceptional ceramics in the termination of this structure.

The next indication of ritualized activity in this complex comes from Group 8, a multipatio residential group to the north of Structure 19 (Figure 6a). Group 8's construction in the Late Classic period marked the transformation of the range structure from a civic-ceremonial building during the site's apogee to the central building of a residential compound (Mixer and Freiwald 2012; Mixer *et al.* 2013). The ancillary group consists of eight structures arranged around three patios of various levels of

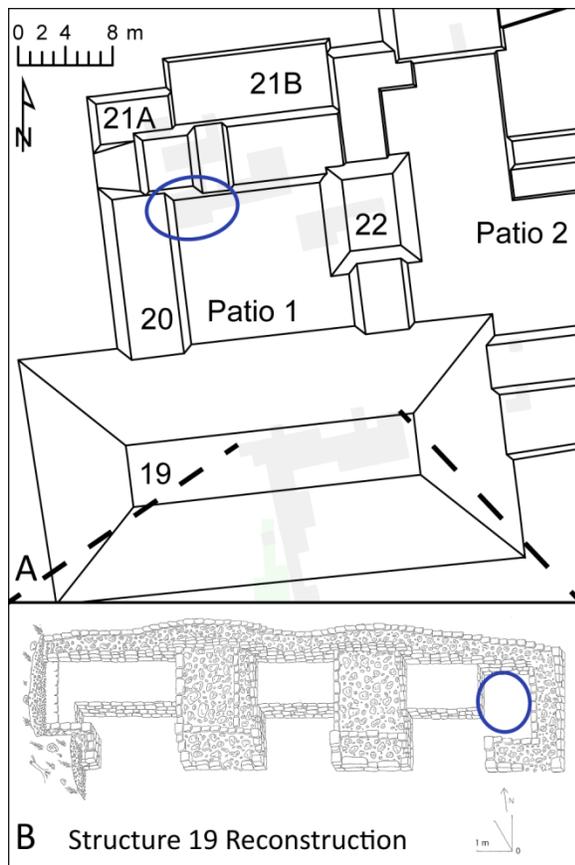


Figure 6. A) Map detailing the arrangement of Structure 19 and Patio 1 of Group 8. B) Axiomatic reconstruction of the excavated portion of Structure 19-1st. Drawn by Merle Alfaro (Mixter et al. 2013: Figure 5). The blue circles indicate the location of the deposits discussed in the text.

accessibility. Excavations into the uppermost enclosed patio, Patio 1, reveal a sequence of major structural modifications. First, a room located in the northwest corner of the patio was filled in, and a new building, Structure 21A, was constructed in its place. Structure 21A was dedicated and ensouled through the inclusion of a fragmented, incised limestone monument in the fill, giving a new meaning to the reimagined structure and residential group (Figure 7). In the Terminal Classic period, the compound was once again resignified as evidenced by a termination deposit at the foot of the subplatform in the northwest corner of the patio. Excavations in this area encountered a dense deposit of broken ceramics that were fairly large in size, with multiple mendable portions of large vessels suggesting *in situ* smashing (Figure 8a). Among the most numerous ceramic types identified are Mount Maloney bowls and jars,

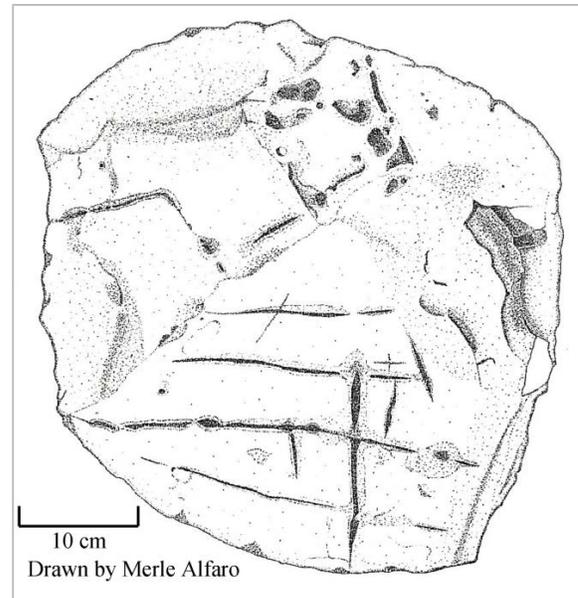


Figure 7. Drawing of the incised monument recovered from the fill of Str. 21A-1st in Group 8 (Mixter et al. 2013: Figure 9).

Alexander jars, and Belize Red incurving bowls. The most spectacular find was a halved, post-fire incised Belize Red ocarina (Figure 9). Besides ceramics, the deposit incorporated three *mano* fragments, obsidian, daub, some lithic material, and small amounts of slate. These materials were imbedded in light-colored clay sediment and many had limey accretions. The surfaces were eroded, but generally better preserved than those of the Structure 19 termination described above, suggesting they were exposed for a short period of time prior to the collapse of the surrounding buildings, Structures 20 and 21A.

In sum, Late Classic rituals at the palace compound centered on more exclusive and proprietary forms of interaction. In the course of constructing the compound, the residents planted a monument within its fill, creating animating forces and proprietary knowledge of the concealed deposit. When its function as an elite residence ended, the termination of the complex took a drastic form. The vaults of Structure 19 were torn down and the remaining walls were in-filled, except in the eastern-most Room 1, which was transformed into a lasting reminder of the ritual end of Structure 19's use as a ruling venue. Similarly, the deposit in Patio 1 publicly marked the abandonment of the associated residential compound. These forms of ritual engagement

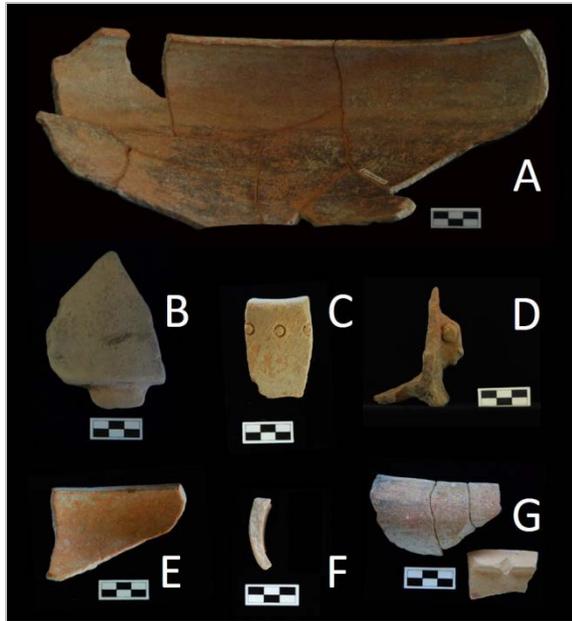


Figure 8. Terminal Classic diagnostics from Group 8 deposit; a, e-g) Mount Maloney incurving bowls, b) cylinder vase, c) reed stamped rim, d) censor fragment, g) McRae Impressed rim.



Figure 9. Post-fire incised Belize Red ocarina found in Group 8, Op. 24 Feature 1 (Modified after Mixter et al. 2013: Figure 7).

did not seek to reintegrate the palace compound into the Terminal Classic community, but instead signaled its enduring termination and precluded further veneration.

Plaza A- The Triadic Temple Plaza

The third and last locus of ceremonialism examined in this paper is Plaza A of Actuncan South (Figure 10). This plaza is situated within the triadic temple group that likely served as the site's primary center of royal authority and spectacle during its apogee. The earliest

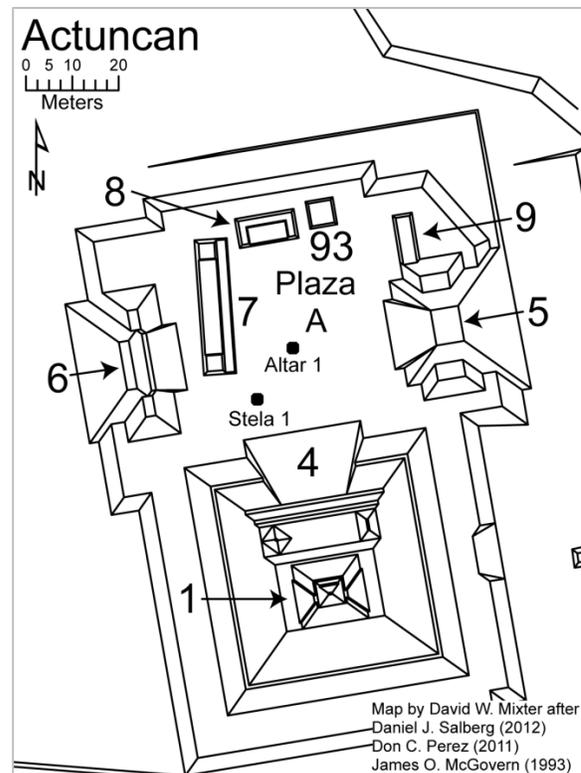


Figure 10. Map of Actuncan South highlighting the Terminal Classic construction in Plaza A. Note that the deposits discussed in the text are located on Structures 5 and 8.

construction phases of Plaza A and its triad of surrounding pyramids were investigated by James McGovern (2004). The three large pyramids, Structures 4, 5, and 6, were constructed primarily during the Late Preclassic and Early Classic periods, although the plaza platform was built in the Middle Preclassic period. The southern pyramid rises to a height of 28 m, taller than any other structure within the site core. Unsurprisingly, Plaza A and its monuments stood as the largest, most exclusive materialization of Preclassic royal power within the Actuncan center. The last monumental construction within Plaza A corresponds to the end of autochthonous rule at the site during the Early Classic period before the site was incorporated as a secondary center into the Xunantunich polity. From the time of the last construction through the Late Classic period, Plaza A's use appears to have been marked by a lack of visitation. This quiet leave-taking contrasts with elite houses, like the previously discussed Structure 73, that were abandoned and



Figure 11. Ceramics from the Structure 8 Terminal Classic deposit.

terminated by smashing polychrome pottery, other significant local ceramic types and objects.

During the Terminal Classic period, intensive use of Plaza A resumed, corresponding to the post-royal return of power to Actuncan. Four low platforms, Structures 7, 8, 9, and 93, were constructed within the plaza, marking its reutilization in support of a new Actuncan community (Mixter and Langlie 2014). Collectively, the arrangement of these low platforms shifted the focus of the plaza away from the towering triadic temple group towards Structure 5 to the east. Structure 9, constructed as a small attached platform to the northern edge of Structure 5 supports the renewed relevance of this structure. Because of its location on the eastern edge of Plaza A, the Terminal Classic community likely viewed Structure 5 as an important shrine, either as the site's original royal shrine and the burial place for the site's founding ancestors (McAnany 1995) or as an eastern shrine associated with the rising sun. It, like other buildings and spaces in Plaza A, would have been the location of regal performances and activities, some of which were private and hidden from view (Freidel and Schele 1995; LeCount 2000).

In contrast, rituals performed during the Terminal Classic period were for all to see and remember. For instance, Structure 5's masonry superstructure was filled with a dense, 80 cm

thick deposit of burned Terminal Classic ceramic sherds. McGovern (2004:159) originally identified this deposit from his inspection of the site's looters' trenches and retrieved over 6,000 sherds simply from cleaning the profile wall. The sheer quantity of this material points to repeated ceremonial events undertaken by the local community.

The inclusive nature of Terminal Classic rituals in Actuncan South also is evidenced by the contents of a deposit of smashed ceramic vessels recovered from Structure 8. This structure was a single long room with at least three entrances on its north side and a portico-like façade on its south side opening onto Plaza A. This novel arrangement would have funneled community members through the three doors to join ceremonies taking place within the open plaza space. Along the building's open side, excavations encountered a deposit of materials smashed over the single step up to its floor. Similar to the Terminal Classic deposits discussed within Group 8, this deposit consisted primarily of broken ceramic vessels with few other materials. Identifiable rims indicate the presence of three major ceramic groups. Notably, types include two large smashed McRae Impressed dishes and the rims of eight other Belize Red vessels, 18 Mount Maloney Black rims, 16 of which were incurving bowls, and 29 large Cayo Group jars, many of which featured flared rims and piecrust lips diagnostic of the Terminal Classic period (Figure 11). These ceramic groups and types are by far the most common serving and water storage vessels within local ceramic assemblages and indicate that ceremonies in Plaza A were undertaken using local identity markers, possibly for feasting. In contrast, other local and exotic types commonly encountered at the site, such as Chial Orange-Brown, Dolphin Head Red, and imitation Fine Orange vases, are rare in the assemblage. As noted above, other artifact classes are poorly represented, but do include two ground stone objects and a quartered jade bead. In contrast to Structure 73, only a few jutes were found; this indicates that a different kind of commemorative ritual took place in this location than in others at the site.

In sum, the Terminal Classic deposits on Structure 5 and 8 were left uncovered as

materializations of the communal nature of these rituals. Such public displays reflect a more inclusive ritual than royal rituals in which the remains were buried or kept out of sight. Open deposits remained accessible to the public who were then able to conduct veneration rites as individuals or in groups. Thus, we argue that Plaza A was resignified by local groups to fulfil an integrative role during the Terminal Classic period as a place of periodic and repeated veneration used to build a renewed community in the post-collapse world.

Conclusion

In this article we have introduced the concept of resignification, which can be examined through changing patterns of ritual within long-lived architectural spaces of significance. We define resignification as the process by which the formerly established importance of places is reshaped to match the changing values and needs of the local populace. It involves recognition of the powerful spiritual and sociopolitical forces vested in places, as well as a conscious modification of their former meanings.

We found parallels and deviations in the construction of ritual and use of architecture in three locations at Actuncan that point to the resignification of the built environment away from a landscape of exclusivity and divine kingship and towards inclusive communal authority. At Structure 73, an Early Classic termination deposit associated with the building's last residents was maintained into the Terminal Classic period and provided an opening for resignification of the building as a communal shrine. Later ceremonies involved periodic practices including co-mingled burials, *jute* consumption, and lithic scattering that marked a shift to inclusive ritual performed by individuals from the community. Similarly, the little-used Preclassic temples of Classic-period Plaza A were resignified as ritual space for more heterarchical Terminal Classic community ceremonies. Here, Actuncan residents appropriated the site's most ancient plaza to create a new social order by funneling separate social groups through a three-doored entrance structure at the terminus of the *sakbe* into a single space where they feasted and performed

ceremonies together. In contrast, termination activities at the ruler's palace compound aimed to openly communicate the end of the building's life force and prohibit its use by members of the community. The space was preserved on the landscape as an imposing reminder of Late Classic non-local rule and its end.

We suggest that resignification most successfully serves to instantiate community investment in inclusive projects when architecture and deposits are left open because in this state they function as signs accessible to all community members. Unlike hidden or buried deposits that imply proprietary knowledge, open deposits solicit individual or communal acts of faith in the collective. Studying the variability in ritual deposits within the built environment at Actuncan illustrates how the significance of structures shift through time and offer archaeologists another means of understanding changes in sociopolitical patterns.

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20 **ORIGINS OF THE BLOCK PARTY: INVESTIGATIONS OF PRECLASSIC ARCHITECTURE OVER AND UNDER PLAZA A AT PACBITUN, BELIZE**

George J. Micheletti and Terry G. Powis

One of the oldest known forms of public architecture that can be found in the Belize Valley and the Maya Lowlands is commonly referred to as the E Group and dates to as early as the Middle Preclassic. However, new evidence presented by Jaime Awe (2016) suggests that the Belize Valley “E Groups” are unique in architecture and content. Multiple burials found within these structures supports the new label of “eastern triadic shrine” proposed by Awe. The 2014 excavations at Pacbitun have focused on the southernmost structure (Structure 5) of the E Group and continued to unearth the 2013 discovery of a Middle Preclassic burned temple found beneath the northern portion of Plaza A. El Quemado, dating to late Middle Preclassic, has now been identified as one of the earliest, if not the earliest form of public architecture at the site. Using new excavation data combined with previous excavation reports of the early ceremonial structures in Plaza A, the Pacbitun Regional Archaeological Project (PRAP) has gathered new and supporting evidence of Awe’s (2016) proposal for the “eastern triadic shrine.”

Introduction

In the Middle Preclassic (900-300 BC), physical evidence of the increasing complexity of Maya society can be found in the form of monumental public architecture. However, before the first stones were laid to create these structures, families scattered over nearby hilltops may have assembled in these open, empty spaces (Estrada-Belli 2012). It was here that these families may have once convened to form a more collective memory and shared identity. Here, as a community, they continued to meet to retell and reenact their now, collaborative ancestral stories of a mythological past (Estrada-Belli 2012). The space, becoming more and more sacred with each gathering, would have been manipulated starting with earthen mounds or carved bedrock formations. Early modifications would have later been transformed into low stone platforms either built for elite aggrandizement or simply for viewing benefits. These early stone features are the precursors to the grandiose constructions forming the ceremonial centers we see today. They are also the beginnings of monumentality. The title “Origins of the Block Party” refers to the initial purpose of monumental public architecture as constructions to bring like-minded communities together for ritual, ceremonial, and/or social functions. In the Maya Lowlands, one early form of public architecture is known as an E Group complex.

In western Belize, between the Pine Ridge of the Maya Mountains and the rain forests of

the Maya Lowlands, lies the ancient site of Pacbitun (Healy 2004:207). Like several sites to the north in the Belize River Valley, excavations at Pacbitun have produced evidence of very early occupation found in the site’s core (Figure 1). The presence of E Group complexes in the Belize Valley gives further proof of early societies in this area. However, while the early societal presence in this region is not in question, a recent study conducted by Jaime Awe (2016) has drawn some speculation on the validity of these E Group complexes. Differing in architectural attributes and burial content when compared to E Groups outside this region, Awe (2016) after proposing a new interpretation, re-labels the Belize Valley archetype as an “eastern triadic shrine.” Following a brief explanation of the E Group complex and a discussion of Awe’s (2016) proposal, we will detail Pacbitun’s E Group assemblage and provide new data from the 2013 and 2014 field seasons at Pacbitun. The 2014 investigation of Structure 5, the southernmost temple of Pacbitun’s eastern triad, provides new information for the eastern triadic shrine proposal. Furthermore, recent discoveries beneath Plaza A provide insight on the early formation and architectural relationship of Pacbitun’s main plaza area. One of these sub-plaza discoveries, a Middle Preclassic temple dubbed El Quemado or “Q,” has extended and expounded upon a preexisting and ongoing social and political importance at Pacbitun. Q may provide additional clues to the eastern

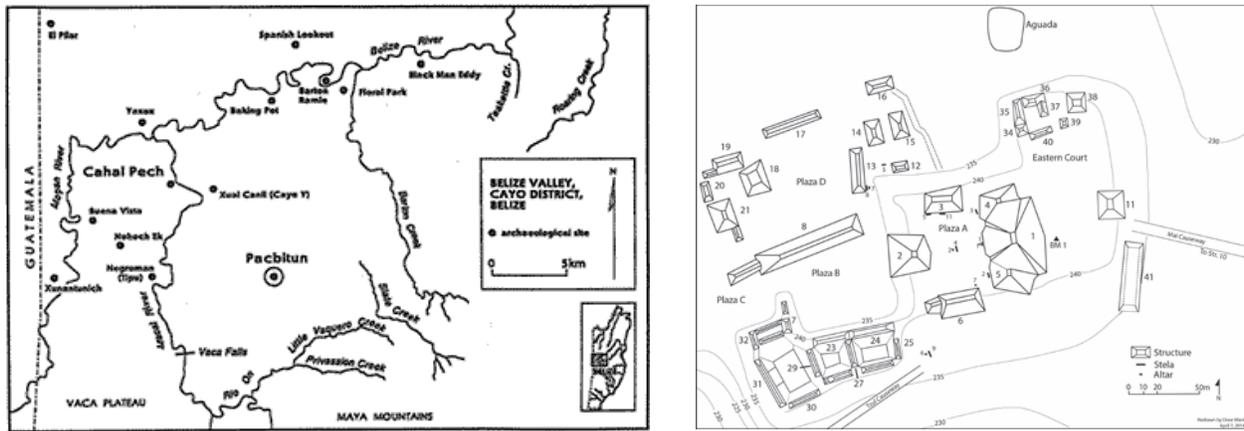


Figure 1. (left) The Belize River Valley and Pacbitun; (right) The site core of Pacbitun.

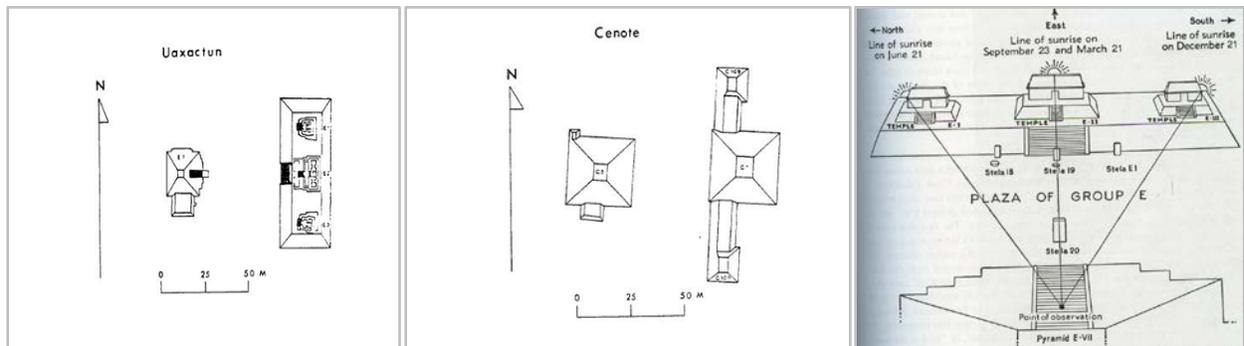


Figure 2. (left) Uaxactun's E Group designated as the Uaxactun style (Chase 1983:?) ; (middle) Cenote's E Group designated as the Cenote style (Chase 1983); (right) The proposed astronomical capabilities of Uaxactun's E Group (Sharer and Traxler 2006:321).

triadic shrine proposal. As a whole, the new information concerning the ceremonial architecture, both above and below Plaza A, will enhance our understanding of the early Maya of Pacbitun and other sites in the Belize River Valley region.

The E Group Complex

Although there are several variants, E Group complexes have a few basic attributes that are assigned to the majority of the known archetypes. The complex usually began as a long north-south oriented, low-lying eastern plaza platform that was often paired with a single western plaza structure (Figure 2). Later, additions to the E Group may have included structures built atop the eastern platform. Architectural diversity, generally found in the eastern plaza assemblage, split the E Group into two separate categories; the Uaxactun Style and the Cenote Style (A. Chase and D. Chase 1995;

Figure 2). Whatever the type, the E Group complex is generally found to predate all other monumental architecture at any given site. As a site's foundational architecture, E Groups are commonly found in large, open, and accessible main plaza areas (Aimers and Rice 2006). Although the exact function of the complex is still being debated, it is widely accepted that E Group complexes were associated with ritualistic and ceremonial activities.

The E Group complex was first recognized by Frans Blom (1924) during his excavations at Uaxactun. The name is actually derived from Uaxactun's Group E where the complex was initially labeled. Hundreds of sites in the Maya Lowlands are now thought to be home to an E Group plaza scheme (Freidel et al. 2016). Blom's (1924) investigations, furthered by Oliver and Edith Ricketson (1937), revealed that the Uaxactun complex could precisely mark the solsticial and equinoctial positions of the sun

(Figure 2). Over the decades, researchers have measured and tested alignments and orientations of E Groups throughout the Maya Lowlands finding that most could not accurately mark these important solar positions (Aimers and Rice 2006; Aveni and Hartung 1989). At this time, all other E Groups were considered to be non-functioning observatories built as replicas of the Uaxactun “prototype” (Aveni and Hartung 1989; Ricketson and Ricketson 1937; Ruppert 1940). However, temporal sequencing at several E Group sites as well as the development of the two E Group types disproved this hypothesis (Freidel et al. 2016). Furthermore, archaeological evidence found at the site of Caracol indicates that the E Group in the site’s epicenter was transformed from a Cenote style to a Uaxactun style suggesting the former preceded the latter (Freidel et al. 2016:11, 15).

Several other functional interpretations have been suggested for the E Group complex. One of the most compelling arguments comes from James Aimers and Prudence Rice (2006) who proposed a temporal commemorative hypothesis which suggests that the complex functioned as a stage for ritualized calendrical celebrations dealing with solar and agricultural events as well as k’atun (7200 days) period endings. Another interpretation proposed by A. Chase and D. Chase (1995:100) recognized the shift of the depositional material from cache to burial in the Tikal and Caracol E Groups occurring sometime in the Late Preclassic – Early Classic transition. A. Chase and D. Chase (1995:100) believe that the cache and burial deposits “likely represents first ritual centralization and then subsequent dynastic centralization” respectively.

The “Eastern Triadic Shrine” Proposal

Closely tied to A. Chase and D. Chase’s (1995) explanation and to this paper’s discussion, the most recent investigation conducted by Awe (2016) focused intensely on functionality through ritual/ceremonial deposits of E Groups found in the Belize River Valley. Excavation reports of Baking Pot, Blackman Eddy, Cahal Pech, Chan, El Pilar, Pacbitun, and Xunantunich have all confirmed the presence of an E Group within the site core (Awe 2016). Although these buildings have E Group

attributes, evidence suggests that the Belize Valley complexes differ in construction and content from other E Groups outside of the area (Awe 2016). Architecturally, Awe (2016) noted that the Belize Valley eastern triadic assemblages do not include the underlying eastern platform; an essential attribute for the E Group archetype. Evidence may also suggest independent construction episodes for each of the eastern buildings (Awe 2016). These individual modifications are evident in the non-uniform heights of each eastern building (Awe 2014; Table 1). Once more, these are not characteristics generally found in a typical E Group complex. To further differentiate these assemblages, Awe (2016) also inspected the artifactual content finding that differences between the E Group and the Belize Valley assemblages were not just architectural in nature.

The most compelling characteristic of the Belize Valley eastern triadic groups are the “significant numbers of elite burials” and caches, particularly those found within the central buildings at each site (Awe 2016). Although E Groups like those at Tikal and Cenote contain burial intrusions, excavations at Uaxactun, Cahal Pichik, and Hatzcab Ceel were devoid of burials and only produced cache deposits (Freidel et al. 2016). Not only are the inclusions of burials in traditional E Group complexes inconsistent, but, when found, they are also few in number. This is especially true when compared to the number of interments in the Belize River Valley assemblages (Awe 2016; Table 2). Awe’s (2016) report on the Belize Valley groups states that Structures B-1, 2, and 3 at Cahal Pech included 18 burials and seven caches. Of those, 12 burials and six caches were found in the central structure (B-1). Nine burials and eight caches were found within Chan’s group, of which eight burials and five caches were located within the central structure (Mierhoff et al. 2004). Baking Pot, Blackman Eddy, El Pilar, and Xunantunich combine for a total of 11 burials and nine caches (Awe 2016). However, eight of the 12 structures were either unexcavated or heavily looted. Finally, Pacbitun’s eastern triad held 14 burials and 11 caches (Healy 1990; 2004; personal communication, 2014). Here, nine burials and

caches were found in the central structure (Awe 2016). Due to the large amount of elite interments and caches, Awe (2016) proposes that these groups are more closely related to ancestor shrines. To avoid the astronomical implications so often assigned to the E Group and to give credence to these structures' "archaeologically established use," Awe (2016:17) proposes that the Belize Valley assemblages be relabeled as "eastern triadic shrines." In the summer of 2014, the Pacbitun Regional Archaeological Project (PRAP) set out to test Awe's (2016) model by investigating the remaining unexcavated portion of Pacbitun's southernmost structure in the eastern plaza assemblage, Structure 5.

Excavations at Pacbitun

The initial excavation of Pacbitun, led by Paul Healy of Trent University, began in the 1980s. Structures 1, 2, and 4 were axially trenched; however, only minor tests of the summit and base of Structure 5 were conducted (Healy, personal communication, 2014). Radiocarbon dates identified that both the central structure of the eastern triad, Structure 1, and the western plaza structure, Structure 2, originated sometime during the late Middle Preclassic (Healy 2004:209-210). Healy (1990; 2004; personal communication, 2014) believes that Structures 4 and 5 were not built simultaneously with Structures 1 and 2 but were constructed shortly after in the Late Preclassic. Sometime in the Terminal Preclassic (100 BC–AD 300), Structure 1 partially subsumes Structures 4 and 5 to form a single edifice (Healy 2004:210). Importantly, the three eastern structures, at one time, lay separate and were never set atop the substructure so often associated with E Group complexes; a staple argument of Awe's (2014) proposal.

Healy's (personal communication, 2014) excavations revealed that the construction episodes of Structures 4 and 5 seem to mirror one another up to the 3rd construction phase completed sometime in the Tzul Phase or Early Classic period (AD 300-550). This is clearly demonstrated in the profile illustrations of Structures 4 and 5 (Healy, personal communication, 2014). During the Coc Phase or Late Classic (AD 550-700), however, the fourth

construction episode of Structures 4 and 5 (the episode that held the burials of both structures) demarcates the two buildings from one another. Once the individuals were interred and the construction episodes complete, Structure 4 would have stood almost 3 meters taller than Structure 5; a height discrepancy that may support another argument of Awe's (2016) proposal. In the next and presumed final (fifth) construction episode dating to the Tzib Phase or Late Classic (AD 700–900), the summit floor of Structure 5 was raised approximately 1.6 meters while the summit floor of Structure 4 only grew approximately 0.4 meters. This Late Classic construction episode significantly lessened the height differential between these two buildings (Healy, personal communication, 2014).

Turning back to the interments at Pacbitun, aside from the 14 burials found in the eastern assemblage, six more burials were located in the western structure of the main plaza. Awe (2016) does not include the western structure in his discussion; nevertheless, we believe this structure is a vital part of the complex. Thus, when discussing all four structures we will refer to the group as a "shrine complex." Out of the 14 burials found in the eastern triad, only one was found entombed (Healy 1990; 2004). Burial 1-9, buried five meters deep beneath Structure 1, contained the remains of a Late Classic male ruler. Noteworthy, the remains of the ruler are just one of eleven interments that date to the Late Classic period in the site core at Pacbitun (Healy 1990; 2004; Micheletti and Stanchly 2013). Two female elite interments, also dating to the Late Classic, were found in Structures 1 and 2. Both females were found with musical instruments and several other elite goods (Healy 1988; 1990; 2004). The northernmost structure in the eastern triad, Structure 4, contained three interments. Two burials, found at the summit, date to the Late Classic Coc Phase (AD 550-700). The third, unlike most burials found at Pacbitun, was not found on the central axis of Structure 4. This individual was located somewhere near the conjunction point of Structures 1 and 4 and is thought to be a post-abandonment interment (Healy 1990; 2004; personal communication, 2014). Healy's (personal communication, 2014) slightly less

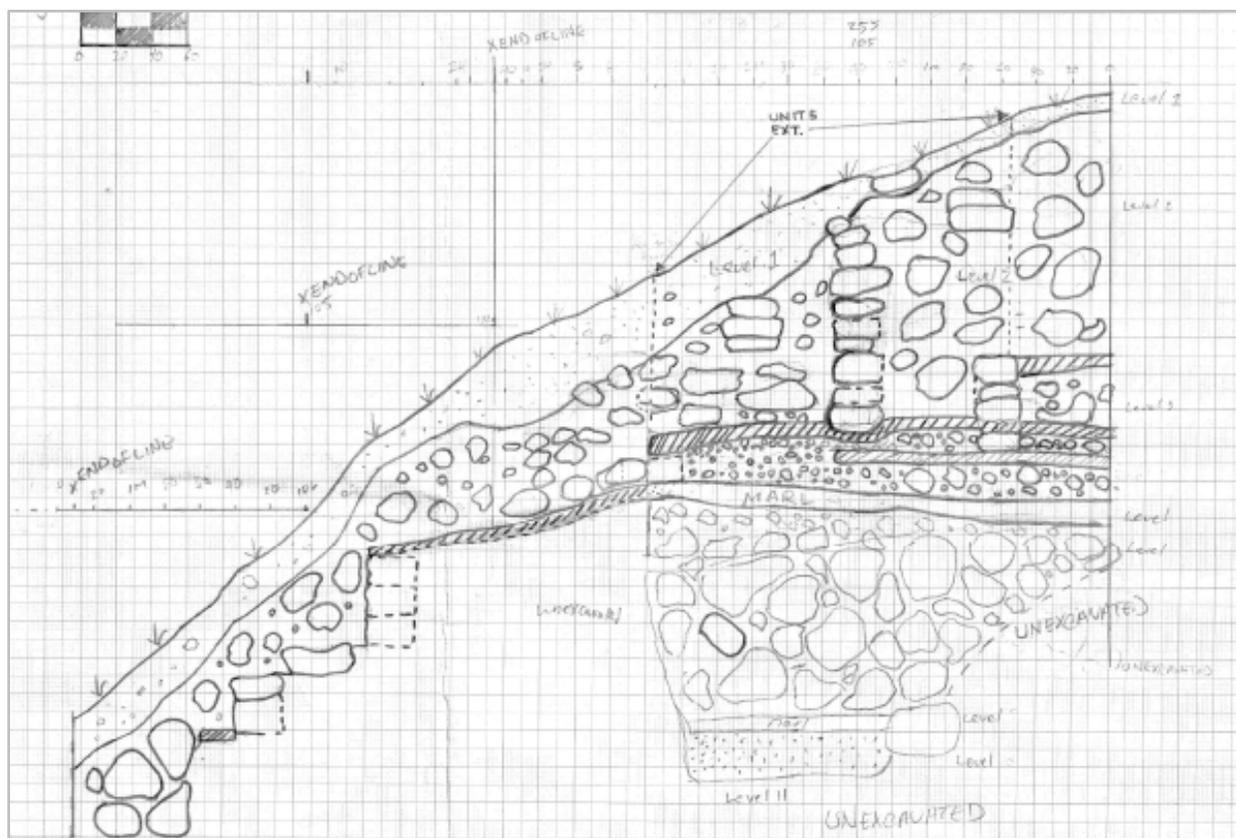


Figure 3. 2014 north profile of Structure 5.

intrusive excavations of Structure 5 included a five meter (north-south) by six meter (east-west) summit unit and a three meter (north-south) by 4.5 meter (east-west) basal unit. The investigation recovered two burials. In the summit unit, Burial 5-1 was found with several ceramic vessels, obsidian blades, and other elite goods; again, another burial dating to the Terminal Classic period (AD 700-900). Burial 5-2 was found beneath Stela 2 at the western base and dates to the Late Classic period (AD 700-900) (Healy 1990; personal communication, 2014). Importantly, Burial 5-2 was virtually devoid of artifacts and is considered to be a sacrificial victim (Healy 1990:259). Similarly, Burial 1-3, found beneath Stela 1 at the western base of Structure 1, contained three sacrificial victims also dating to the Terminal Classic (Healy 1990:259).

Investigations of Structure 5 during the 2014 field season focused on the unexcavated portion of the western face. The excavation was able to coincide with Healy's summit unit

construction phases dating back to the Tzul ceramic complex (AD 300-550) and possibly earlier. The 2014 profile of the central western face of Structure 5 (Figure 3) further solidifies Healy's argument that Structures 4 and 5 basically mirror each other up to the Early Classic period while the fourth construction episode in the Late Classic gives Structure 4 a distinct height advantage. Unfortunately, the project's excavation of Structure 5 did not yield a single burial or cache. However, one significant find was made in a plaza unit set in front of Structure 5. A ritual offering set in association with a large slate altar was discovered approximately 1.4 meters to the west of Stela 2 on the building's central axis. Ceramic dating suggests a Terminal Classic date (post AD 820). Found encircling the slate altar, the ritual offering was composed of a partial ceramic chalice vessel, a complete helmet conch shell music horn, a ceramic mask, a broken metate fragment, and a large smoothed ball of granite. This offering suggests that the building



Figure 4. (top) Photo of El Quemado or “Q” facing north; (bottom) Photo of El Quemado or “Q” facing west (both photos courtesy of Terry Powis).

was still important to the inhabitants of Pacbitun during the Terminal Classic period.

Looking at other Plaza A structures, the 2013 investigation of Structure 3, the northern structure in the plaza, revealed a single construction phase dating to the Late Classic period (Micheletti and Stanchly 2014). A separate Late Preclassic architectural feature was also found below Structure 3 (Micheletti and Stanchly 2014). Therefore, the northern end of Plaza A would have been open for the majority of the Classic period. Structure 6, bordering the southern end of the plaza, has yet to be excavated. Thus, we still do not know whether Plaza A, at one point, would have been open on both the north and south ends. What we have recently learned, however, is that there is more to Plaza A than meets the eye. Three sub-Plaza A discoveries may reveal a different and earlier story of Pacbitun.

Sub-Plaza A Features

The first of the three sub-surface discoveries was found during the 2013 investigation of Structure 3. Approximately 4.5 meters below the summit and at the base of Structure 3, evidence of a Late Preclassic (300 – 100 BC) structure (Structure 3-2nd) set atop a plaster floor was uncovered (Micheletti and Stanchly 2014:57-59, Figure 8). In the summer of 2014, located about three meters out from Stela 2 and west of Structure 5 at a depth of approximately 2.5 meters beneath the plaza surface, the north-west corner of a platform was found during excavation (Micheletti et al. 2014). Ceramics associated with this feature suggest a late Middle Preclassic origin. It is difficult for us to know whether or not this platform may have been an early form of Structure 5 given that it was located several meters to the west and into the plaza. Further testing will likely inform us as to how this feature fits within the architectural development of Structure 5 as well as its relationship with other structures in Plaza A. However, it is through the use of the third sub-plaza discovery, El Quemado, that we are able to hypothesize scenarios of possible temporal layouts of Pacbitun’s main plaza.

El Quemado

Noted earlier, the eastern assemblage and western structure in Plaza A would have been used for ceremonial activities performed by elite occupants and observed by the gathered peoples of the surrounding community starting sometime in the late Middle to early Late Preclassic. This group of architecture was originally thought to be the earliest, most important public form of monumentality at the site. However, the discovery of El Quemado (Figure 4) may suggest otherwise. In 2013, a plaza unit in the northern portion of Plaza A was set to investigate an anomaly found using geophysical survey (Skaggs and Powis 2013). Here, a Late Preclassic construction pen wall was found set atop a platform. Extensions were added to this plaza unit and measured 11 meters east-west by seven meters north-south by the end of the season; merely exposing a fragment of what lay below the plaza floor. The structure is now referred to as El Quemado, or “Q” for short, meaning “the burned one,” due to extensive

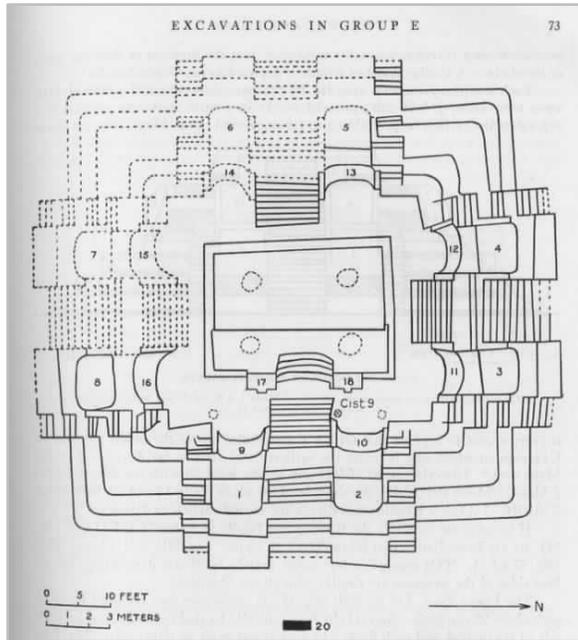


Figure 5. An illustration of Uaxactun's E-VII-sub, the western structure of the site's E Group complex (from Ricketson and Ricketson 1937:73).

burning on a large percentage of the building's surface.

The investigations continued in 2014 in the hope of determining the overall size and shape of Q. In turn, we wanted to identify how this structure fit, if at all, in the early Plaza A scheme. The excavation measured 25 meters east-west by 12 meters north-south by the end of the 2014 season. The structure is now believed to stand approximately 2.5 meters tall. Excavations on the summit have not revealed postholes or any other evidence to date that would suggest Q held any type of perishable superstructure. Furthermore, the presence of armatures on the three exposed sides of the structure suggests that the edifice may have been adorned by stucco masks. A test unit set near the central area of the structure confirms that Q was not built over earlier buildings. Radiocarbon samples taken from the test unit coincide with the ceramic evidence dating the structure to the late Middle Preclassic (ca. 700-400 BC). We now believe that Q was abandoned around 400 BC. At that time it was covered by a thick layer of muck that entombed the building intact. Sometime during the early Late Preclassic a series of construction pen walls

were laid down crisscrossing Plaza A to stabilize the area so that Pacbitun's main plaza could be enlarged to its maximum extent.

The 2014 excavation of Q was not able to provide the structure's overall size and shape. However, excavations have provided enough information concerning the architectural dimensions, orientation, and plaza position to hypothesize and interpret plausible plaza scenarios. Using the known architectural dimensions, we now believe that Q is a radial pyramid, very reminiscent of Str. E-VII-sub at Uaxactun.

Discussion

The old and new information concerning Pacbitun's main plaza architecture found above and below the surface both confirms and adds to Awe's (2016) Eastern Triadic Shrine proposal. Beginning with the surface structures, three important notions arise when looking at the architecture. The first notion confirms that Pacbitun's eastern triad was never constructed upon the quintessential long, north-south oriented, low platform so often attributed to the E Group complex. The missing platform is one of Awe's (2016) major arguments for differentiating between E Groups and the Belize Valley assemblages. The second notion is that, at one point in time, Structure 1 would have sat alone on the eastern edge of Plaza A without its north and south flanking counterparts. The eastern plaza edge is a common shrine location which adds further support for Awe's (2016) proposal. Might the position and mass of burial deposits be an indication that the purpose of this structure was funerary in nature? Obviously, the burials found within Pacbitun's main plaza architecture supports this assertion. The third notion is that, sometime in the Late Classic period, all three structures lining the eastern edge of Plaza A would have stood at different heights from one another. The height discrepancy bares a close resemblance to the eastern triad at Cahal Pech (Awe 2016). Importantly, the three combined burials found at the summits of Structures 4 and 5 at Pacbitun date to the Late Classic construction episode when the buildings were no longer symmetrical and varied in height. No burials were found in

the last construction episode fill at the summit when the height discrepancy was lessened.

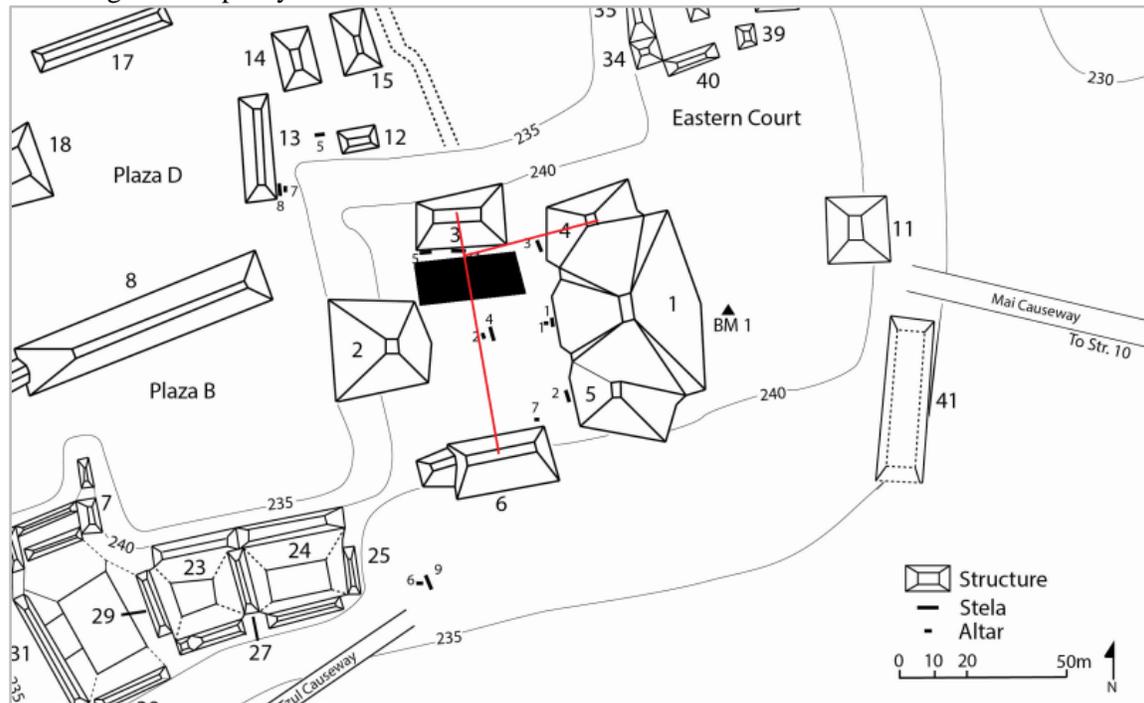


Figure 6. Site core map of Pacbitun with an illustration of the approximate location of the excavation of El Quemado; The north-south line indicates the coinciding central axis of Q with Structure 3 to the north and Structure 6 to the south, the east-west line indicates the coinciding central axis of Q's east face with the west face of Structure 4.

Looking at the location and dimensions of the sub-plaza temple, El Quemado, we were able to interpret possible plaza layouts. If Q is radial, then the structure would have four sides equal in length and could possibly have stairs running up the central axis of each side. The features of Q resemble the Structure E-VII-sub (Figure 5); a radial structure adorned with masks at the site of Uaxactun. E-VII-sub is the western structure of the first designated E Group (Blom 1924). If Q is the western structure to an earlier E Group, a platform and superstructure(s) would lie to the east of the eastern triad in Plaza A. The position of Q and the elevation of the area's surface to the east may support this idea. Radial buildings could also stand alone in the center of a plaza or be paired with an identical structure aligning east to west. If the former holds true, no other structures at Pacbitun, including the shrine complex, would have existed in the plaza. The latter, a layout known as the twin pyramid complex, is highly unlikely due to the fact that this plaza scheme did not begin until the Late Classic period long after Q was built (Shook

1956:9). Exploring other options, Q's northern plaza position may suggest that it was an earlier version of Plaza A's northern structure, Structure 3. Symmetry suggests that Q's central axis is consistent with both Structure 3 and Structure 6 (Figure 6). The central axis of the eastern face would also closely align with the central axis of the western face of Structure 4 (Figure 6). If Q is an early northern structure in Plaza A, it is possible that Structures 1 and 2, both dating to the Middle Preclassic, may have accompanied it. However, it is doubtful that either of the flanking eastern structures would have been built during the existence of the sub-plaza temple due to the location it was found. Perhaps the reason for building up Plaza A was to incorporate the eastern triadic scheme. Whatever type of structure Q may have been, the eastern triadic formation would not have likely existed leaving only the central structure in a shrine-like position. Future investigations will be important to identify Q's relationship with the other ceremonial architecture found in Plaza A.

Although we support Awe's (2016) claim, there are some issues that need to be investigated. One conflicting issue is the fact that the construction episodes of Pacbitun's flanking structures almost perfectly mirror one another up to the Early Classic period. Although the ceramic phases dating the construction episodes suggest that the flanking structures were built up simultaneously, a closer inspection is needed to identify if they may have been erected at different intervals within a particular ceramic phase. For now, however, it seems that the eastern triad at Pacbitun would have been symmetrical at least until the Early Classic.

A couple issues also arise when looking at Pacbitun's burial data. Two sub-stela burials (BU 5-1, 1-3) and two simple urn graves (BU 2-5, 2-6), all thought to contain sacrificial victims, are undoubtedly non-elite individuals due to the method of deposition and lack of grave goods (Healy 1990; 2004). Thus, not all burials associated with the shrine complex are elite. Their status as sacrificial victims may mean they were interred for different reasons and should be noted as such. Finally, as noted earlier, the majority of burials in the shrine complex at Pacbitun date to the Late Classic period. This might suggest that the interring practice in the shrine complex may not have been the structures' initial purpose but was actually a practice that developed sometime in the Late Classic period. However, all excavations were cut short for safety reasons and time constraints and may have missed earlier burials further within the structures.

Future research should focus on these architectural and artifactual issues to find common themes or disparities. We encourage future researchers to also include data from the western structures which we believe completes the shrine complex. A closer inspection of Pacbitun's architecture, interments, and other artifacts of the site's shrine complex will be the focus of the senior author's M.A. thesis. The goal is to provide a base for Awe's (2016) proposed Eastern Triadic Shrine so that others may use Pacbitun's group as an example for comparison.

Conclusion

The architecture and interments of Pacbitun's shrine complex supports several of Awe's (2016) arguments for the Belize Valley Eastern Triadic Shrines. Although PRAP's 2014 investigation of Structure 5 was unable to obtain burial deposits, the multitude of interments found in the Belize Valley eastern triadic assemblages, demonstrated in Awe's (2016) study, are still too copious to dispute. It is clear that a prime location for interring elite members of the community was inside the main plaza's central eastern structure and, to a slightly lesser degree, in its flanking structures. Furthermore, the location and conceivable dimensions of El Quemado suggest a possible relationship with Structure 1 without its flanking structures. The presence of Q also implies an alternative ideological importance prior to the shrine complex at Pacbitun. Although Q is unique to Pacbitun, excavations in similar locations at other Belize Valley sites with eastern triadic assemblages may prove otherwise. Future investigations of Q and similar structures may, one day, provide a prelude to the Maya of this region.

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21 THE FINAL OCCUPATION: THE TERMINAL CLASSIC EVIDENCE FROM PLAZA H, CAHAL PECH, BELIZE

John E. Douglas, Linda J. Brown, and Jaime J. Awe

Evidence of ancient Maya activities at the Cahal Pech acropolis includes Terminal Classic architectural remains that mark the final phase of the roughly 2,000-year old settlement. The buildings erected during this period differ radically from earlier structures; they are smaller-scale, roughly constructed, and limited to the eastern portion of the site. Over the last four years, participants from the University of Montana Belize Archaeological Field School, under the auspices of the Belize Valley Archaeological Reconnaissance Project, have been excavating some of these Terminal Classic structures found in Plaza H. A clearer picture of the plaza during its final occupation is emerging, despite the challenges in identifying and interpreting low-visibility structures close to the surface. The project has mapped extensively reconfigured platforms and an apparently terraced plaza floor that suggests a thriving, if small-scale, center of activity that was sustained over sufficient years to allow two Terminal Classic building phases to be distinguished. In addition, several uncovered features, along with preliminary study of the artifacts, help identify the spatial organization and some of the activities that occurred within the plaza. The aggregate of available evidence from Plaza H indicates that Cahal Pech likely remained at the apex of the local settlement system, albeit a dwindling system.

Introduction

The site core of Cahal Pech, one of the major Maya centers of the Upper Belize Valley, is dramatically situated on a ridge overlooking the Macal River. The core area of the ancient city, now surrounded by the modern urban fringe of San Ignacio, Cayo District, is best known for its roles as a publically interpreted Maya center in Belize (Ball 1993) and as a “textbook example” (e.g., Houston and Inomata 2009:79) of an Early Middle Formative community in the Maya Lowlands (Awe 1992, Garber and Awe 2009, Sullivan and Awe 2013). Yet, beyond these highlights, decades of effort at the site under the auspices of the Belize Valley Archaeological Reconnaissance (BVAR) by Jaime Awe and a dedicated group of co-investigators has resulted in a multitude of contributions to Maya archaeology (far too numerous to catalogue here), demonstrating what a long-term commitment to a single site can accomplish.

In recent years, the final occupation at Cahal Pech has received increased interest. The old picture of Cahal Pech as a place that was rapidly and quietly abandoned at the end of the Late Classic has given way to more nuanced and interesting scenarios. There are a significant number of intrusive burials at the site and plentiful quantities of final deposits of partial vessels and other materials in many of the plazas, indicators of new activities after Classic Period construction and renewal ceased (Awe

2009). The focus of this chapter, however, is constructions in the eastern portion of the site using novel, and far less labor-intensive, construction techniques, dating to the end of the occupation span.

We consider the pattern of abandonment deposits and hasty, small constructions as indicative of the “Terminal Classic,” a term requiring comment. Terminal Classic has multiple meanings in Maya Archaeology (Demarest et al. 1995). Within the Belize Valley, absolute dating of the period has been ambiguous: for example, Wiley (1976:98), working without radiocarbon dates, placed the Terminal Classic in the Belize Valley at A.D. 830 to 890-950; at Xunantunich, AMS dating suggested to LeCount and others (2002:42) that the Terminal Classic was best dated to A.D. 780 to 890, but the authors left open the possibility that the available assays had underestimated the end date. Recently, Hoggarth and others (2014:1070) have again addressed the Terminal Classic chronology in the Upper Belize Valley, and found that analysis of directly dated burials indicates, “the political and demographic collapse at Baking Pot may have been earlier than previously interpreted.” Efforts to substantiate Terminal Classic chronology with absolute dates in the Belize Valley must, and eventually will, encompass Cahal Pech as well, but at present we apply the term “Terminal Classic” to Cahal Pech in a behavioral sense, to designate archaeological remains that show

some continuity with the Late Classic but within a context of a breakdown in standard Classic construction, ritual, and habitation patterns, events widely held to indicate “the decline, collapse, or cessation of Maya hierarchic activity” (Willey 1973:94).

By this definition, then, Terminal Classic construction efforts are limited and small by Late Classic standards. Although new excavations could alter our understanding, it appears that most of the Terminal Classic construction activities found on the Cahal Pech acropolis occurred in the east portion of the complex, in Plaza C and particularly in Plaza H (Figure 1), the latter which is the focus of this chapter. The area was recognized as a formal Plaza only recently, taking its place as significant to the story of Cahal Pech in 2006. In June of that year, the BVAR team trenched along platform walls in the northeast corner of the plaza that were built of unshaped limestone boulders visible on the surface. In addition to identifying several low platforms of unshaped stones, which had been built partially over Late Classic structures, a formal tomb was discovered within one of these rough stone structures that enclosed a single adult male who was richly appointed (Figure 2). Since 2006, several important projects have been conducted in Plaza H (Pritchard et al. 2011; Santasilia 2012), but the most prolonged and extensive project has been conducted by BVAR in conjunction with the University of Montana.

Investigations of Terminal Classic Deposits in Plaza H, Cahal Pech

Focusing on the Terminal Classic presents special challenges. The Terminal Classic architecture tends to exhibit a moderately high rate of disturbance, because of its lack of capping constructions and deposits, a fairly low level of obtrusiveness, due to the use of unshaped stones in platform constructions, and a lack of predictability, stemming from a more vernacular approach to construction. For these reasons, along with the use of student excavators, our excavations in Plaza H have been cautious, with generally small excavation units, a high level of recording, frequent level changes--even when there are no visible changes

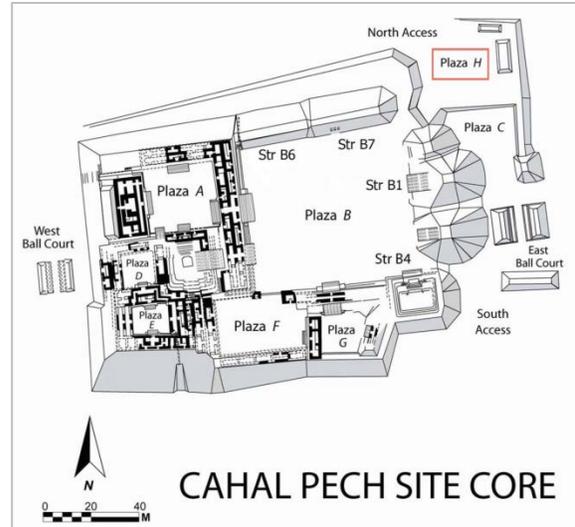


Figure 1. Location of Plaza H at Cahal Pech.



Figure 2. Interior of the Tomb in Platform H-1, Plaza H, 2006.

in stratigraphy--and a conservative approach to the removal of rocks found in the fill.

Despite the challenges, the Terminal Classic architecture does provide insights into the final occupation at the Cahal Pech acropolis. The question that concerns us here is: What do the *construction history, architecture, and activities* related to the buildings that post-date

the Late Classic construction in Plaza H tell us about Cahal Pech and its final inhabitants? We begin by first examining the Terminal Classic architecture and then considering the associated artifacts.

Architecture

Although the Terminal Classic buildings within Plaza H are modest, a fact made even clearer by comparison with Cahal Pech's main plaza, a stone's throw away, it is noteworthy that the remodeling in Plaza H was undertaken on a plaza-wide level, with every building platform and the plaza floor redesigned and rebuilt. The Terminal Classic structures rarely follow the precise outlines of the older shaped and stacked block Late Classic walls, and differed significantly in construction technique.

As currently recognized, the Terminal Classic architecture is comprised of four platforms, three rectangular and one roughly L-shaped. Figure 3 shows the approximate location of these platforms, although it is important to note that this is a work in progress: out of the 20 corners for this configuration, only about half have been definitely located for this map.

Most of the Terminal Classic platform construction is comprised of unmodified rocks, ranging in size from boulder to cobble. Interestingly, the major exception to unmodified stones as the primary construction material is the underground elite tomb, where even the fill in the stairwell incorporated shaped blocks, presumably stripped from Late Classic structures. Two different styles of Terminal Classic platform walls have been found: stacked cobbles and boulders, up to four courses high; and single course boulder walls, including sections where rectilinear, elongated natural boulders were upended to maximize the height that could be spanned with a single stone. These approaches appear to be intermixed freely, depending on the required wall height. Platform H-1, for example, incorporated a regular single course of boulders where the tomb and a previous Terminal Classic structure stood; to gain height farther south, where the structure was built over an older plaza floor, upright stones were employed.

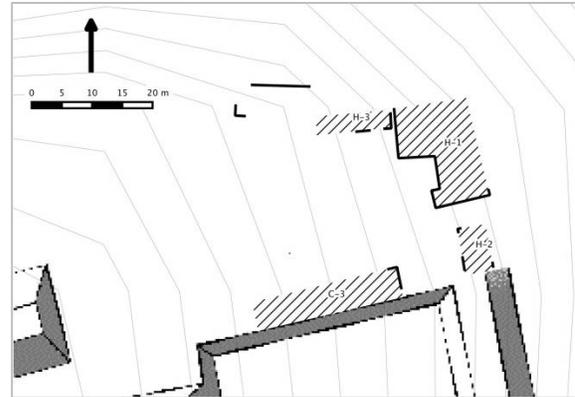


Figure 3. Reconstructed Terminal Classic Platform Locations in Plaza H. Structure walls are shown as black lines with speculative structure plans shown by hatched areas. General surface trends are from ASTER-GTM.



Figure 4. Stairs for the H-1 tomb.

The presence of two Terminal Classic construction phases was a critical interpretive discovery during our research. In the excavations at the northeast corner of Platform C-3 (Figure 4), the structure that defines the southern boundary of the Plaza, an earlier, lower corner was found. Made of piled cobbles and a few boulders, it was covered by plaza fill and was replaced by a taller structure with a slightly smaller footprint. A similar pattern appears to have been found on the western end of C-3 during 2010 excavations by the BVAR project (Pritchard et al. 2011). This pattern of slightly smaller, taller buildings coupled with extensive plaza floor fill is repeated in the construction of the older east-west leg of structure H-1—the part of the structure that is north and west of the tomb. The smaller, often cobble-sized, rock walls in these earlier structures are less



Figure 5. Ceramic Vessels from the Tomb.

detectable; when discovered in previous projects, they tended to be interpreted as steps. However, the last plaster floor level was clearly above these lower stone alignments, and an earlier plaster floor is visible at the base of the lower corners and walls, indicating two construction phases. In a test within the older section of platform H-1, a level with an increased density of artifacts is correlated with the elevation of this earlier Terminal Classic platform wall, further evidence for these two building phases. Intriguingly, the larger stones, higher walls, and larger size of structure H-1—by about 50 m²—demonstrates that more construction labor was expended in the second Terminal Classic construction than the first.

This increase in construction labor is even more evident when the building of the tomb is considered. The contents of this tomb were rich (figures 4 and 5), and in a 2013 paper, Awe

makes the case that the interred individual was the last ruler of Cahal Pech. The current project strengthens that conclusion through two straightforward observations. First, our excavations show that construction of the tomb was the first step in the last remodeling of the plaza. The southern leg of platform H-1 did not exist before the tomb; the tomb's construction is integral to the structure, with the chamber forming part of the western wall of H-1 in its final configuration. Simply put, this is not an intrusive burial. Second, our excavations located a southern stairway into the tomb (Figure 6) that had not been recognized in the 2006 excavations—a mature gumbo-limbo tree had prevented its discovery. Five stone steps and risers led into the tomb, which were carefully filled with stones and stacked blocks after the tomb was completed. The presence of a single human fibula fragment at the top of this



Figure 6. Other Artifacts from the Tomb.

fill might indicate a previously unknown offering for the tomb's occupant. These are the only stairs associated with a tomb at Cahal Pech, although stairs are common at the site of Caracol to the south. At that site, the Chases (1995) have argued that crypts equipped with stairs facilitated their reuse for multiple generations. If that was the intention of the builders of the tomb in Plaza H, the lineage leadership, at least at this locality, was broken before the tomb could be reused. Alternatively, the site may simply have been abandoned for the last time, not too long after the interment of the individual. Regardless, the elaboration of a staircase adds to the evidence that this is a tomb of an important individual who was a member of a lineage with considerable resources—especially when the context of a rapidly eroding social base in the Terminal Classic is considered.

One last, and essential, architectural feature needs to be mentioned: the plaza floors themselves. On the eastern part of the plaza (Figure 7), Late Classic structures were partially deconstructed and covered by the new plaza floor. This necessitated a considerable increase in the height of the floors. With some of the platforms to the west lower than these eastern plaza floors, it is obvious that the plaza must have been terraced. In building these higher plaza floors, stone alignments forming simple—and not particularly regular—“construction pens” were used to stabilize and fill this portion of the plaza. Efforts were made to follow and map these alignments around structure H-1. It is worth mentioning that even though the platform construction is readily identified as less sophisticated than Late Classic buildings, the plaza floors were thick and durable, especially in light of their proximity to the ground surface.



Figure 7. Excavation at Structure H-1, looking East, 2013 Season. Left (north) of the red line are walls from the 2006 season and re-exposed, including both Late Classic (lower) and Terminal Classic (higher) platform walls. Right (south) of the line shows the 2012-2013 excavations, including the potential construction pen underlying the raised plaza floor in the foreground and the western wall of H-1 constructed of upright stones in the background.

The final plaza floor also included at least one feature: a small, formal hearth, found by Santasilia (2011) in the floor quite close to the eastern end of structure H-3, which demonstrates one activity in the Plaza after the construction of the tomb.

Artifacts

The excavations have recovered a range of artifacts in fill and possible trash deposits that appear relatable to daily household activities: fragments of vessels of all sorts; mano and metate fragments; chert flakes, cores, and occasional bifaces; obsidian blade fragments; river shells and scraps of faunal materials; marine shell fragments; and a few beads and pendants made from marine shell, stone, and pottery. The decorated ceramic assemblage found in the fill and between floors includes specimens from the Belize Red Group, along

with the Pine Ridge Carbonate Group, including the various red slipped types and the black slipped member, Mt Maloney. With the exception of a single censer plug and a few fragments that are likely from vases, quotidian activities can be inferred from the ceramic assemblage.

A special artifact context deserving special mention is the presence of very dense deposits of small chert flakes in the plaza fill. These high-density deposits, some of which appear to be late-stage bifacial thinning flakes, are quite localized within the plaza. They are found only along the eastern edge of structure H-3 and the western edge of structure H-1. However, stratigraphically, and therefore temporally, it occurs in fill over multiple plaza floors that overlie a deconstructed Late Classic platform wall. Where this high chipped stone density occurs, the number of flakes often

exceeds the amount of limestone gravel. In a small test in 2014, 18.9 kg of chert chipped stone was found in the ¼" screens from about 0.42 m³ of matrix removed from four levels with two distinct plastered floors. Because the flake stone material is found in all Terminal Classic fill levels, it appears that there is unbroken lithic production at or near this area during the entire sequence of Terminal Classic use of the plaza.

Implications and Conclusions

One of the most basic questions that we can ask of the data recovered from Plaza H is: What was the nature and spatial organization of activities that took place in Plaza H during the Terminal Classic? Because of the rapid social changes that occurred during this period, the question cannot be answered with a routine response. Specifically, Plaza H has the appearance of a modest residential plaza group, but one platform contains an elite tomb. Does the presence of the elite tomb indicate that Platform H-1, or even the entire remodeled plaza, was ritual or public space, as is typical of elite burials throughout Mesoamerica (Awe 2013:33-34)? All the earlier burials at Cahal Pech identified as royal by Awe (2013) were placed in contexts that are best interpreted as public. Or, does the wider Maya household pattern of keeping important ancestors very close, often in the same structure as the living, apply here? Although the analysis is far from complete, where the H1 tomb is concerned, we tend to find more supporting evidence for the latter suggestion.

This inference rests on four lines of evidence. First, are the two stages of construction. Because the first phase is not associated with a tomb, Plaza H Terminal Classic construction does not appear to be initiated as a locality designated for ritual activities related to ancestor veneration. Rather, it appears to be part of a construction cycle triggered by the death of an important person. Second, is the evidence of specialized lithic production over an extended period suggesting household specialization, rather than a single event or the accidental inclusion of a deposit from some other part of the site. Third, is the plaza-level hearth, whose positioning and small size suggests household activities that occurred

after the tomb was built. Fourth, is the wide range of household ceramics and stone tools that are present, which at least in the field and in preliminary analysis appear to be locally produced trash. This is true for all the platforms, and extensive work around Platform H-1 in particular suggests the deposition of primarily ordinary artifacts along the edges of the platform, particularly platform walls not facing the plaza. The ordinary remains around the H-1 platform is particularly relevant because of the presence of the tomb.

Thus, we tentatively suggest that Plaza H was inhabited by a lineage that buried an important individual at the initiation of a final construction phase. We do not yet know if this occupation was continuous with the Late Classic occupation or occurred after a hiatus; either way, the earlier structures were razed and the new structures represented a thorough reorganization of the plaza. Any geomorphological evidence of a hiatus, if it occurred, would have been erased in this process. Given the ceramic analysis, we do not think that the Terminal Classic occupation of this plaza was very long. Yet, on architectural analysis, the two construction phases suggest that the Terminal Classic use of this plaza was more than a fleeting moment on the archaeological time scale. This sort of reasoning, of course, is not fully satisfactory. Better chronological controls are clearly needed, and the authors of this report, in conjunction with a Terminal Classic chronology project initiated by Julie Hoggarth of BVAR and Pennsylvania State University, have several radiocarbon dates planned to help identify the time frame of the tomb, structures, and associated deposits, and we continue to analyze ceramics from various contexts to illuminate change.

Plaza H is radically reorganized during the Terminal Classic while at the same time maintaining or reviving the tradition of elite tomb burial. This, statement, of course, is somewhat self-contradictory. Consider first that we have a probable leader buried on the acropolis in a manner that creates a strong claim to the tradition of the previous lords of Cahal Pech. In fact, the staircase is one of several indicators that the royal burial tradition became

more, not less, elaborate with this Terminal Classic burial (Awe 2013).

But second, consider that if the case for a habitation function proves correct, this lineage did not appear to live in a physically removed, elite courtyard. They would have lived more simply and openly, presumably in relatively ordinary, rounded-end thatched buildings on low, rough, platforms in Plaza H. Thus, the architecture and features of Terminal Classic Plaza H appears to scramble the Late Classic signals for elites and commoners.

This contradiction is neatly illustrated by considering the construction of the tomb compared with the construction of the platforms. Cut stone blocks, presumably salvaged from Late Classic buildings, were extensively used for the tomb. The construction of the tomb with these materials helped insure its survival, without collapse, until it was investigated in 2006. The rough boulders used for the platform walls sometimes did collapse, especially at the corners. Why build the hidden tomb with the superior salvaged blocks and the visible platform walls with the inferior boulders and cobbles? A number of reasons could play a role in these choices, none of which are exclusionary of the other possibilities. First, the pattern of using the most desirable building materials for the hidden tomb follows the same values expressed in placing prestige pottery and fine objects of personal adornment in a tomb, while the pottery and objects of adornment found in other deposits are markedly plainer. Second, it is possible that placing the burial in stones removed from ancient buildings held power, conceivably part of the same impulse that led to a number of Terminal Classic intrusive burials to be placed into the older deposits in several of the large temples at Cahal Pech. Finally, as leadership changed and the social pyramid was “flattened,” building platforms from cut stone blocks could have become a symbol of the old leadership rejected by the inhabitants; possibly, such materials were too closely tied to the concomitant construction labor demands of past elites (Abrams 1994) and, as such, were undesirable public displays. Alternatively, it could simply reflect the fact that Terminal Classic leaders just did not have the support

population of their earlier Classic period predecessors.

At least at Cahal Pech, it appears that elaborate ancestor veneration was among the last trappings of the Classic Period elite to be lost. Indeed, it is only through the presence of the tomb that the status of the builders of Plaza H can be currently recognized. This observation may be of broader value in considering the methodological challenges of identifying higher ranking lineages at a time of massive social and demographic change.

The research into Plaza H is a work in progress, and more effort is needed to understand the Plaza in its entirety, its chronology, the activities that took place there, and the nature of leadership embodied by both the continuities and the changes seen in Plaza H. Furthermore, although we have treated this small area as a microcosm, inescapably Plaza H needs to be understood in the context of the other Terminal Classic activities that have been documented across the site—and ultimately must be linked with other settlements in the Belize Valley.

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22 **ANCIENT MAYA USE OF DOG (*CANIS LUPUS FAMILIARIS*): EVIDENCE FROM THE UPPER BELIZE RIVER VALLEY**

Norbert Stanchly and Jaime J. Awe

The domestic dog is often cited as a common food source for the ancient Maya. However, research in the Upper Belize River Valley region suggests differential use of dog and not primarily as a source of protein. Dogs played an important practical, ritual and symbolic role in Mesoamerican society. Differential use of dog by the Maya has been noted on a regional and temporal scale by several scholars. This paper examines evidence of dog use for a number of sites in the region, with a particular focus on Cahal Pech, to contextualize the dynamics of dog use within the Upper Belize River Valley region. The data suggest that domestic dog was not a common food source for the ancient Maya of the region. The majority of dog remains are associated with elite burials, and not contexts associated with food refuse.

Introduction

Dog remains are ubiquitous in the archaeological record of sites throughout Mesoamerica. Given their relative frequency in faunal assemblages, they are often interpreted as a common food source for many Mesoamerican cultures, including the ancient Maya. In this paper we examine the role of the domestic dog in the Upper Belize River Valley, drawing on zooarchaeological research conducted on data recovered from the site of Cahal Pech (Figure 1). We subsequently compare results of our investigation with data from other sites within the region in an effort to contextualize the dynamics of dog use within the Upper Belize River Valley. Preliminary results of these investigations suggest that the Belize Valley Maya used dogs, and dog remains, in a variety of ways, and not only as a source of protein. This pattern of use contrasts with perceived patterns of dog utilization noted in some parts of the Maya area.

The Dog in Mesoamerica

The domestic dog was used for practical, utilitarian and symbolic purposes throughout greater Mesoamerica. They were used as pets, hunting guides, as a food source (both as tribute and for personal consumption) and their teeth and bones were utilized as raw materials for the manufacture of items of personal adornment and tools (Hamlin 1984; Pendergast 1974; Pohl and Feldman 1982; Valadez Azúa et al. 2013; Wing 1978). Evidence further suggests that they were ritually sacrificed as offerings in agricultural rites, in renewal ceremonies and feasting events (Brown and Emery 2008; Emery 2004a; Pohl

1983; Shaw 1999; Tozzer 1941; White et al. 2001). They also acted as companions and protectors for the dead in their journey through the Underworld (Miller and Taube 1993; Tozzer and Allen 1910). The multiple roles of dogs in Mesoamerica, including the Maya region, is not only widely recorded in ethnohistoric, ethnographic, and archaeological sources, but also in zooarchaeological and iconography reports. As Valadez Azúa and colleagues (2013:558) note:

“their presence and value is as linked to Mesoamerican civilization as corn or obsidian”

The earliest evidence for the presence of domestic dog in Mesoamerica comes from the Tehuacan Valley and Tecolate Cave, Hidalgo, where their remains have been found to date to approximately 5,000 years before present (Flannery 2001:221; Valadez Azúa et al. 2013:568). Flannery (2001:222) suggests that dog became a significant food source during the Formative period, ca. 1150-150 BC, “when human populations were growing rapidly and a new meat source was needed”.

Dog remains are the most common identified vertebrate in the Mesoamerican zooarchaeological record, leading several scholars to advocate their importance as a food source. Evidence from the Olmec site of San Lorenzo, indicates that greater than half of all dog remains recovered showed signs of being consumed (Wing 1978). However, from early on, dog remains, including worked teeth and bone, were also found in burial and other ritual contexts and scholars have long recognized their

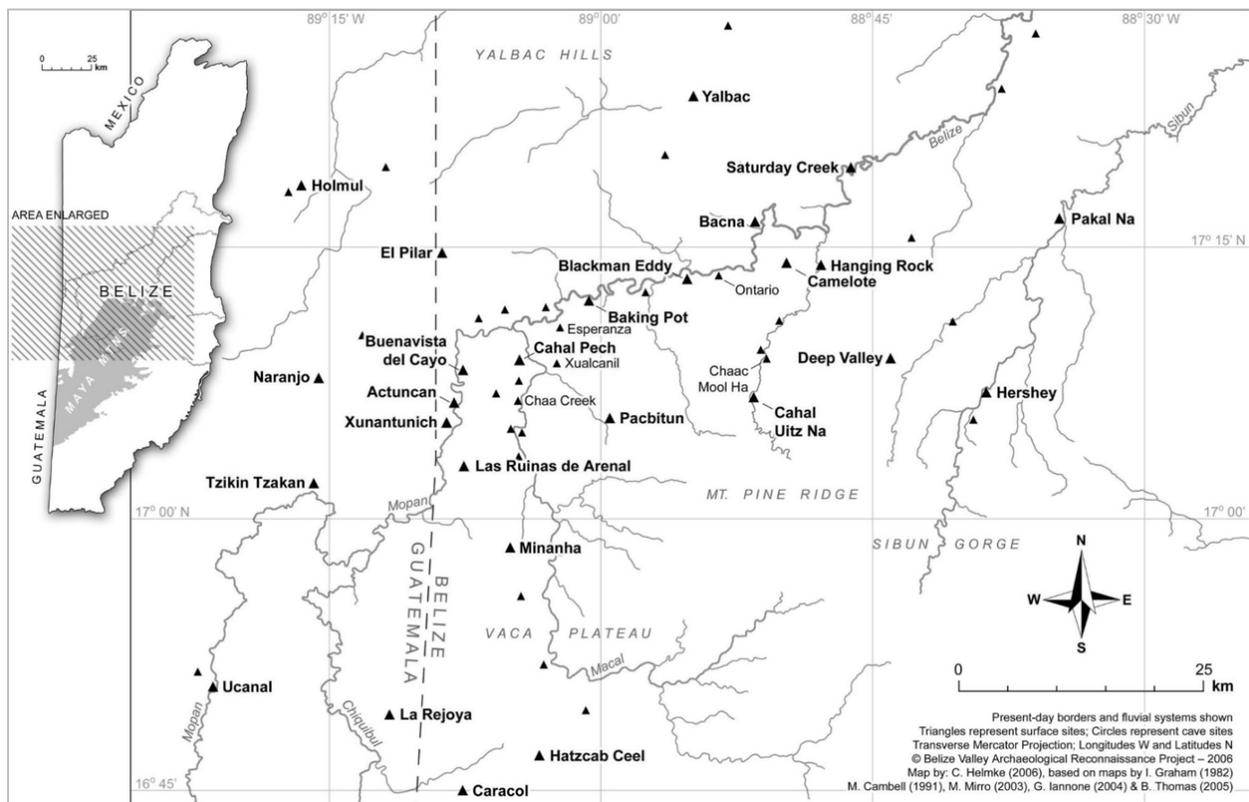


Figure 1. Location of Cahal Pech.

practical, utilitarian and symbolic importance (Valadez Azúa et al. 2013:569) for all Mesoamerican cultures.

Types of Dogs in Mesoamerica

Although some have suggested that all New World domestic dogs are derived from the North American gray wolf (Schwartz 1997), recent DNA evidence indicates that New World dogs are ultimately derived from Old World gray wolves and that “multiple lineages of domesticated dogs” arrived in the New World accompanying the first human colonizers (Leonard et al. 2002; Vilà et al. 1997). In ancient Mesoamerica, there were at least five types of dogs (Valadez Azúa et al. 2013:572). These included 1) the Mesoamerican common dog; 2) the hairless dog or *xoloitzuintles*; 3) the short-legged dog or *tlalchichi*; 4) the short-nosed or Maya dog; and 5) the wolf-dog hybrid.

The Mesoamerican common dog is described as a small, slender dog and was fairly widely distributed throughout Mesoamerica, including the Maya area, by the Late Preclassic.

The hairless dog, also known as the *xolo*, was restricted in its distribution to Western Mesoamerica until the sixth century AD when human migratory movements expanded its distribution eastwards. The hairless dog is believed to have first made an appearance in the Maya area in the thirteenth century AD. The ‘hairlessness’ of the *xolo* is the result of a phenotype now classified as canine ectodermal dysplasia, or CED, and also results in these dogs missing their simple incisors and premolars (Valadez Azúa et al. 2013).

Also originating in Western Mesoamerica, the *tlalchichi*, or short-legged dog, was thought to have had a very small area of distribution and not introduced into the Maya region until the Terminal Classic period (Valadez Azúa et al. 2013). A recent study by Elizabeth Olsen and her colleagues (Olsen et al., n.d.), however, indicates that the *tlalchichi* was introduced to the Maya area by the Early Classic period. The *tlalchichi* is characterized by its short limbs, which is caused by achondroplasia, “an autosomal-recessive genetic disease of dogs

characterized by disproportionate dwarfism” (<http://vetbook.org/wiki/dog/index.php/Achondroplasia>).

The short-nosed Indian, or Maya dog, was smaller and more slender than the Mesoamerican common dog. According to Valadez Azúa et al. (2013:576), this breed “lived in isolation when compared to other dog populations...in the rest of Mesoamerica”, suggesting that the Maya dog was restricted to the Maya region. Olsen et al. (n.d.) further add that the Maya dog was present in this region by at least Early Classic times.

Finally, the wolf-dog hybrid, as the name implies, is the result of purposeful cross-breeding between wolves and dogs and had a very restricted distribution to Central Mesoamerica.

Osteologically, the dog breeds can be identified by using a combination of bone morphology and metrics, and in the case of the *xolo*, by dental abnormalities.

Ancient Maya Use of Dog

Like in other Mesoamerican cultures, the dog had practical, utilitarian and symbolic purposes to the ancient Maya. Given the ubiquitous nature of dog remains in the archaeological record, they are, by and large, cited by many Maya scholars as a common food source (Carr 1986; Clutton-Brock and Hammond 1994; Hamblin 1984; Miller and Taube 1993; Pohl 1985, 1989; Sharer and Traxler 2006; Shaw 1999; Wing 1978, 1981), although their ritual importance has received an equal and increasing amount of attention (Brown and Emery 2008; Emery 2004b; White et al. 2001, 2004). It is important to note that distinguishing between those dogs used solely for consumption versus dogs used explicitly for ritual purposes is challenging because dogs used in rituals were often also consumed.

Patterns of dog use by the Maya have been noted by several scholars. These have been summarized by Kitty Emery in a recent paper examining the utility and challenges of assessing regional and temporal patterns of ancient Maya animal use (Emery 2004b). Several other scholars have noted the relative abundance of dog remains from Preclassic contexts, suggesting that dog made up a significant proportion of the Preclassic Maya diet (Carr

1986; Clutton-Brock and Hammond 1994; Shaw 1999; Wing 1978; Wing and Scudder 1991; Wing and Steadman 1980). By the end of the Preclassic period, the extant data suggests that there is an apparent decline in the exploitation of dogs, with a resurgence in their use during the Postclassic to Historic periods (Emery 1999; Masson and Peraza Lope 2013).

Dog remains from Kaminaljuyu in Guatemala (Emery et al. 2013), from Cerros (Carr 1986), Cuello (Clutton-Brock and Hammond 1994, Wing and Scudder 1991), and Colha (Shaw 1999) in northern Belize, and from Dzibilchaltun (Wing and Steadman 1980) in the Yucatan Peninsula indicate that the dog was an important food source at these sites during the Preclassic period. Additionally, they also may have been important components of ritual events, particularly at Colha and Cuello, where young dogs appear to have been reared for consumption during important feasts (Clutton-Brock and Hammond 1994; Shaw 1999).

Emery (2004b) examined dog data from twenty Maya sites of various time periods to see if the above mentioned patterns in Maya dog use had any statistical validity in a regional perspective. Her results confirmed that, for the Preclassic period, dogs were primarily used as a source of food in the Maya lowlands. Her investigations further noted that following a steady decline in dog use over time, there was a renewed use of dog during the Terminal Classic, and a resurgence in their relative abundance by the start of the Postclassic period.

Evaluating Dog Use in the Upper Belize River Valley

One of the primary purposes of our analysis of dog remains from the Belize Valley was to determine whether the data from this lowland Maya sub-region reflected a similar pattern to that observed by Emery (2004b) in the greater Maya area. Before discussing the Belize Valley data, however, it is important to identify some of the limitations and obstacles associated with any regional study of animal utilization based on faunal remains. Emery previously identified a number of these challenges, and, in fact, commented that “the variability in archaeological and zooarchaeological methods across the science, suggests that we do not yet

have an appropriate basis for regional interpretation” (2004:38).

Many of the limitations to regional interpretation are related to 1) incomplete datasets and 2) variability in the quality of data in terms of preservation and research methods. Incomplete datasets refers to inadequate sample size, or sample representativeness. Indeed, there are many sites and time periods for which we do not have anywhere near representative faunal samples. This holds true for many of the centers in the Upper Belize River Valley region. Most of the sites within the valley that have yielded vertebrate remains, only produced specimen totals that range between one hundred and one thousand, a number that Emery suggests “are unlikely to effectively represent the diversity of taxa of the region or the characteristics of animal use at a site” (2004:41). In fact, she suggests that the number of identified specimen values, or NISP, needed for a representative sample is between 3,000 - 5,000 specimens.

Equally important as sample representativeness, is the issue of sample comparability, or data quality. Data quality is affected by a host of factors. These include appropriate recovery methods, recognizing potential sample biases due to specimen preservation and their depositional contexts, having adequate comparative materials for accurate identifications, and using appropriate and accurate quantification methods for the identified faunal assemblage (Emery 2004:43). In other words, accurate and detailed data are needed to ensure that samples are “directly comparable” (Emery 2004:42).

So that’s the bad news. The good news is that, with the possible exception of the white-tailed deer, the analysis of dog use by the ancient Maya is not as affected by issues of data quality as are other species. Dogs are medium-sized animals and their bones and teeth represent a generalized mammalian skeleton. Dog remains are also relatively robust, and tend to preserve fairly well in the archaeological record. Perhaps the most important thing about examining patterns of dog use, however, is that their bones and teeth are easily identified by zooarchaeologists. There is likely not a faunal comparative reference collection in the world that does not include several domestic dog

skeletons. We believe that published dog identifications are accurate and representative of their abundance in a given faunal assemblage, although their relative abundance to other species is still affected by the limitations we’ve just outlined.

Dog Use at Cahal Pech

Excavations conducted at Cahal Pech since 1988 have yielded greater than 25,000 animal remains from within the site core and its peripheral settlement groups, most notably the Tolok Group. The remains of dog, including modified teeth and bone, have been found in both primary and secondary contexts dating from the Preclassic to the Terminal Classic periods.

Excavations in Structure B-4 resulted in the recovery of a total of 14 dog bones, or 5.8% of the identified vertebrate assemblage. Of these, 13 dated to the Preclassic period, including nine specimens from early Cunil (1100-900 B.C.) contexts, accounting for 9.5% of the Preclassic identified vertebrates. This is generally comparable to the relative abundance of dogs noted at other Preclassic sites. However, of the 13 dog bones identified, seven are scapula elements found within a deposit of other scapulae, including those of deer and peccary, suggesting that the deposit is ritual in nature.

Within the Tolok settlement group, just southeast of the Cahal Pech site core, an undisturbed late Middle Preclassic midden was found at the base of an abandoned chultun. The midden contained some 5,600 bone and shell remains (Powis et al. 1999). To our knowledge this still represents one of the largest single assemblages of Middle Preclassic faunal remains. Dogs account for three of the approximately 2,500 bones recovered, or only 0.12% of the identified specimens. The low relative abundance of dog remains in the Tolok midden suggests that they were not an important food source for the Middle Preclassic inhabitants of the site. This contrasts significantly to data from Middle Preclassic sites in northern Belize.

Classic period remains of dog found within the Cahal Pech site core are almost entirely composed of modified remains. These include approximately 3,290 drilled teeth recovered from a transitional Early Classic to

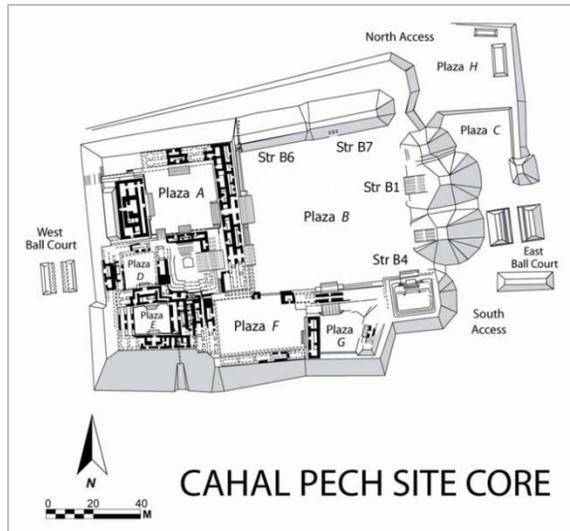


Figure 2. Cahal Pech Site Core.

Late Classic tomb from Structure B1 (Awe 2013; Santasilia 2012) and a total of 481 drilled dog teeth from a Terminal Classic tomb found in Structure H1 (Figure 2) (Awe 2009, 2013). The teeth from both burials had been perforated in one or more roots.

Burial B1-7 dates to the end of the Early Classic and start of the Late Classic, ca. AD 550-650. It was discovered in a large tomb about 3 meters below the summit of Str. B1 (Awe 2013, Santasilia 2012). This burial is one of the richest found at the site, in terms of grave goods, and represents the only multiple burial within a tomb at Cahal Pech (Awe 2013). The tomb contained the skeletal remains of at least three adult individuals. The burial contained 8 ceramic vessels, several polished stone objects including 12 jade beads, three jade celts or belt plaques, two jade bar pendants, a jade effigy pendant depicting the corn god, and three jade ear flares. Shell and bone objects were represented by three deer antler rings, one complete and 7 fragmented styluses, three pins, four shell adornos with obsidian and spondylus shell inlays, a shell inkpot with red, black, yellow and blue pigment, a bone spatula carved with a hand design, and numerous other small objects (Figure 3) (Awe 2013).

The dog teeth found in Burial B1-7 are thought to be from a necklace and were found in the northern end of the burial chamber (Santasilia 2012). Preliminary analysis indicates that the majority of the teeth are represented by

upper and lower incisors and canines, although premolars and molars area also present. Preliminary estimates of minimum number of individuals, based on the pairing of upper incisor teeth, suggest that a minimum of 398 dogs may be represented. Age estimates based on tooth eruption and attrition, has not been conducted. To our knowledge, this is the largest single assemblage of perforated dog teeth recovered from a burial or offering of any sort in the Maya Lowlands.

Another large quantity of perforated dog teeth was found in a Terminal Classic tomb, designated Burial H1-1, located within Structure H1. This is the only Terminal Classic interment of a high ranking elite found at Cahal Pech (Awe 2009, 2013). Burial H1-1 was discovered just below the floor of Str. H1b, on the eastern side of Plaza H. The large tomb was constructed of cut stones that had been scavenged or looted from a Late Classic building that was subsequently covered over by Str. H1a. Inside the tomb were the articulated remains of a young adult male. The skeleton was in an extended position with head to the south. Associated with the burial were a variety of grave goods including 11 ceramic vessels (Figure 4), approximately 24 complete and fragmented, perforated deer bone tubes, five obsidian blades, a carve jade pendant, two jade ear flares, two jade beads one modified conch shell and one shell bead (Figure 5). Burial H1-1 represents the last ruler in Cahal Pech's incredibly long history of occupation (Awe 2013). Non modified faunal remains were also intentionally interred, including at least one peccary and several foot bones of a white-tailed deer, suggesting that a deer skin may have been placed within the tomb.

A total of 481 perforated dog teeth were recovered within the H1 tomb. A preliminary analysis of the teeth indicates that they come from both immature and adult aged dogs, based on wear patterns observed. Immature dogs, likely ranging in age from between 6-7 months to 12 months based on the presence of premolars and molars with little to no tooth wear, dominate the assemblage. All of the teeth are either premolars or molars. In contrast to Burial B1-7, no canines or incisors were noted. More specifically, the majority of the teeth are the lower third or fourth premolar or the first or

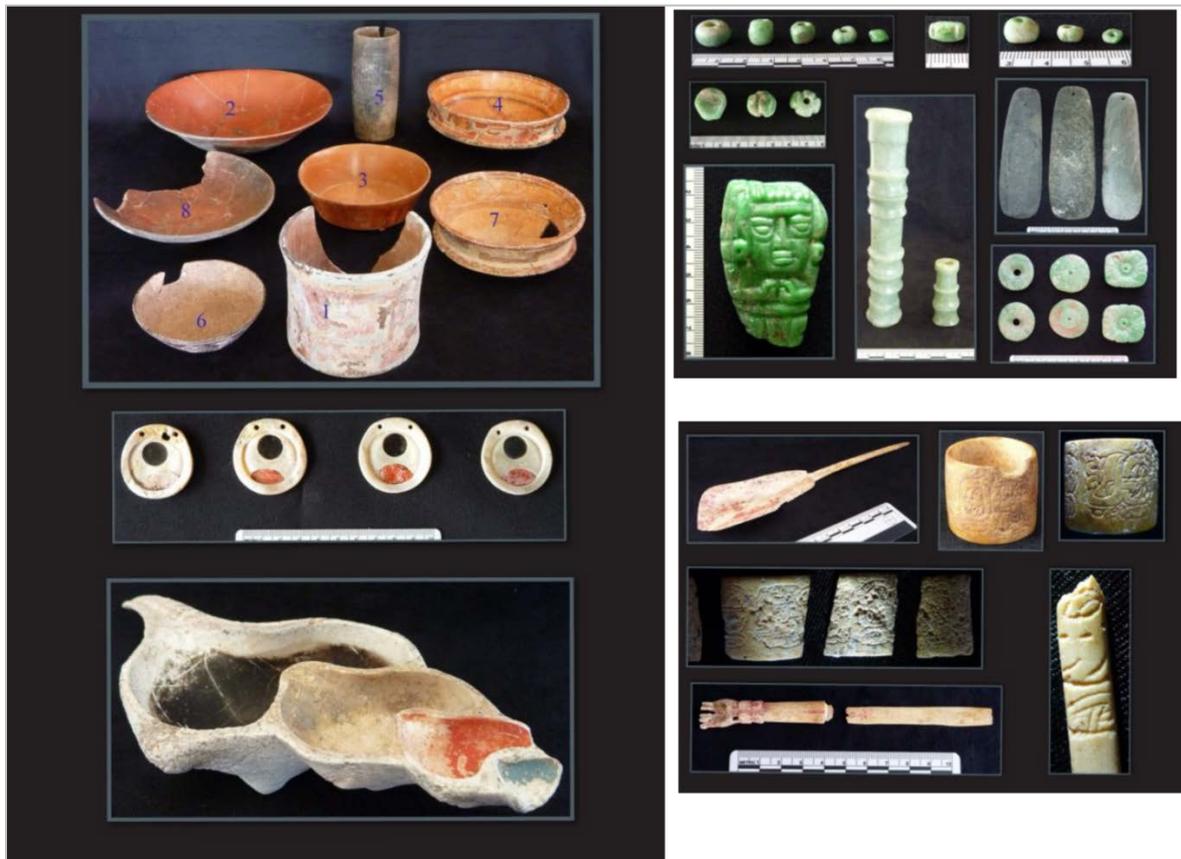


Figure 3. Artifacts recovered from Burial B1-7.



Figure 4. Ceramic vessels from Burial H1-1.



Figure 5. Dog teeth and other artifacts from Burial H1-1.

second lower molars. A minimum of 52 immature dogs are represented. Additional examination of the teeth is necessary to provide a more accurate indication of the age range of the dogs. No other dog skeletal elements were noted in the tomb with the exception of the drilled teeth.

Discussion

The dog data from Cahal Pech is largely derived from ritual contexts, and more specifically from burials and caches. Apart from the Middle Preclassic midden at Tolok, no dog remains have been recovered from contexts that can be clearly interpreted to represent food refuse. This contextual distribution suggests that dog was likely not a significant food source during the Preclassic period. This pattern is similar to that observed at Pacbitun, where Arianne Boileau (2013:150) noted that “dogs do not appear to have been an important source of food”. Indeed, Boileau (2013:159) suggests that “the use of dogs as a source of food during the Middle Preclassic period may have been restricted to northern Belize”.

Assessing the importance of dog as a food source at Cahal Pech during the Classic period is more difficult and highlights many of the challenges facing zooarchaeologists working in

the Maya area. The circa 4,500 dog teeth, representing a minimum of approximately 450 dogs, recovered from two Classic period burials at Cahal Pech, indicates the importance of dogs as a source of raw material for the manufacture of personal adornments. The inclusion of the dog remains as grave goods in elite burials, also reflects their symbolic importance to the Belize Valley Maya. Although it is tempting to argue that the 450 dogs used in the manufacture of the teeth were consumed prior to being used for secondary purposes, we in fact have no evidence for making that conclusion. The apparent lack of dog remains in Classic period middens at the site, thus suggests that during the Classic period, dogs may not have been an important food source. This observation concurs with the results reached by Emery (2004) in her regional study of dog use, and with Carolyn Freiwald (2011:257) who stated that “zooarchaeological evidence suggests that dogs were not an important part of Maya diet during the Classic Period...in the Belize Valley”. Dog remains have also been found in low frequencies in Classic period deposits at several other Belize Valley sites, including Buenavista del Cayo (Clowery 2005), Caracol (Teeter 2001), Minanha (Stanchly 2012), Xunantunich

(Freiwald 2010) and Baking Pot (Stanchly 2005, 2011).

It is not uncommon to find drilled dog teeth in mortuary contexts. However, they are usually found in small numbers. The high frequency of drilled teeth found within Burial B1-7 and Burial H1-1 is an unusual occurrence. A similar assemblage of dog tooth pendants was recovered at Actun Polbilche, a cave located near the Xibun River (Pendergast 1974). Excavations in this cave yielded a total of “641 drilled whole and fragmentary *Canis* teeth, plus 217 fragments presumably from drilled teeth” (Pendergast 1974:63). It was estimated that at least 120 or more small and medium sized dogs were represented. The presence of permanent dentition and tooth wear patterns suggested that the teeth were from adult dogs. The 34 ceramic vessels from the cave date the deposit to “the period between about A.D. 850 and the mid to late tenth Century” (Pendergast 1974:47).

Other sites known to have yielded dog tooth beads and/or pendants include Caracol (Giddens-Teeter 2001:259), Pook’s Hill (Stanchly 2006); Uaxactun (Ricketson and Ricketson 1937:206), Altar de Sacrificios (Willey 1972:239), Kaminaljuyu (Kidder, Jennings and Shook 1946:155), Copan (Longyear 1952:112), Mayapan (Pollock et al. 1962:377), and Altun Ha (Pendergast 1979:166), to name just a few.

At Caracol, anklets and bracelets made from modified dog premolars were recovered from a Late Preclassic cist burial (Giddens-Teeter 2001:259). A total of 299 teeth, representing at least 99 dogs were noted. These were modified differently than the Cahal Pech dog beads. The premolars were cut horizontally along the crown and root tips. The roots were then “hollowed through to allow stringing” (Giddens-Teeter 2001:259). The age range of dogs represented is not provided.

Several questions arise from the recovery of such large quantities of drilled dog teeth: 1) were dogs killed specifically for tooth extraction?; 2) if so, were they killed all at once or were the teeth simply removed from dogs that died natural deaths?; 3) if the teeth were collected from naturally deceased dogs, were they collected over time, curated and then modified specifically for interment?; 4) were

dog tooth pendants gifted to the rulers?; 5) if so, were they gifted locally or from far away? Future analysis of the teeth recovered from the two tombs will focus on completing the identification of each specific tooth so that more accurate age profiles can be obtained, and minimum number of individuals determined.

In conclusion, our data indicates that the majority of dog remains at Cahal Pech, and in the Belize Valley in general, are associated with elite burials and caches, and not with contexts associated with food refuse, such as middens. The data further suggests that dog was an important raw material for the manufacture of personal adornments and the inclusion of dog remains in elite burials hints at their symbolic importance. At the same time, our ongoing analysis of the Cahal Pech dog assemblage, and our review of existing data on dog use at sites in the Belize River Valley suggests that the domestic dog may not have been a common food source for the ancient inhabitants of this lowland Maya sub-region. At Buenavista del Cayo, for example, dog remains were found within a Late Classic palace midden believed to represent food refuse associated with feasting (Clowery 2005), perhaps indicating that dog consumption may have been restricted to specific ritual events. In spite of this situation, however, we must recognize the possibility that we are not recovering the remains of dogs that were likely consumed because they may have been discarded in open middens where they could have been scavenged by other animals or destroyed by the elements. This situation could certainly explain their low frequency in the archaeological record vis a vis remains that were ritually deposited in sealed contexts. In the end, the one thing we do know for sure is that, for the ancient Maya of the Upper Belize River Valley, the dog had practical, utilitarian and symbolic importance.

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23 **DREAMS AT LAS CUEVAS: A LOCATION OF HIGH DEVOTIONAL EXPRESSION OF THE LATE CLASSIC MAYA**

Holley Moyes, Mark Robinson, Barbara Voorhies, Laura Kosakowsky, Marieka Arksey, Erin Ray, Nicholas Bourgeois and Shayna Hernandez

This paper presents results of cave investigations at the site of Las Cuevas carried out by the Las Cuevas Archaeological Reconnaissance (LCAR) from 2011-2014. Las Cuevas, located in the Chiquibul Forest Reserve in western Belize, appears to be a typical Late Classic, medium-sized, administrative/ceremonial center, but has something that most others do not—a large cave system that runs directly beneath the main plaza. The cave whose entrance sits directly below the largest eastern pyramid is entered via a sinkhole. The site’s architectural layout and incorporation of natural features creates a cosmologically salient space designed to sanctify the rites and ceremonies that occurred within the precinct. We discuss the site layout and architectural modifications made to the cave as well as our findings from excavated contexts. Because of its elaboration and massive architectural program, we argue that Las Cuevas was likely to have been an important “Location of High Devotional Expression” in the Late Classic period.

“There are some sites, I would argue, which we can only begin to make intelligible to us if we regard them as the product of a powerful imaginative symbolic system (“a dream”) of which we have at first sight no very clear idea. There is implied here a vision, a worldview...”

Colin Renfrew 2001:17

Introduction

In his 2001 assessment of Chaco Canyon, Colin Renfrew suggested that the site was a Location of High Devotional Expression (LHDE), a city cosmologically charged whose economy depended on symbolic currency in exchange for tribute or votive offerings. Renfrew suggested that LHDE were the places that dreams were made of, places of ideological significance where rites and ceremonies were conducted that sustained the hopes and aspirations of pilgrims from far and wide. He compared Chaco with other sites such as the temples at Malta, the stones of Stenness on the Orkney Islands of Scotland, and the Church of St. James de Compostella in northern Spain. In his ruminations he examined the material characteristics of such sites and described how we might recognize one in the archaeological record. Renfrew observes that LHDE will often display monumental architecture and structures often define special approaches to the site that may exclude or restrict certain areas. The architecture makes use of “attention focusing” devices (Renfrew 1985:1) and the site contains features of cosmological significance or perhaps special alignments or axis that create

cosmological synergies. LHDE are often found in isolated places, away from large population centers where a large scale of labor input might not have been anticipated. At least part of the material culture at these sites will serve to facilitate ritual and objects may come from a wide range of places to be left as offerings. Such locations will also have evidence that large numbers of people participated or witnessed rituals or ceremonies. There may also be evidence of temporal structuring such as periodicity in artifact deposition. Finally Renfrew cautions that LHDE should not be thought of as exclusively religious or symbolic places, but that the sites will certainly have a strong symbolic component.

Based on Renfrew’s insights, we propose that the Las Cuevas site, located in the Chiquibul Forest Reserve in western Belize is an LHDE and perhaps one of the most important LHDE for a large region that included the Belize Valley as well as polities to the south. Las Cuevas has been under investigation by the Las Cuevas Archaeological Reconnaissance (LCAR) since 2011. Our work has included mapping, test pitting, horizontal excavations, and chronology building using ceramic analyses as well as AMS dating. This paper focuses primarily on the cave at Las Cuevas and synthesizes our current thoughts on how it was used, who used it, and how this ritual complex fits into the socio/political landscape of the Late Classic period.

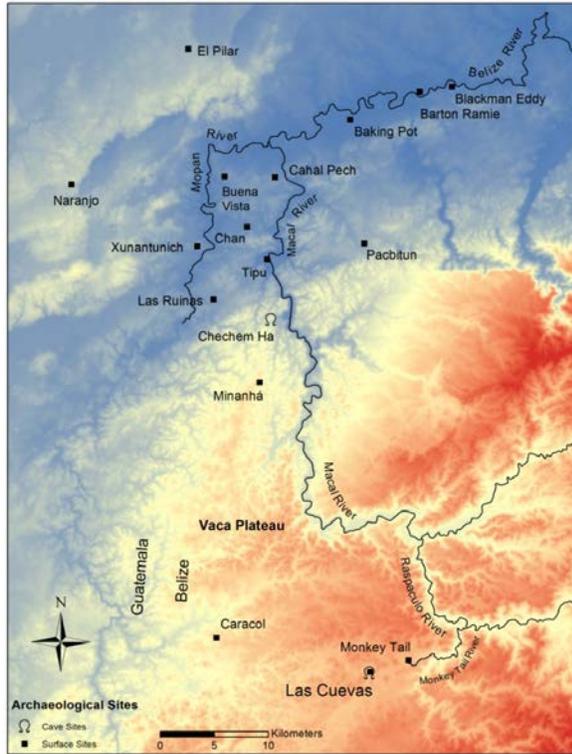


Figure 1. Map of western Belize showing location of Las Cuevas in western Belize (Courtesy of LCAR).

Las Cuevas

Las Cuevas is a mid-sized center located 14km as the crow flies southeast of the mammoth polity of Caracol (Figure 1). In four field seasons, initiated in 2011, we recorded 26 structures situated around two plazas (Plazas A and B), a ballcourt, and a sacbe leading into a hillside as well as an elite *plazuela* group set on a platform just to the north of Plaza A (Figure 2). The surface architecture surrounds a 15m deep dry cenote (sinkhole) with a huge cave entrance at its base on the west side. In the cave's interior is an additional cenote where an underground river surfaces. A 335m cave system runs beneath Las Cuevas Plaza A and directly underlies Structures 1, 3, and 4 as well as the plazuela group.

Las Cuevas' short history makes its spatial layout more legible than would be expected at a site with a longer temporal span, and therefore a greater number of building programs and political fortunes (Ashmore and Sabloff 2002: 211). Plaza A is reminiscent of Tikal's twin pyramid complexes, particularly the North Acropolis, with east/west oriented twin

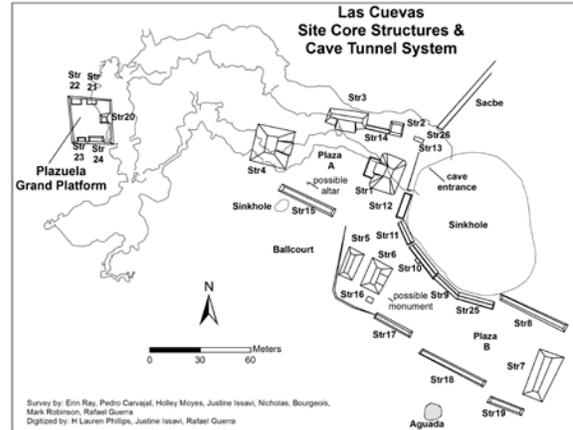


Figure 2. Site map of Las Cuevas site core showing surface structures and the underlying cave system (Courtesy of LCAR).

structures thought to mark the path of the sun, a northern palace and low southern structures believed to represent the underworld (Ashmore 1991:200-203). In Plaza A we have two similar sized structures that were found to be the same height (8 m post excavation), positioned on an east/west axis. The eastern temple, Structure 1, is located directly above the cave entrance. To the north is a large range structure that has yet to be excavated that we suspect is an elite palace. Although at Tikal there are structures on the southern side of the plaza set with nine doorways, at Cuevas there is a long low linear structure standing .7m in height that defines the southern border of the plaza. The north/south oriented ballcourt (the axis is 23° east of north) sits just south of the eastern structure, similar to that found at Tikal's North Acropolis. The ballcourt serves as the western structure for Plaza B and has steps off the back protruding into the plaza (Robinson et al. 2013). Plaza B has a northwest/southeast orientation with a southeastern temple facing the ballcourt across the plaza. Bordering the north and south are additional long, low, linear structures similar to those in Plaza A. The structures on the north side curve, hugging the circular rim of the cenote. According to Ashmore and Sabloff (2002), for the ideal Late Classic Maya site plan, the two plazas should be set either on a north/south or east/west orientation depending on political leanings, but at Las Cuevas, Plaza B is placed southeast of Plaza A. Rather than exhibiting an orientation based on the cardinal

directions, the cenote defines the shape and size of Plaza B. Additionally, it can be no accident that Structure 1, which anchors Plaza A, was placed directly above the cave entrance nor that the cave tunnel system runs below all three of the large Plaza A structures.

Understanding the importance of Maya sacred geography helps us to appreciate the cosmological salience of the Las Cuevas site layout. What is impressive is that the vertical model of a three-tiered universe containing the sky, the earth, and the watery underworld is writ large at the site. As Brady and Ashmore (1999) noted, this manifests as the sacred mountain/cave/water complex is at the heart of Maya cosmology. Deities are associated with each domain and it is through ritual that the three can be aligned, portals opened through blood sacrifice, and contacts can be sought. Both earth deities such as the rain god Chac and underworld denizens such as the evil Lords of the Underworld were thought to live in caves and could be more easily contacted there (See Moyes 2012 for discussion). This helps explain why deep natural caves were and are exclusively used as ritual spaces (Christenson 2008, Prufer and Brady 2005, Moyes and Brady 2012). Given this underlying cultural logic it is not surprising that in the Classic period, caves became highly politicized spaces (Brady 1989; Brady and Colas 2005; Moyes 2006; Moyes and Prufer 2013; Stone 1995). Sacred ritual was an important political tool that could be manipulated by kings and elites, so that caves operated in political arenas. Therefore control of these spaces also represented control over the natural environment, the earth itself, and its indwelling deities (Moyes 2006; Moyes et al. 2009).

Caves also served as fundamental anchoring points for Maya communities and played an important role in settlement. Work by ethnohistorian Angel García-Zambrano (1994) demonstrated that caves and waterholes functioned as salient geopolitical entities. In his study of the mid-16th century Town Land Titles (*Títulos de Pueblos y Tierras*), he discussed models of ideal landscapes that figured prominently into immigrant's decisions regarding where to settle. The ideal location included a centrally located mountain that

represented the center of the world. In this ideal case, the central mountain was dotted with caves and springs. Caves with water emitting from their interiors were favored, but man-made substitutes or modified crevices could be created to fit the model. A chosen cave would then function as the mythological place of origin of the people and the sacred core of the community providing the "cosmogonic referents that legitimized the settler's rights for occupying that space and for the ruler's authority over that site" (García-Zambrano 1994:217-218). If the local topography failed to naturally mimic the ideological model, modifications could be undertaken as we see played out at Las Cuevas.

We can be relatively certain that the cave at Las Cuevas with running water in the entrance chamber attracted settlers for both cosmological and practical reasons. The placement of Structure 1 directly above the cave mouth served to reify the existing cosmological referents to create a natural cosmological theatre as a backdrop for rites and ceremonies in a powerful expression of the natural and built environment. In addition, Structure 1 was crowned with a stucco frieze above the doorway leading to the interior rooms (Robinson et al. 2014). Such a feature is normally reserved for typical elite structures and is a highly unusual feature at mid-sized sites such as Las Cuevas. Although the frieze had been completely destroyed, we recovered a single stucco tooth among the rubble. This suggests that the frieze represented an incarnation of a toothy maw, such as that described as the zoomorphic earth monsters in comparative architecture (See Schávelzon 1980 for discussion), marking the structure as a sacred mountain. This is in keeping with other ancient Maya constructions that referred to and replicated the sacred landscape, building temples to represent sacred mountains and constructing rooms at their summits to replicate their caves (Vogt and Stuart 2005), echoing the cosmological significance of the site plan at Las Cuevas.

Las Cuevas appears to be a Late Classic manifestation, though we are fairly certain that people were in the area in the Late Preclassic period. However, there is no evidence of Preclassic cave use or that any of the larger buildings were constructed at that time. The

project located one small deposit of Late Preclassic sherds beneath the platform upon which the ballcourt sits (Moyes et al. 2011) and a burial placed in front of the eastern structure of the plazuela group is possibly Preclassic based on the presence of Chicanel ceramics accompanying the remains, but the structure itself appears to have been built in Late Classic period (Carpenter 2013). Based on 25 AMS dates, the structures, as well as the use of the cave, date to between AD 641-985 at the 2 sigma range. Ceramic cross-dating places all building phases at the site into the later part of the Late Classic period (Tepeu 2/ Spanish Lookout), which agrees well with the radiocarbon dates. Additionally, the ceramic types found at the site are typical of the Petén, Belize Valley and points south, suggesting influences from afar, though we are awaiting the results of compositional analyses to determine if they are actually manufactured and imported from elsewhere (Kosakowsky et al. 2012).

Although Diane and Arlen Chase (2014) argue that large polities in the Maya area were capable of directly controlling areas of 7,000-9,000 square kilometers, our research has been unable to establish any direct connections to Caracol despite Las Cuevas' proximity to the larger site. Caracol has an extensive road system radiating from the site core, yet there is no road to Cuevas. Based on the perusal of our recent LiDAR surveys we do not find continuous population density between the two sites and a natural karstic ridge separates them. Unlike Hatzcap Ceel (Mountain Cow), a mid-sized civic/ceremonial center east of Caracol (Morris 2004), there are no stelae proclaiming a relationship or control by the larger city. The mosaic-style building techniques at Cuevas are not consistent with masonry at Caracol, nor do we find burials or caches in our large eastern or western structures as might be expected if burial practices were similar (Carpenter 2013; Robinson et al. 2013). In fact, after extensive excavations we have only encountered a sole burial that was discovered in the plazuela group, which appears to be a single individual. The skull is missing as well as numerous other bones, suggesting the remains are a secondary interment.

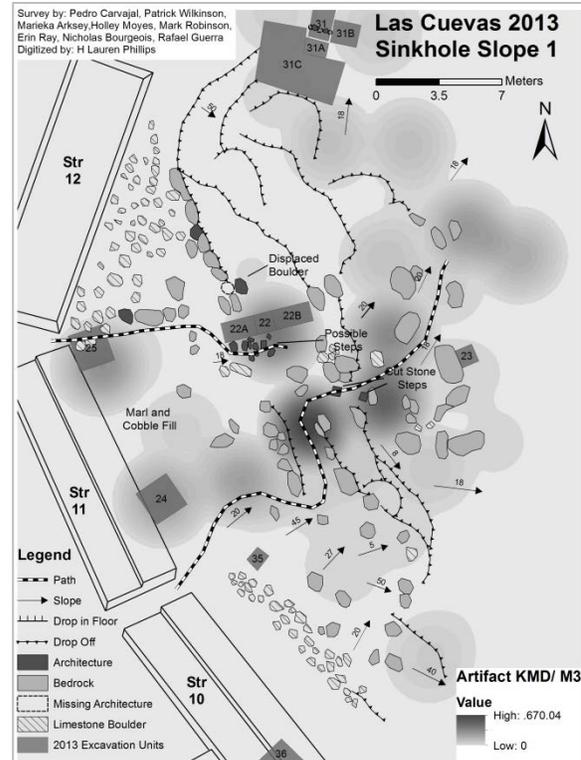


Figure 3. Map showing entrance to the cave from the southwest side of the cenote (Courtesy of LCAR).

The Cave at Las Cuevas

To reach the cave from the site core, one descends into the cenote from Plaza B (Figure 3), and enters it through two narrow passages less than a meter in width between linear Structures 10 and 11 and 11 and 12 respectively. The area behind the structures was filled and leveled and a few remnant steps suggest that there was a formal path leading down the southwest slope to the cave entrance below. Natural bedrock outcrops were modified using uncut limestone boulders to form terracing. Our excavations in Unit 31 demonstrated that there were buried terraces at the base of the path just in front of the cave. Subsurface shovel pit testing of the cenote was instructive because we were able to demonstrate that based on artifact density analyses this was the only part of the cenote that was clearly used. We have suggested elsewhere that the architecture defined a ritual pathway leading to the cave along which offerings were made before reaching the entrance (Arksey 2013; Arksey et al. in press).

The mouth of the cave is a mammoth, east-facing entrance, measuring 28m across with

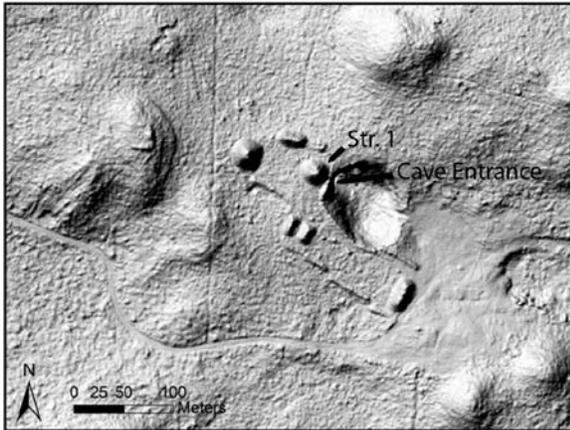


Figure 4. LiDAR image of the Las Cuevas site core illustrating the cave entrance beneath Structure 1 (Courtesy of LCAR).



Figure 5. Wall 1 blocks the entrance to the tunnel system. Note the constructed doorway (Photo by Holley Moyes, Courtesy of LCAR).

a 7.5m ceiling height, positioned at the base of the western side of the cenote (Figure 4). Stalactites hang from the cave's drip line so that the entrance itself resembles a large toothy maw, such as that described as the zoomorphic earth monsters in Maya iconography. We have witnessed clouds emerging from the entrance on at least two occasions, events that reinforce the relationship between caves and rain common in Maya belief (Vogt 1969:302).

The cave mouth opens into a cathedral-like chamber measuring 108m in length, 40m in width, and 17m in height. The Entrance Chamber is heavily modified with monumental architectural constructions including terraces, retaining walls, stairs and platforms that are topped with thick plaster (Moyes 2013). Plastered stairs descend into a cenote in the center of the Entrance Chamber that is lined with



Figure 6. View from the window in Chamber 8 looks onto Chamber 1 cenote, cave mouth, and platforms in the eastern part of the Entrance Chamber (Photo by Oubalit Akeryans, Courtesy of LCAR).

cut stone block retaining walls. At its base is a river that surfaces and then disappears underground. The water level rises and falls in rhythm to the amount of local rainfall. The cenote is surrounded by 73 platforms (surface and subsurface) connected by stairways rising up to the cave ceiling creating an amphitheater-like space. This suggests that the cave was used for large and well-organized ceremonies and that could be viewed by many observers and supported a large number of participants. We have calculated the number of people that could comfortably use the platforms. The surface area of the combined platforms is 533 square meters. If we assume 2 people per square meter (based on Herbert Jacobs 1960 crowd size calculations), the platforms could support 266 people, or if we assume a more crowded 1 square meter per person, 533 people could attend ceremonies. Others may have stood on stairways or paths, but this gives us an idea of how many people were important enough to have space on the platforms.

The Entrance Chamber is divided into east and west areas separated by an archway that from some angles resembles the representations of a large toothy maw, echoing both the mouth of the cave and the frieze of Structure 1 above. As one proceeds west, the light zone fades to twilight and eventually into darkness at the westernmost end of the chamber. The entrance to the tunnel system lies at the back of the chamber on the northwesternmost wall, which forms a natural constriction. A constructed wall (Wall 1) spans the 6.2m wide constriction

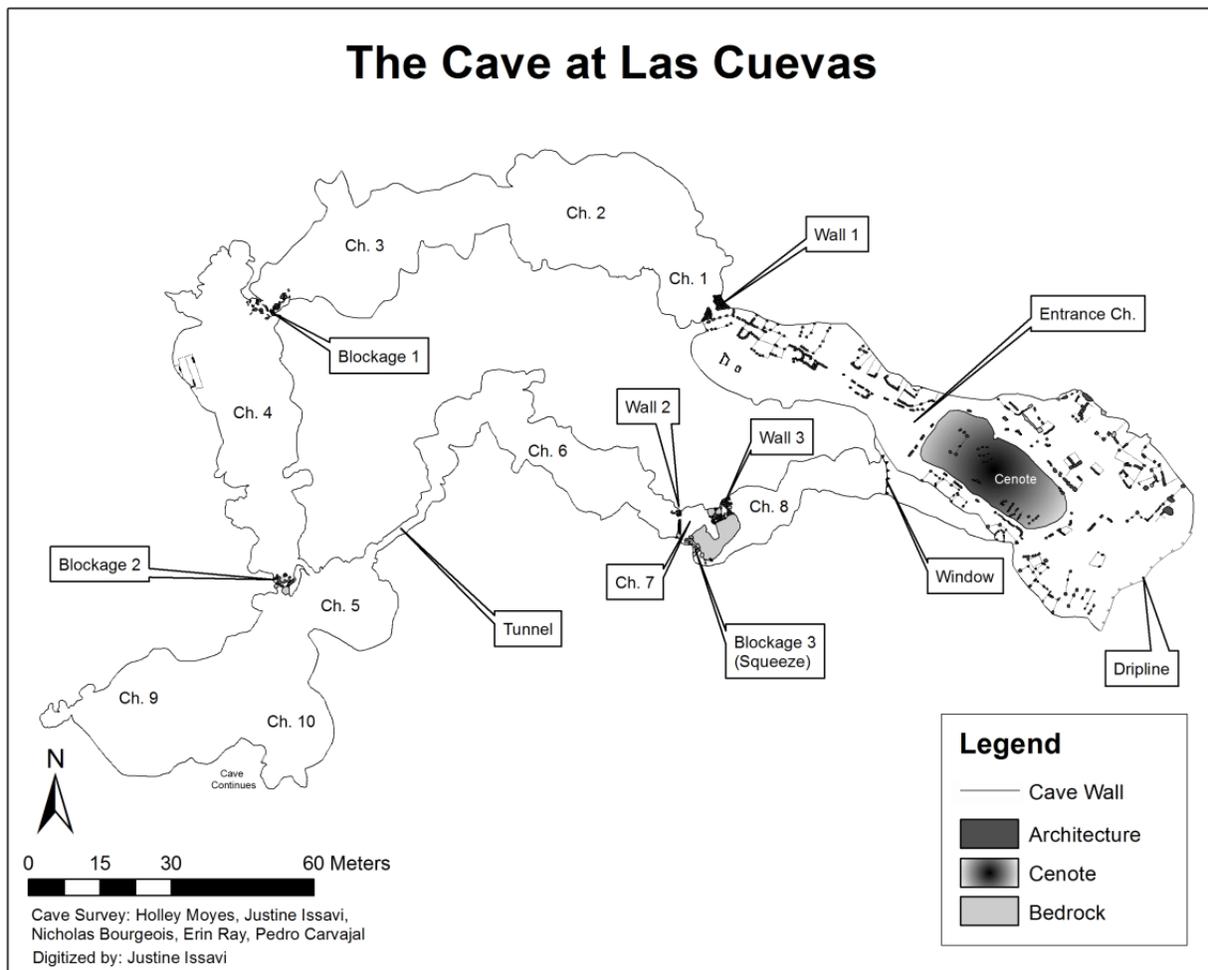


Figure 7. Map illustrating the blockages and walls in the Las Cuevas Tunnel system (Courtesy of LCAR).

blocking it totally (Figure 5). A formal entrance or “doorway” measuring 0.75m in width and 1.1m in height allows only one person to enter at a time, and forces one to bow or duck when entering Chamber 1 from the Entrance Chamber. Loose limestone boulders strewn on the exterior of the wall suggest that the entrance was blocked off at some point in the past.

The tunnel system is comprised of rooms and passages that circle around on themselves and terminate in a window 8m above the cave floor on the west wall of the Entrance Chamber. The window looks out onto the eastern end of the Entrance Chamber with a view to the cave mouth and cenote, as well as the platforms and terraces on the north side of the cave (Figure 6). The acoustics are quite impressive from the window and even a soft voice may be heard all the way to the north wall of the chamber. On the

floor of the window there is a great deal of charcoal but only a handful of potsherds, suggesting that performative activities occurred there as opposed to the deposition of offerings. One can imagine a grand oration being presented from this high vantage point.

As one moves through the system there are three blockages, two additional walls, and a natural morphological restriction (Figure 7). The first blockage is between Chambers 3 and 4. Blockage 1 is constructed with small to medium-sized limestone boulders and speleothems. It further restricts a small 3.3m wide opening with a 0.7m ceiling height forcing one to crawl through a squeeze into Chamber 4. Upright flat stones and a fallen stalactite form an entryway on the northwest side of the entrance. Another blockage, Blockage 2, occurs as one exits Chamber 4 and enters Chamber 5. Here, there is

a 2.5m wide natural constriction with a ceiling height of 1m, plugged by piled up limestone boulders to further restrict the entrance.

A natural constriction occurs as one exits Chamber 5. A long narrow tunnel measuring 23m in length and 1-2.3m in width must be traversed in order to enter Chamber 6. The ceiling height is high enough to allow one to walk through the tunnel. The next construction, Wall 2 divides Chambers 6 and 7. Wall 2 was constructed in the 5m wide natural constriction and reaches from floor to ceiling, measuring 1.5m at its highest point. It is 0.5-0.6m thick, and on the north side there is a constructed doorway measuring 0.5m in width and 0.8m in height allowing only one person to enter at a time. The wall is constructed of small to medium limestone boulders and speleothems. It is nicely laid and held in place by mud mortar. Finally, Chamber 7 contains two constructions. At the back of the chamber there is a natural 4.4m opening into Chamber 8 along the west wall. This was completely blocked off from floor to ceiling at one time by Wall 3. The wall is constructed of well-laid small to medium-sized limestone boulders and is 2.5m in thickness. Looters have collapsed the rock to allow entry to Chamber 8 and loose rocks lie on the floor on either side of the blockage. We suspect that this entrance was completely blocked to force ritual participants to enter Chamber 8 via a small constructed crawl space, Blockage 3, beneath a drop in the ceiling on the north side of Chamber 7 (Figure 8). This constriction is 1.1m in width, with a very low ceiling height of 0.7m. The 2.5m crawl has both a constructed entryway and exit fashioned with upright flat stones and speleothems that constrict the entrance to 0.5m in width.

Chamber 8 terminates with a sheer drop off from the window looking onto the Entrance Chamber. The window measures 5.5m across and has a ceiling height of 3.15m. Although the cave has been heavily looted, we have argued elsewhere (Moyes et al. in press) that small finds and remnant artifacts provide good evidence for activity areas in caves. Comparative data between looted and unlooted caves suggest that looters are uninterested in sherds or even partial vessels that have no economic value. They tend to leave these things behind, carrying only whole



Figure 8. Justine Issavi demonstrates the crawl through Blockage 3 (Photo by Oubalit Akeryans, Courtesy of LCAR).

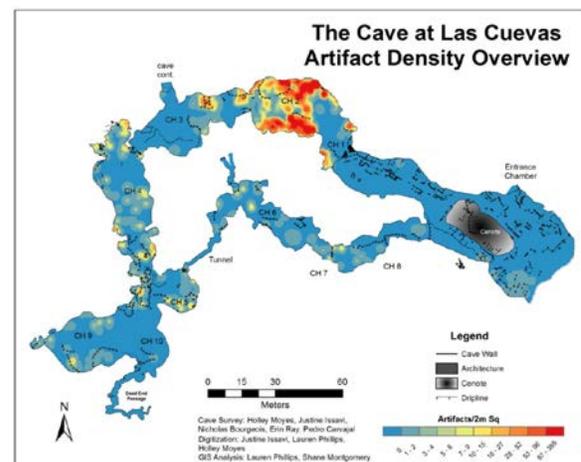


Figure 9. Artifact density map illustrating drop off in deposition as one moves through the tunnel system (Courtesy of LCAR).

objects such as polychrome or slipped vessels, jade, or other items that can potentially be sold on the black market. A density analysis of artifacts from the cave at Las Cuevas illustrates that as one moves through the tunnel system there is a drop off in artifact deposition, and the low density of artifacts toward the tunnel's terminus suggests that fewer people advanced to the end as they wound their way through the cave (Moyes et al., in press; Figure 9). Moyes (2012) has suggested elsewhere that the tunnel constructions created a narrative for the ancient users, representing levels and marking the descent into the underworld realm, finally emerging back into the light high above the cenote at the cave's entrance. The precipitous drop in artifact density and numerous restricted entrances suggest that only the privileged could

make this journey. The journey through the cave is reminiscent of the underworld descent and reemergence of Hun Hunahpu of the *Popol Vuh* story, who is sacrificed and resurrected as the Maize God, returning to the earth as the maize plant. This is replicated by his son Hunahpu, who journeys to the underworld, is sacrificed, and resurrected as the Sun deity. Furthermore, the mythological themes of the journey are at the heart of a Maya religious tradition that is still played out in caves today in the initiation rites of day keepers. In these rites the initiate enters the cave, leaves offerings, and at the culmination of the journey waits for the sun to rise at the cave entrance (Earle 2008:85-88).

Discussion and Conclusion

In this paper we suggest that the site of Las Cuevas is a LHDE as defined by Renfrew. A LHDE is not merely a pilgrimage place but one that instantiates cosmological principals in a grand monumentally-constructed setting serving as a backdrop for large ceremonies. Las Cuevas' isolated location over an hour's walk to any river and away from any large population center, as well as ceramic offerings typical of styles found elsewhere, suggest that supplicants journeyed to the site from far-afield for well-organized ceremonies in these sacred precincts. At Las Cuevas we find a site plan incorporating the natural and built environment that reifies Maya cosmological spatial models on both the horizontal and vertical axes writ large. The mammoth cave Entrance Chamber with its interior water source, modified to comfortably accommodate at well over 200-500 people, created a ritual setting that is unparalleled in the Maya Lowlands. Monumental architecture in the cave entrance suggests polity-sponsored ceremonies, and the restricted entrance leading from Plaza B to the cave indicates that attendance was tightly controlled and that access was granted only to elites and their retinues. Once in the cave, only the privileged few could venture through to the end of the tunnel system eventually emerging into the light to gaze upon the crowds on the platforms below. Jaime Awe and his colleagues (2005) have argued for general elite cave use and it is unfathomable that at Las Cuevas ceremonies could be anything but

elite-sponsored due to the size, labor investments, and monumentality of the space. We argue based on these spatial configurations that the cave ceremonies were by elites, for elites, or possibly sub-elites and their retinues. Non-elites may well have visited Las Cuevas and it is possible that the plazas held large markets and ceremonies provided for the public, but this has yet to be determined. We also speculate that pilgrims may have visited the site to collect or receive pure water brought from the cave's interior water source.

The building of the eastern temple of Plaza A with its stucco frieze as well as the installations of cave platforms all occurred in the Late Classic period after AD 641. Our AMS dates so far do not allow us to refine our chronology, therefore we cannot fully articulate our data within a regional context, but the ceramic assemblage suggests that the site was constructed in later part of the Late Classic period (Tepeu 2/ Spanish Lookout, post AD 700). With almost no Terminal Classic markers, it is likely that the site fell into abandonment about AD 900.

At Caracol this period was one of political flux. In the early 8th century the elite/commoner dichotomy had been suppressed by what the Chases refer to as "symbolic egalitarianism" (A. Chase and D. Chase 2009). A middle class developed and elites shared wealth and identity with commoners. There was little monument construction in the early part of the 8th century and it did not resume until about AD 798. During this time Caracol also began to lose its control over the site of Naranjo that had been under its political sway. The Chases suggest that Caracol then began to focus on internal infrastructure rather than external control. By AD 800, elites at Caracol had reasserted their status differences and symbolic egalitarianism was no longer practiced. By the Terminal Classic period the site fell into disarray and was abandoned as evidenced by unfinished structures and stockpiled garbage that was never used for construction fill as it was intended (D. Chase and A. Chase 2014). Although we cannot articulate building programs at Las Cuevas with the fortunes and misfortunes of the larger site, it stands to reason that Las Cuevas blossomed during the 8th century downturn when Caracol

became more insular, focusing on its own affairs. Because Las Cuevas was clearly not a military state and did not have the sustaining population to engage in warfare, it was unlikely that it was seen as a threat.

It is not lost on us that the site was erected at the onset of a long drying trend culminating in the Late Classic droughts beginning in AD 820 (See Kennett et al. 2012 for discussion). This supports the model developed by John Kantner and Kevin Vaughn (2012) that pilgrimage centers arise when there is climatic unpredictability and religious leaders are thought to influence environmental, subsistence, and/or societal success. It is also possible (and not mutually exclusive) that the site originated as part of the Late Classic Drought Cult proposed by Holley Moyes, Jaime Awe, and their colleagues (2009), as a ritual response to increased societal stress caused by diminishing rainfall and the drying of water resources. Data collected by the Belize Cave Research Project demonstrates that cave use increased dramatically at this time. Many, if not most, caves were used solely in the Late Classic period.

We have suggested that Las Cuevas was an important LHDE, but it was not the only center that sprang up in the Late Classic. Other large caves with monumental architecture such as Actun Chapat in western Belize (Ferguson 2000) or natural features such as the pools of Cara Blanca (Lucero 2013) also may have been visited by pilgrims, ostensibly to supplicate for rain as a result of increasingly dry conditions. From a Durkheimian perspective these ceremonies would have served to promote solidarity during a time of stress. The rites and ceremonies at Las Cuevas would have promoted elite solidarity and therefore impacted the political arena of the Late Classic period. While many of our colleagues will argue, perhaps rightly so, that among the Late Classic Maya environmental change and societal stressors led to increased conflict and warfare, it is comforting to know that there were other responses to uncertainty and duress, and that some groups were coming together in solidarity. Perhaps the cosmological backdrop and elaborate ceremonials at Las Cuevas created a dream of a more peaceful and ordered world set

against the stress and chaos of the Late Classic period.

Acknowledgments

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24 AIRBORNE LIDAR FOR DETECTING ANCIENT SETTLEMENTS, AND LANDSCAPE MODIFICATIONS AT UXBENKÁ, BELIZE

Amy E. Thompson and Keith M. Prufer

This paper examines the use of Light Detecting and Ranging (LiDAR) for detecting ancient settlements and landscape modeling near the Classic Period Maya center Uxbenká, Toledo District, Belize. LiDAR allows archaeologists to “peer” through the dense jungle canopy allowing archaeologists to see large, ancient city centers. The usefulness of LiDAR to detect small, hinterland settlements is explored in this paper using three different visualization techniques in conjunction with the previously mapped settlements at Uxbenká. A hillshade is the least effective for detecting settlements. The point cloud dataset was also ineffective while the slope raster was the most effective. However, traditional settlement survey used in conjunction with the high-resolution LiDAR derived DEM (which used to create a predictive model), remains the most effective method of identifying hinterland settlements. Furthermore, high-resolution (<1m) LiDAR derived products are useful for modeling social movements on the landscape, which aid in our interpretations of the ancient Maya.

Introduction

Aerial Light Detection and Ranging (LiDAR) has recently seen increasing use by archaeologists in order to enhance the detection of ancient settlements in tropical environments. This paper discusses the use of LiDAR for detecting ancient settlements. We focus on a LiDAR dataset covering parts of the Toledo District of Southern Belize, Central America, near the modern village of Santa Cruz and the Classic Period Maya site of Uxbenká.

LiDAR has become increasingly employed by archaeologists for identifying architecture and landscape alterations in forested environments. LiDAR allows archaeologists to discover new archaeological sites, study the spatial arrangements of households, and compare urban centers (Chase et al. 2014; Rosenswig et al. 2013). Furthermore, LiDAR derived DEMs can be used to create high-resolution visualizations of various social and ecological processes. In studies of settlement systems, especially those settlement patterns that are dispersed over a large geographic area, LiDAR can partially substitute for months or years of ground survey, which typically consists of pedestrian survey along hand cleared transects through the jungle.

A key issue in the use of LiDAR is the degree to which it is capable of detecting the wide range of settlement types and related structures that comprise the bulk of the archaeological record in ancient urban environments. This capability has been tested in a case study from Uxbenká, a Maya polity

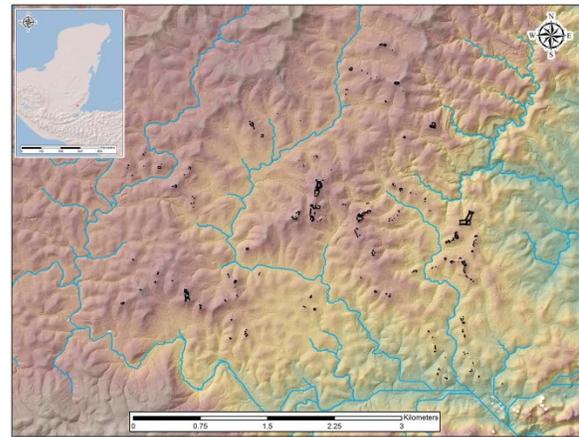


Figure 1. A map of Uxbenká with a LiDAR derived shaded relief map in the background showing rolling topography and the locations of architectural and hydrological features.

spread over 16km² in the foothills of the Maya Mountains of southern Belize (Figure 1). Six years of intensive settlement survey have been carried out at this site by members of the Uxbenká Archaeological Project (see Kalosky and Ebert 2009, 2010; Kalosky et al. 2011; Kalosky et al. 2012; Kalosky and Prufer 2012; Prufer and Thompson 2014; Thompson 2014). This robust data set provides a basis for comparison in testing the ability of LiDAR to detect archaeological features in the highly variable landscape of southern Belize. Much of the area around Uxbenká is utilized in swidden agriculture, resulting in a shifting pattern of vegetation regimes of varying height and density (Prufer et al. 2015). This type of agriculture is in wide use across much of modern Mesoamerica, with several million people

practicing slash and burn farming in various settings (Diemont et al. 2011). We (Prüfer et al. 2015) suggest that smaller structures may not be visible in simple point cloud profiles of LiDAR ground returns or surface relief maps. However, indicators of landscape alteration in the form of leveling hilltops for settlement provide a good predictor for locating a wider range of settlements on the landscape.

Additionally, this paper addresses the impact of variations in data resolution on the resulting digital landscape models derived from that data. LiDAR data creates a high-resolution (<1m) Digital Elevation Model (DEM), which is far superior for modeling purposes to the 30m DEMs that are commonly available for free from various online sources. A comparison of 1m and 30m DEMs will be discussed in regard to their applications in Least Cost Path (LCP) modelling and hydrological modelling in the area around Uxbenká.

LiDAR and Settlement Studies

Archaeological applications of LiDAR datasets are not yet fully developed (Rosenswig et al. 2013). Many studies focus on the ability of LiDAR to detect archaeological features on a given landscape (Chase et al. 2011; Evans et al. 2013; Harman et al. 2006; Štular et al. 2012). Among Mesoamerican archaeologists, LiDAR acquisition has resulted in a shift in the ability to maximize survey (Chase et al. 2012) and interpret highly resolved geospatial data across a landscape.

Most ancient Maya communities are characterized as low-density urban environments with settlements spread across the landscape. Settlements can range from one to many buildings which may be highly dispersed, at times arranged into neighborhoods and districts (Smith 2010, 2011), or nucleated around the center of the community at the site core. The location of settlements and their spatial arrangements were likely influenced by local political, ideological, and social factors. The dispersal of settlements across the hinterlands at a given site contributes to the interest in the use of LiDAR for maximizing survey efforts in an efficient yet accurate manner. The movement of people between settlements within a landscape is also of interest to the study of settlement

archaeology, as people interacted both within and outside of localized social groups. Understanding how past peoples interacted with their environment and the resulting impact on choice of settlement location and formation is also of interest to settlement archaeology. In many areas, as seen at Uxbenká, settlement patterns conform to local topography and are located so as to facilitate access to important resources such as permanent water sources and arable land.

While large ceremonial and administrative cores of Maya polities are usually large enough to be detected on a LiDAR Digital Terrain Model (DTM), the range of sizes of outlying residential settlements varies significantly. Generally, the wealth and status of residential spaces directly correlates to the size of buildings within the settlement groups. This makes settlement archaeology a vital aspect of our interpretations and understandings of past social hierarchies. However, quantifiable settlement data is often constrained by limited visibility across a landscape during pedestrian surveys due to vegetation obscuring low-lying architecture. High resolution LiDAR data gives archaeologists the tools to visualize aspects of settlement systems without many of the impediments of physical surveys. However, the assumption that DTMs reflect a true proxy image of the ground surface and all architectural features on a landscape is misleading and has not been adequately addressed in the literature that is commonly used in the archaeological community. In the following sections, we present the case study of Uxbenká, where many settlement structures are small (<1m), vegetation is dense and of variable height due to shifting agricultural fields, and sufficient pedestrian survey has been conducted to compare the results with a point cloud derived DTM and ground return profiles.

In 2011, the UAP obtained 132km² of LiDAR data centered on Uxbenká from the National Center for Airborne Laser Mapping (NCALM) at the University of Houston. The LiDAR data were collected in late May, at the end of the dry season. Data were collected from 17 North-South and 42 East-West oriented flight transects. The transects were flown at 500m above ground level (AGL) in 287m wide flight

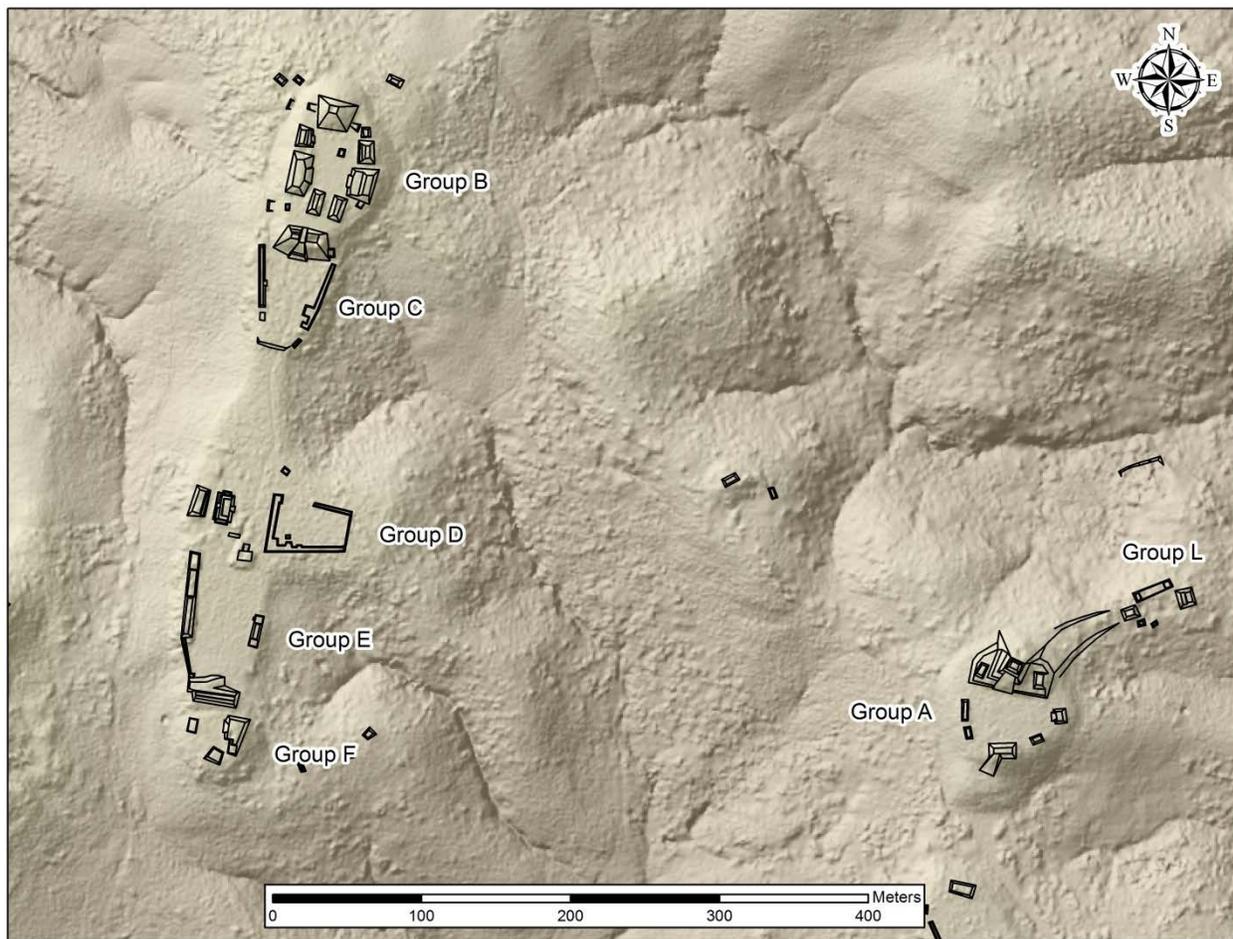


Figure 2. LiDAR derived shaded relief map of the Uxbenká site core architecture (Group A and the Group B-F ridge).

swaths with 50% overlap. Classifications of the raw laser point clouds group the measurements into categories such as vegetation, buildings or ground to create a highly accurate model of the bare earth and features upon it.

Uxbenká Background

Uxbenká is a medium sized Classic Period Maya polity located in the southern foothills of the Maya Mountains in modern day Toledo District, Belize. It is situated along an unusually fertile 25km long hilly relief feature composed of interbedded Tertiary mudstones, sandstones and shales of the Sepur Formation, interspersed with limestone outcrops of the Cretaceous Campur Formation (Keller et al. 2003). Nearby ancient Maya centers include Pusilha, Lubaantun, and Nim li Punit, which are situated along a southwest to northeast axis. Additionally, smaller centers in the region

include Xnaheb, Uxbentun, and Ix Kuku'il. Uxbenká is the earliest and longest occupied polity in the region and likely had a population of between 4000-10,000 people at its apogee between 400-800 C.E. (Culleton 2012; Prufer et al. 2011). Uxbenká consists of two large public architectural complexes within the site core (Group A and the Group B – F ridge), with extensive settlements across the hinterlands (Figure 2).

At the end of the 2014 field season, 115 settlements have been documented at Uxbenká. The methods for surveying settlements at Uxbenká have evolved since the initiation of intensive settlement survey in 2008. In 2005 – 2007, survey initially focused on walking transects to identify architectural groupings, which were mapped using a Leica GPS System 1200. However, in the hilly terrain traditional transects proved inefficient as settlements

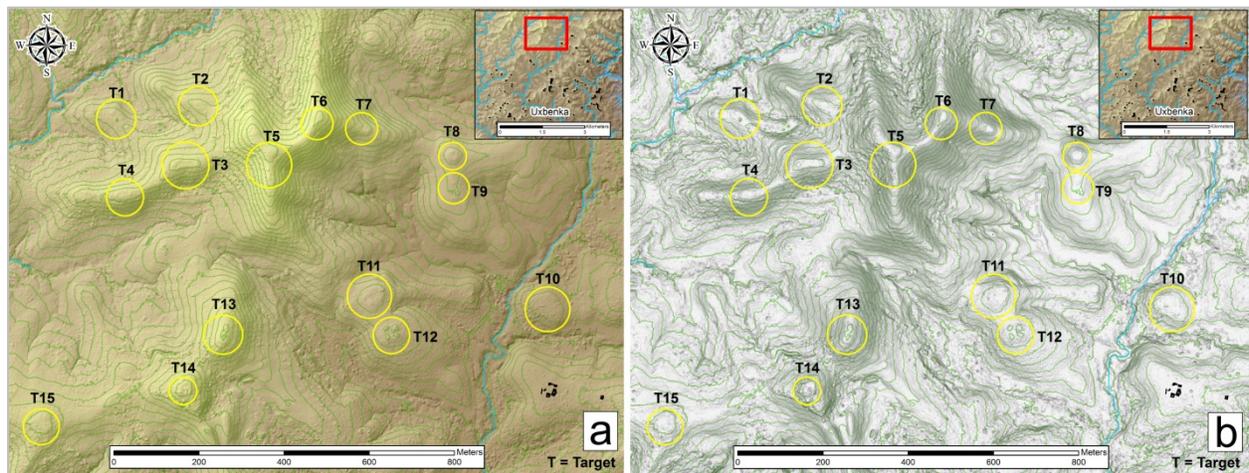


Figure 3. Predictive Model with target names for efficient and effective ground survey using LiDAR derived 5m contour lines, DEMs, DSMs, slope raster, and point cloud information. (a) Targets marked on a hillshade map. (b) Targets on a slope raster.

identified during this time were located almost exclusively on hilltops, a settlement pattern that can be attributed to several factors including high rainfall, farming practices, defense, and personal comfort (see Prufer et al. 2015). From 2009-2012 the survey methods were largely opportunistic. Each year local Mopan Maya farmers from the nearby village of Santa Cruz clear plots of land for the planting of maize, beans, and rice. In doing so, they remove the dense foliage, which provided the UAP with an opportunity to explore previously unexamined portions of the landscape with relative ease (Kalosky and Prufer 2012).

In 2013, a predictive model was created to enable more efficient and accurate settlement survey. Using the LiDAR derived DTM, DEM, point cloud dataset, slope raster, and 5m topographic lines, Thompson analyzed the DTM (hillshade) and slope raster for visible hilltop modifications and architecture utilizing LP360's profile tool to check the point cloud dataset for visible "bumps" (i.e. architecture) on the landscape that would indicate the presence of archaeological features. The GPS coordinates (in WGS 84 UTM 16N) and "target names" (arbitrary designations to aid in the organization of survey) for hilltops with possible archaeological features, as well as all hilltops within the desired survey zone, were entered into a handheld GPS (Figures 3a and 3b). This technique allowed for every hilltop in the survey zone to be rapidly surveyed, ensuring more

complete survey coverage than the previous opportunistic survey technique. Between 2008 and 2011, 57 residential complexes were identified (Kalosky and Prufer 2012). Using the predictive model, in 2013, 23 new settlement groups were documented within a two-week survey period (Thompson 2014) and during the 2014 field season, more than 30 new settlement groups were recorded within the two-week survey period. In two years of survey, the known settlements at Uxbenká nearly doubled, affirming the efficiency and accuracy of the LiDAR dataset derived predictive model. To date, excavations have been conducted in more than 30 settlement groups at Uxbenká.

Detecting Settlements at Uxbenká using LiDAR

To test the limitations of LiDAR data on the detection of ancient settlements at Uxbenká, we examined 23 settlements within a 4km² area surrounding the Uxbenká site core (Figure 4). Within the 23 settlement groups, 135 buildings were documented throughout the years of the extensive UAP settlement survey. This area has undergone extensive pedestrian survey and the 23 settlement groups are a representative sample of the types of settlement groups (Kalosky and Prufer 2012; Prufer and Thompson 2014) present at Uxbenká. We analyzed the study area using three LiDAR derived datasets, a hillshade raster, a slope raster, and an LAS point cloud

dataset. The analyses were performed in ArcGIS using the LP360 extension tool.

The first analysis attempted to visually identify structures on the bare earth hillshade raster. Of the 135 buildings mapped, only three (2.2%) were visible in the hillshade (Prufer et al. 2015). Two of these buildings were more than 3m tall, suggesting that smaller buildings will often be undetectable using this technique. However, larger buildings are more easily visible. Using this technique alone, the nearby site of Ix Kuku'il was identified (Thompson et al. 2013).

In a second analysis, profiles were cut across each settlement group using LP360 and the ground classified point cloud data was visually scanned. Any noticeable “bumps” (i.e. archaeologically features) were recorded. Using this technique, 52 (38.5%) of the 135 known structures were identified (Prufer et al. 2015). While this analysis proved more effective than using only a hillshade, it still detected less than half of the previously documented structures. No structures less than 0.5m tall were detected in the point cloud, again indicating that many smaller buildings would be over looked if this technique alone was employed in lieu of traditional settlement survey.

In the third analysis, the landscape was visually examined for human modifications using a slope raster created in ArcGIS. Reclassifying the slope raster caused flattened areas to stand out visually among the hilly topography. As discussed above, all settlements at Uxbenká are located on hilltops or ridgelines (Kalosky and Prufer 2012). In order to make these spaces habitable, some degree of landscape modification is generally necessary and is a function of labor investment (sometimes linked to status, Thompson et al. 2013), or length of occupation. Therefore, flattened or modified hilltops often contain archaeological features, while rounded hilltops do not. In our study area we found that 13 (56.6%) of the 23 settlement groups were situated on visibly flattened hilltops (Prufer et al. 2015). Neither the number of buildings nor size of buildings impacted the presence or absence of hilltop modification. Settlement groups with a single building (e.g. SG 18 and SG 30) as well as the largest settlement groups containing more than 20

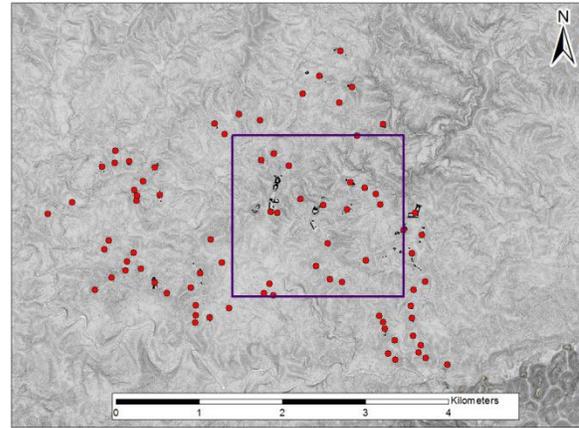


Figure 4. Slope raster with 4km² study area containing 23 settlement groups. Red dots represent settlements groups.

buildings (e.g. SG 28 and SG 25) both show hilltop modifications. Similarly, household status or ranking (Kalosky and Prufer 2012; Prufer and Thompson 2014) does not impact the presence or absence of hilltop modifications. One elite residential zone, Group L, has no evidence of hilltop modification, while a second elite area, SG 25 does. Non-elite settlements exist both with and without hilltop modifications as well.

While LiDAR makes a wide variety of analyses possible and can aid in the detection of settlements, using a hillshade or point cloud dataset alone is not adequate to thoroughly examine the ancient landscape. The slope raster analysis proved more effective for identifying settlements in this region, where hilltop modifications were used to make an area more habitable. However, the most effective way that LiDAR can be used to detect ancient settlements is the predictive model described above. The 1m DEM produced within a LiDAR dataset allowed us to efficiently and effectively perform settlement survey, nearly doubling the known settlements at Uxbenká in four weeks of survey.

Social and Ecological Modelling

In addition to detecting archaeological features on the landscape, LiDAR datasets are of use to archaeologists as they provide a high-resolution (1m) DEM that enables more accurate modeling of the sociopolitical landscape than widely available 10m or 30m DEMs. Using a 1m and 30m DEM we compared Least Cost Paths (LCPs) connecting several architectural

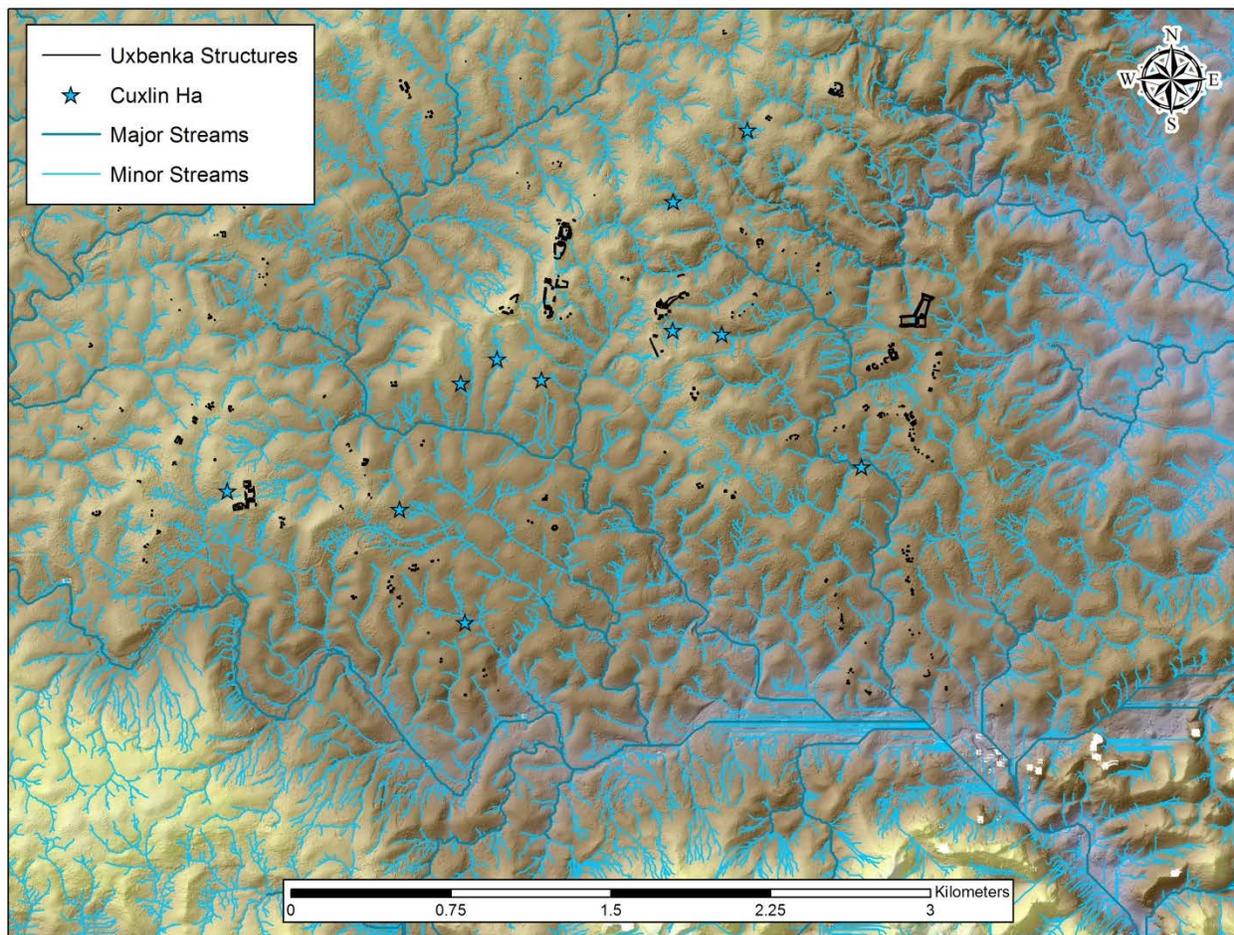


Figure 5. Hydrological modelling of the landscape around Uxbenka showing a comparison of stream shapefiles including the minor streams that are present during heavy rains.

groups at Uxbenká in order to model the movement of people across the past environment. Additionally, using the LiDAR derived DEM we developed a high-resolution hydrological model for the LiDAR acquisition zone, which revealed movement of water out of architectural groups, minor streams that appear during heavy rainfall, and proximity to easily accessible year-round water sources (Figure 5).

Least Cost Analysis (LCA) models human behavior based on the assumption that people are more likely to move within areas of easier access (Surface-Evens and White 2012: 2). Our analysis tested whether the 1m DEM created a more accurate LCP than a 30m DEM and examined the major differences in modelled movement are LCPs created from the two different DEMs. The LCA was completed using Model Building in ArcGIS. Four paths were

created to test the model (Figure 6a). One path (yellow) began at Uxbenká's Group A and terminated at Ix Kuku'il's Group A. A second path (purple) connected two major architectural groups with ball courts within Uxbenká, Group B and Group I. A third path (green) connected the largest outlying settlement group, SG 25, to the Uxbenká Late Classic site core area of Group B. A fourth path (pink) marks a potential corridor through the study area from the east to the west.

The results indicate that the 30m DEM LCPs tend to follow the areas of lowest elevation, such as stream beds and valleys (Figure 6b). These areas are not ideal to walk through as they often flood during the rainy season. The 1m DEM LCPs tend to follow existing roads and footpaths (Figures 6a and 6b). In this region, footpaths were used into the early

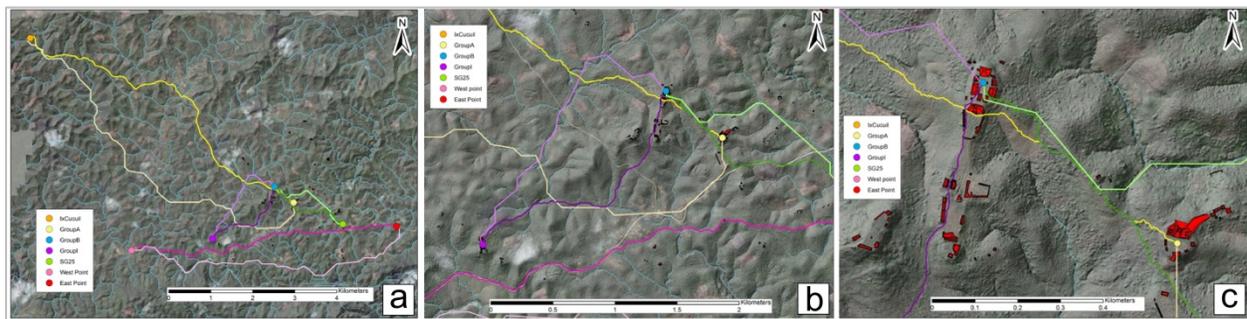


Figure 6. A comparison of Least Cost Paths created using 1m and 30m DEMs. Lighter colors represent the 30m DEM LCP while darker colors represent the 1m DEM LCP. (a) Four LCPs showing the variation of movement across the landscape based on the resolution of the DEM. (b) 1m DEM LCPs tend to follow roads while 30m DEM LCPs tend to follow rivers and valleys. (c) 1m DEM LCPs are more precise than 30m DEM LCPs.

20th century. Some footpaths were later converted into logging roads. The construction of these roads resulted in little, if any, vertical alteration to the landscape. Today, the Southern Highway is being paved over and major landscape modifications are occurring, but the LiDAR data was acquired prior to these recent developments. The paths that the modern roads and footpaths follow were likely used during ancient times as well. The LCPs diverge slightly from the modern roads, suggesting that the road itself is not influencing the LCP, but rather that the road was placed on the path of least resistance. The results of the LCPs on the 30m and 1m DEMs suggest that the LiDAR derived DEMs are more precise for modelling movement across the landscape than the 30m DEM due to the resolution of the data (Figure 6c).

Discussion

The use of LiDAR within archaeological research has allowed for the detection of previously unmapped architecture and landscape features, refinements of previously documented archaeological remains, and a clearer understanding of the geospatial landscapes of the past. In Mesoamerica, LiDAR has been regarded as a promising method to make settlement survey, a mainstay of most large archaeological projects, more efficient. However, an evaluation of several LiDAR datasets suggests that while LiDAR is useful for identifying previously undocumented ceremonial centers, such as Ix Kuku'il (Thompson et al. 2013), it is not adequate for thoroughly detecting the smaller, hinterland

settlements that composed the majority of ancient Maya populations (Prufer et al. 2015).

Within the 4km² study zone at Uxbenká, three LiDAR datasets were compared to six years of settlement data collected via pedestrian survey. The hillshade raster proved ineffective; only 2.2% of known structures were visible in the hillshade raster. Only larger buildings were detected on the hillshade raster, while the smaller buildings which compose the majority of hinterland house platforms at Uxbenká were undetected. The LAS point cloud dataset was more effective, but only detected 38.5% of previously documented settlements. While a larger range of building sizes were identified in the LAS point cloud dataset, structures less than 0.5m high were not visible. The use of this analysis alone would overlook smaller, auxiliary buildings on the landscape. The slope raster was the most effective of these analyses, correctly detecting 56.6% of known settlement groups. Settlements of varying size and status were identified in this analysis, suggesting that if used in conjunction with the predictive model, settlement detection will not be biased to larger groups of higher status, as would be the case if the hillshade raster or LAS point cloud were used alone.

In addition to using LiDAR to detect archaeological features on the landscape, the products of this technology can be used to model the sociopolitical landscape. We utilized the LiDAR derived DEM to model LCP and local hydrology, though many more applications are possible. The 1m DEM provided more accurate and precise measures to model both the

movement of people across the landscape and the location of important ecological resources such as perennial streams.

Conclusions

In conclusion, the LiDAR hillshade raster and point cloud profiles are not reliable for identifying small settlement structures or groups. The slope raster provides the most robust method for detecting settlement groups if using only the LiDAR data. However, in tropical regions with dense vegetation such as Uxenká, LiDAR cannot be considered a substitute for settlement surveys where documentation of the full range of architectural features is desired. The utility of LiDAR for creating a high-resolution DEM of the landscape is vital to effective and efficient settlement survey, as suggested by the predictive model. In other regions, the applicability of available tool kits may vary, depending on local conditions.

Furthermore, LiDAR data is useful for modelling of the sociopolitical landscape. While only two examples were discussed above, the use of a high-resolution 1m LiDAR derived DEM has countless possibilities. A comparison of LCPs using a 1m and 30m DEM suggest that the 1m DEM provides a more accurate model of people's movement across the landscape. The hydrological model constitutes a more accurate and precise representation of perennial streams, which may have directly impacted settlement location choices of past peoples.

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25 CHEMICAL ANALYSIS OF MARINE SEDIMENT FROM CHAN B'I, PAYNES CREEK SALT WORKS, BELIZE

E. Cory Sills, Heather McKillop and E. Christian Wells

We report the results of soil chemistry testing at the underwater salt work of Chan b'i located in Paynes Creek National Park, Belize. Chemical soil testing such as inductively coupled plasma-mass spectroscopy has been used at other terrestrial archaeological sites to detect concentrations of chemical elements to indicate activity areas. Can soil chemistry provide insights into ancient activities not preserved in the slightly acidic marine sediment at the ancient salt work of Chan b'i, an Early Classic Maya site submerged by sea-level rise? Chan b'i is one of 105 salt works with preserved wooden architecture in a peat bog. The salt works were submerged by sea-level rise sometime after the Late Classic abandonment preserving wood, botanicals, and ceramics. Excavations at the site yielded abundant briquetage—pottery vessels used to evaporate brine over fires to produce salt. Chemical analysis was conducted on 40 sediment samples from Chan b'i. The results of this analysis indicate chemical variations throughout the site. This study extends chemical testing on terrestrial soils to submerged marine sediment at an underwater site.

Introduction

Chan b'i is one of 105 salt works discovered along the coast of Belize by the Underwater Maya project in Paynes Creek National Park related to a Classic Maya salt industry (Figure 1). Wooden buildings and ceramics are preserved underwater in a peat bog composed of red mangrove (McKillop 2005, 2009; McKillop et al. 2010a and b; Sills and McKillop 2013). Wooden buildings associated with the salt works are the only known architecturally associated preserved wood discovered in the Maya area. During the Classic period coastal peoples produced salt for the inland cities meeting the biological as well as the desired need for salt (McKillop 2002, 2005, 2009). Underwater excavations conducted in 2010 at Early Classic Chan b'i revealed an abundance of briquetage—ceramic vessels used to evaporate brine over fires to make salt indicating the function of the wooden architecture as workshop production of salt (Sills and McKillop 2013). Lacking from the cultural remains was evidence of habitation such as bones or organic refuse from fires. Inductively coupled plasma-mass spectroscopy (ICP-MS) was undertaken on 40 excavated marine samples from Chan b'i to examine anthropogenic activities as well as examining variations in the mangrove peat that spectacularly preserved the wooden architecture.

Chemical soil testing such as ICP-MS can detect concentrations of chemical elements to allow for the identification of activity areas and



Figure 1. Map of Maya area showing Paynes Creek National Park (McKillop 2004).

non-artifactual evidence of settlement that indicate habitation. Initial use of soil chemistry for identification of human activities focused on the concentrations of phosphates and Ph as an indication of anthropogenic organic refuse (Lippi 1998). Phosphates are a form of phosphorous that are bonded compounds fixed

to the minerals within soils and sediments (Wells et al. 2007). The phosphate compounds are stable whereas the element phosphorous is not. Phosphate values within a soil matrix are shown to be higher in areas of anthropogenic refuse and organic remains than areas where these activities do not occur (Terry et al. 2004). At the site of Aguateca, Guatemala, high values of phosphorus helped to locate areas for food preparation, disposal, and consumption (Terry et al. 2004). Chemical sediment analysis can indicate activity areas not seen on the surface, such as refuse from meals, ash from fires, and human waste (Holliday and Gartner 2007; Hutson and Terry 2006; Lippi 1988; Middleton and Price 1996; Middleton 2004; Terry et al. 2000, 2004; Wells et al. 2000; Wells 2010). Elements such as calcium are shown to belong to areas that were enclosed spaces (Middleton and Price 1996). At the site of Palmarejo, Honduras, concentrations of aluminum, barium, iron, potassium, magnesium, manganese, sodium, phosphorus, and strontium were compared between plaza and patio areas looking for non-homogenous patterns within the samples. The results linked phosphorous, potassium, calcium, and magnesium to food preparation and consumption activities (Wells et al. 2007). We have adapted terrestrial testing using chemical analysis to the underwater Paynes Creek salt works to examine additional activity areas not apparent from the artifactual record.

Mangrove Environment at the Salt Works

The Paynes Creek salt works are located in Punta Ycacos Lagoon, an estuarine lagoon system located in Paynes Creek National Park. Today, the area is a mangrove ecosystem dominated by *Rhizophora mangle* (red mangrove) with minor amounts of *Avicennia germinans* (black mangrove) and *Laguncularia racemosa* (white mangrove) (Figure 2). At the time of occupation (A.D. 300-900), the salt works were on dry land close to the source of brackish water needed for evaporation over fire to make salt. Sea level rise inundated the sites after the Late Classic abandonment.

Punta Ycacos lagoon is supplied by fresh water from nearby Freshwater Creek that drains from the pine savannah and granite Maya mountains along with salt water from the



Figure 2. Aerial photograph showing the location of the underwater salt work Chan b'i, Paynes Creek National Park, Belize.

Caribbean Sea to the east. Directly surrounding the lagoon are mangrove forests. Mangroves are classified as evergreen trees that grow along salt water coastlines or shallow water in tropical and subtropical regions between 32°N and 28°S latitude (Chapman 1975; Tomlinson 1986). Within these latitudes in the Americas they represent an area of approximately 43,161 km² (Mitsch and Gosselink 2000). Mangroves are not found along rocky coasts due to the lack of accretion of sediment as well as intensity of waves (Tomlinson 1986). Mangrove forests differ from other evergreens because they maintain complete fidelity to their environment, form pure stands, develop morphological adaptation to the environment such as the aerial roots of *R. mangle*, practice salt exclusion, and are isolated from terrestrial relatives (Tomlinson 1986).

The distribution and productivity of mangroves in antiquity as well as today are controlled by three factors: resource gradients, regulator gradients, and hydroperiod (Twilley and Rivera-Monroy 2005). Resource gradients represent aspects of the environment available for mangrove production including absorption of light, spacing of trees, and access to nutrients (phosphorus and nitrogen). Regulator gradients are conditions of the sediment such as the amount of salinity, pH, sulfides, and temperature. The final factor hydroperiod represents the frequency and duration of water submersion. A combination of these three factors determines the composition and zonation

of a mangrove forest. For example, the three primary species in Paynes Creek have different tolerances to salinity. *R. mangle* is the least salt tolerant of the three but has the best morphological adaptations in the form of aerial roots to tolerate constant submersion in water (Tomlinson 1986). *A. germinans* is one of the more tolerant species withstanding saline environments up to 100 parts per thousandth (ppt.). This species is found further away from water where tides occasionally flush the roots and sediment. *L. racemosa* is more productive within intermediate saline areas (25-35 ppt.).

Coastal areas are dynamic environments that undergo constant change through tides, waves, sediment accumulation, tropical storms, and hurricanes. In addition to natural impacts, human use of coastal areas for settlement, recreation, and subsistence activities have anthropogenic impacts to the environment. The Paynes Creek salt makers utilized a coastal lagoon environment in order to produce salt. These activities left impressions in the environment. Analysis of the marine sediment macroscopically indicates that *R. mangle* dominated the edges this environment even though the area is water today. The microscopic analysis of a 1.5 meter sediment core from between Chan bi and K'ak' Naab', showed that the sediment is composed of *R. mangle*. The radiocarbon dating of the core showed a 4,000 year-record of mangrove accumulation. Loss-on ignition indicates high organic matter accounting for approximately 60% of the sediment (McKillop et al. 2010a and b). The majority of the sediment structure is composed of mangrove roots with minor amounts of leaves and wood. Elsewhere within the Belize barrier reef farther north at Pelican Cays the peat is composed of mangrove roots with the leaves and wood accounting for less than 20% of the total composition (McKee and Faulkner 2000). Relative rates of degradation of peat accumulation were measured for a year on Twin Cays. The rates of decay are higher for mangrove roots and leaves with roots contributing the most to peat accumulation (McKee and Faulkner 2000).

Evidence of a mangrove forest environment is further corroborated by species identification of the wooden posts used for the

salt work architecture (Robinson and McKillop 2013, 2014). The main building material at Chan b'i has been identified as *A. germinans* from nearby forests (Robinson and McKillop 2013). Overtime the mangroves near or on the site were unable to keep pace with sea level rise inundating and preserving the salt works. This similar type of process has been documented for Glover's reef, Lighthouse reef, and Turneffe islands (Gischler 2003).

Excavations at Chan b'i

The wooden architecture at Chan b'i forms a rectangular building with one or more room divisions. The building(s) measure approximately 11 m north to south and 14.5 m east to west (Sills and McKillop 2013). There are two lines of palmetto palm posts (*Accelorocea wightii*) located to the southwest of the rectangular building. The areas inside and directly surrounding the wooden buildings are approximately 15 cm higher in elevation than the area surrounding the palmetto palm posts. The lines of palmetto palm posts found at the salt works in Paynes Creek have been interpreted as retaining walls (McKillop 2009; Sills and McKillop 2010). A radiocarbon date from one post places the site within the Chan b'i dates to the Early Classic period (A.D. 300-600) (Sills and McKillop 2013).

At the time of excavations, the wooden architecture and ceramics at Chan b'i were 50 cm below the water surface. Transect excavations were carried out at the salt work in June, 2010, to evaluate the spatial patterning of artifacts and their relationship to wooden architecture. First, the wooden posts were relocated using a Geographic Information Systems map from the 2007 survey. Once located, pin flags placed on the north side of the posts were used to mark their location. The flags extended above the water surface. Using a compass and 30 m tape, two transects were placed across the site intersecting at right angles. The ends of each transect were marked with long PVC pipes pushed into the seafloor. Each transect was divided into one meter units. Short lengths of PVC pipes were placed into the sea floor at each meter mark (Figure 3).

Excavations proceeded along each transect using a 1 x 1 meter metal grid frame.

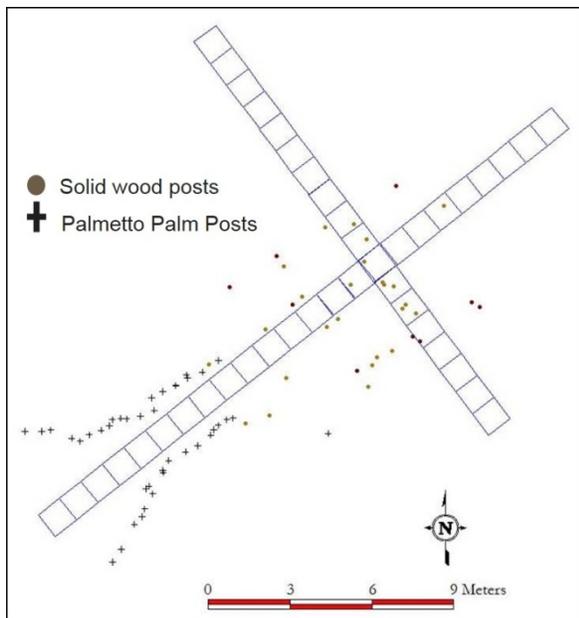


Figure 3. Transect excavation locations at Chan b'i. Sediment samples were collected from the northwest corner of each 1 X 1 m unit.



Figure 4. Photograph of acquiring the marine sediment samples at Chan b'i using a stainless steel knife and placing the sediment into Whirl-pak bags (photo by H. McKillop).

The transects were placed to extend across the site—as defined by the surface distribution of artifacts and wooden architecture—and to include inside and outside areas of the building. The results of the transect excavations are reported in the 2013 Research Reports in Belizean Archaeology (Sills and McKillop 2013).

The artifacts were studied at the field lab in Belize. After fresh water rinsing and drying, the artifacts were separated into material classes. The ceramics were sorted according to the type-variety classification for Maya pottery, which is

useful for developing a site chronology. Most types fit within existing classifications for the Paynes Creek area (McKillop 2002).

The excavations revealed an abundance of briquetage located inside and directly surrounding the wooden building. Abundant charcoal mixed with the briquetage was found. Artifact density diminished between the two lines of palmetto palm posts further away from the building. At Chan b'i, briquetage comprises approximately 85% of the ceramic assemblage (Sills and McKillop 2013). Minor amounts of water jars used to store water or brine were accounted for along with a very minor amount of serving vessels.

Briquetage includes all the pottery used to evaporate brine over fires to make salt and is typical of the assemblage at the Paynes Creek salt works. Briquetage consists mainly of Punta Ycacos Unslipped jars, basins, and bowls that were placed onto clay cylinder vessel supports, inserted into clumps of clay bases and sockets placed at the top of the vessel support and connected to the pot. Clay spacers were placed between the pots to steady them over the fire to evaporate the brine and make salt cakes. Also, there are amorphous clay lumps that are the broken pieces of cylinders, sockets, spacers, and bases, as well as other salt making debris (McKillop 1995, 2002).

Methods

We report the results of 40 collected sediment samples from Chan b'i from two excavated transects (see Figure 3 and Figure 4). Sediment was excavated using a sharp stainless steel knife. A small block of sediment was cut from the sea floor at one meter intervals along the excavated transects. All samples were placed directly into whirl-pak bags. The marine sediment was exported under permit to Louisiana State University. Sub-samples were selected and sent to the Center for Geochemical Analysis at the University of South Florida.

Results

Forty sediment samples were chemically characterized from Chan b'i. The samples were analyzed in an inductively coupled plasma-mass spectrometer for the calibrated concentrations of 20 elements: barium (Ba), copper (Cu), lead

Table 1. Summary statistics for the primary elements.

	Minimum	Maximum	Range	Mean	Median	Standard Deviation	Coefficient of Variation
Ba	0.010	0.130	0.120	0.036	0.034	0.022	0.000
Cu	0.280	0.500	0.220	0.359	0.357	0.047	0.002
Pb	0.040	0.350	0.310	0.141	0.137	0.065	0.004
Hg	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ni	0.170	0.900	0.730	0.466	0.282	0.289	0.083
P	0.490	6.330	5.840	2.025	1.739	1.169	1.367
Sr	1.330	11.400	10.070	3.867	3.787	1.964	3.857
Zn	0.770	1.950	1.180	1.248	1.228	0.207	0.043
Ti	0.340	4.890	4.550	1.444	1.205	1.044	1.089
Cr	0.030	0.290	0.260	0.118	0.062	0.084	0.007
Co	0.010	0.080	0.070	0.041	0.038	0.018	0.000
Y	0.050	0.250	0.210	0.116	0.113	0.047	0.002
U	0.050	0.920	0.870	0.314	0.223	0.244	0.060
Na	665.620	3844.360	3178.740	1893.423	1764.105	815.271	664666.914
Mg	15.800	89.660	73.860	45.232	44.618	19.437	377.784
Al	-0.520	687.040	687.560	146.493	108.372	146.136	21355.656
K	67.570	209.010	141.440	135.252	132.747	40.789	1663.777
Ca	138.360	2393.180	2254.820	400.494	341.486	368.229	135592.777
Mn	0.210	3.460	3.260	1.322	1.135	0.897	0.804
Fe	37.750	297.140	259.390	136.864	117.925	62.108	3857.342

(Pb), mercury (Hg), nickel (Ni), phosphorus (P), strontium (Sr), zinc (Zn), titanium (Ti), chromium (Cr), cobalt (Co), yttrium (Y), uranium (U), sodium (Na), magnesium (Mg), aluminum (Al), potassium (K), calcium (Ca), manganese (Mn), and iron (Fe). The results are reported in parts per million (ppm). Summary statistics including the minimum, maximum, range, mean, median, standard deviation, and coefficient of variation for each of the 20 elements are presented in Table 1. Eleven elements exhibit little or no variation. These are Ba, Cu, Pb, Hg, Ni, Zn, Ti, Cr, Co, Y, and U. These elements, which have very low concentrations in the sediment, represent heavy metals and rare earth elements (Figure 5). Due to their low concentrations these elements are difficult to assess in relation to human activities such as salt production activity areas. A side-

by-side boxplot of these elements show that the majority are represented by less than 2 ppm except for Ti which has concentrations less than 5 ppm. The remaining nine elements show variation from one to two standard deviations that warrant further discussion: These are P, Sr, Na, Mg, Al, K, Ca, Mn, and Fe.

Sodium and calcium are directly associated with calcareous sediments from brackish and saline contexts. A side-by-side boxplot of the two elements shows the range of chemical concentrations (Figure 6). Sodium is expected within a salt water lagoon. However, the sediment samples contain much lower concentrations than those found in open sea water which is typically around 36,000 ppm. The sodium values range from 665 ppm to 3,844 ppm. Sodium and potassium can be associated with the production of ash from fires (Middleton

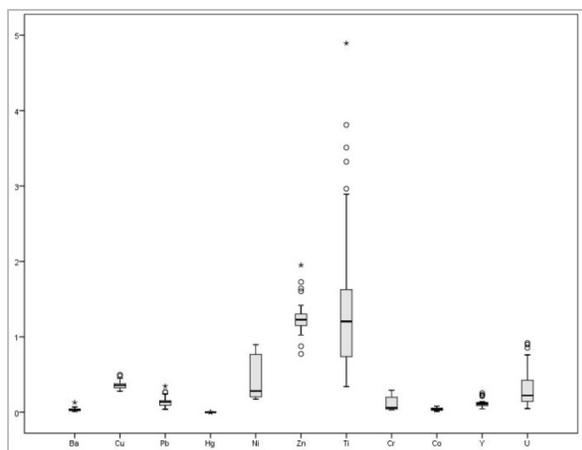


Figure 5. Side-by-side boxplot of the minor and trace elements exhibiting little or no variation (ppm, n =40). These elements are Barium (Ba), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn), Titanium (Ti), Chromium (Cr), Cobalt (Co), Yttrium (Y), and Uranium (U). The open circles represent 1.5 spread of the interquartile range and the asterisks represent 3.0 spread of the interquartile range.

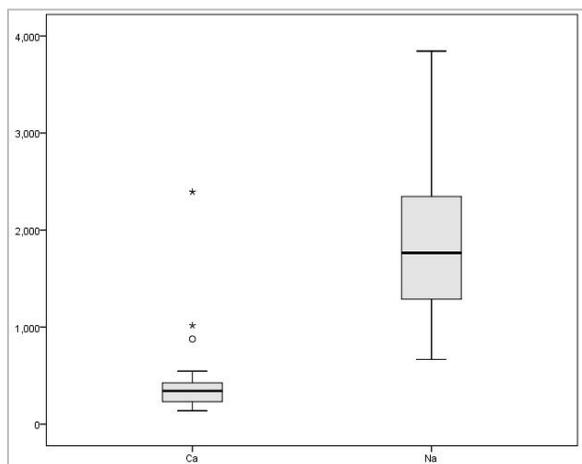


Figure 6. Side-by-side boxplot of Sodium (Na) and Calcium (Ca) (ppm, n=40). The open circles represent 1.5 spread of the interquartile range and the asterisks represent 3.0 spread of the interquartile range.

and Price 1996). Salt making at the site would require wood for fuel. The large amounts of charcoal recovered from excavations support the interpretation that variation in sodium values represent areas where salt was evaporated or areas where the remains of fires were swept. Calcium concentrations are not uniform among the samples. Instead, calcium has a fairly wide range extending from a minimum of 138 ppm to 2,393 ppm. Variations of calcium can be associated with limestone sediments drained

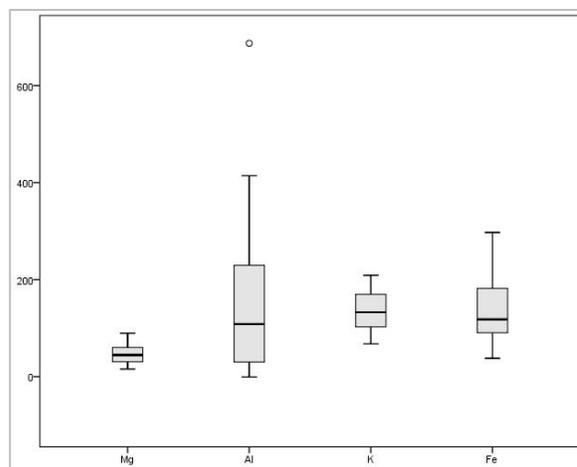


Figure 7. Side-by-side boxplot of Magnesium (mg), Aluminum (Al), Potassium (K), and Iron (Fe) (ppm, n=40). The open circles represent 1.5 spread of the interquartile range and the asterisks represent 3.0 spread of the interquartile range.

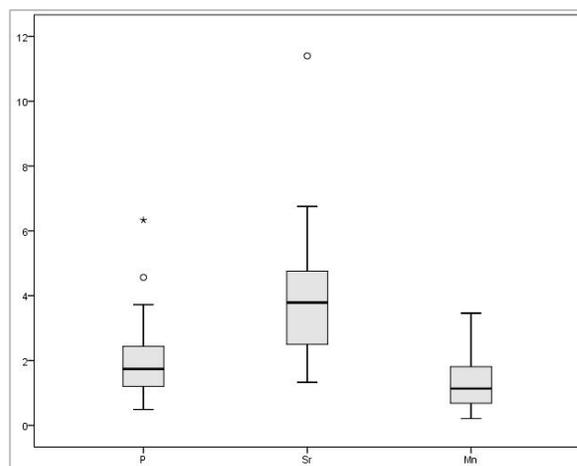


Figure 8. Side-by-side boxplot of Phosphorus (P), Strontium (Sr), and Manganese (Mn) (ppm, n=40). The open circles represent 1.5 spread of the interquartile range and the asterisks represent 3.0 spread of the interquartile range.

from the mainland or washed in from coral. Calcium can be deposited from mangrove oysters that typically grow on the prop roots of *R. mangle*, or calcium could be associated with the erosion of limestone tempered pottery.

Magnesium, aluminum, potassium, and iron are also represented in the sediment chemistry. Side-by-side box plots show variations in the range of these concentrations that may provide insights into environmental reconstructions as well as human activities (Figure 7). Magnesium derives from limestone,

aluminum from clays and sands, potassium from water, and iron from gleyed soils. However, the differences in the concentrations of these samples can be the result of human activities. The briquetage found at Chan b'i consists of a sand temper that mixed with the sediment can account for variations especially for the elements of aluminum and iron (McKillop 2002). Magnesium and potassium have been linked to food preparation and consumption activities (Wells et al. 2007). However, due to the context of Chan b'i as a salt work, magnesium and potassium could represent the ash from fires.

Phosphorus, strontium, and manganese can be linked to human activities. These elements are relatively low concentrations (less than 400 ppm) but do exhibit variation (Figure 8). Phosphorus can be associated with the deposition of organic matter. In the context of a mangrove peat sea floor these concentrations are most likely associated with the organic remains of *R. mangle* found microscopically from column samples (McKillop et al. 2010a and b).

Conclusions

Chemical characterization of marine sediment at the Chan b'i salt work extends testing from terrestrial soils to inundated archaeological sites. This study follows successful soil analysis at other Maya sites, including Aguateca, Cerén, Chunchucmil, and Coyote (Hutson and Terry 2006; Parnell et al. 2002; Terry et al. 2004; Wells 2004). Human activities are represented within the variations of chemical concentrations at Chan b'i relating to a Classic Maya salt industry. The salt work is associated with wooden architecture allowing for an opportunity to evaluate the location of activities within a salt workshop (Sills and McKillop 2013). Variations in sodium, magnesium, aluminum, potassium, and phosphorus designate the remains of fires from the evaporation of salty water over fires supporting the interpretation that these sites were salt workshops.

The results of sediment chemistry from the underwater site of Chan b'i are comparable to results from inland sites (Hutson and Terry 2006; Parnell et al. 2002; Terry et al. 2004; Wells 2004; Wells et al. 2007). Human activities leave behind chemical signatures that

exhibit high and low variations. These variations can be compared within an archaeological site to find activities not represented within the artifactual record. The importance of sediment chemistry is not necessarily comparing two separate sites since each soil environment is different. Instead, the significance is within datasets that show large ranges of an element with high standard deviations (Wells et al. 2007). However, these differences do form patterns or non-homogeneous areas that can be tied through ground truth to a specific activity. For example, heavy metals including copper, iron, mercury, manganese, lead, and zinc were associated with pigment production activities at Cerén (Parnell et al. 2002), painted urban houses at Piedras Negras in Guatemala (Wells et al. 2000).

Mangrove peat, an anaerobic sediment, has preserved wooden architecture as well as botanicals at the Paynes Creek salt works. The variations in chemical signatures from Chan b'i indicate the peat preserved elements associated with human activity. Heavy and rare earth metals show low concentrations at Chan b'i specifying these as the base chemical levels of the *R. mangle* peat substrate. The fibrous *R. mangle* roots that form the sea floor bonded elements indicative of human activity such as sodium, magnesium, aluminum, potassium, and phosphorus to the roots. The non-homogenous character of the elements in the sediment samples has successfully extended the use of sediment chemistry to a marine environment.

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26 TOWARDS AN ARCHAEOLOGICAL CHRONOLOGY OF SOUTHERN BELIZE

Mark D. Irish and Geoffrey E. Braswell

For many decades, the chronology of the Southern Belize Region has been based almost entirely on absolute dates. These have been either Maya Long Count or radiocarbon dates. Hieroglyphic dates come chiefly from Pusilha and Nim li Punit, with a few more from Uxbenka and Xnaheb. In contrast, radiocarbon dates have come largely from Uxbenka with a few more from Pusilha. With the exception of an early and flawed attempt to understand the history of Lubaantun based on architectural styles, before 2001 there was no archaeological chronology for the region. Hammond's excellent description of the pottery of Lubaantun, for example, is a typology with a very limited temporal dimension. In this chapter we begin to sketch out a regional ceramic chronology for the Southern Belize Region. There is to date no convincing ceramic evidence of occupation during the Preclassic period. The Early Classic is divided into three phases, the first of which is known principally from Uxbenka. Nim li Punit was founded during the second part of the Early Classic, and Pusilha at the very end of that period. The Late Classic is tentatively divided into three phases. Lubaantun was first occupied during the second of these Late Classic phases. The Terminal Classic, at least at Nim li Punit, is divisible into two phases. Finally, a limited Postclassic occupation also exists, but so far has been identified only at Pusilha.

Introduction

The Southern Belize Region, defined as that part of Toledo District stretching from the Caribbean coast to the foothills of the Maya Mountains, was one of the first parts of the country to witness modern and professional archaeological excavations (Figure 1). These were directed by Raymond Merwin at Lubaantun (Merwin 1915; see also Hammond 1975:31-33) and later by Thomas Joyce of the British Museum at both Lubaantun (Joyce 1926a, 1926b, 1927, 1928; Joyce et al. 1927) and Pusilha (Joyce 1929). At the same time, the British Museum also conducted investigations at Xunantunich and Minanha (Joyce 1927). The most important publications resulting from this work describe the architecture of Lubaantun (Joyce 1926a), the polychrome pottery of Pusilha (Joyce 1929), and the hieroglyphic texts from both sites (Morley 1937). In some sense, Maya ceramic studies began at Pusilha. Joyce's discussion of pottery from that site predates Merwin and Vaillant's (1932) publication on Holmul by just a couple of years.

After this early research, the archaeology of Toledo District languished for approximately 40 years. The next important project, directed by Norman Hammond, again concentrated on Lubaantun (Hammond 1975). His 1975 monograph describing excavations and ceramic analyses, as well as more limited regional survey, still stands as the most important published work on an archaeological site in

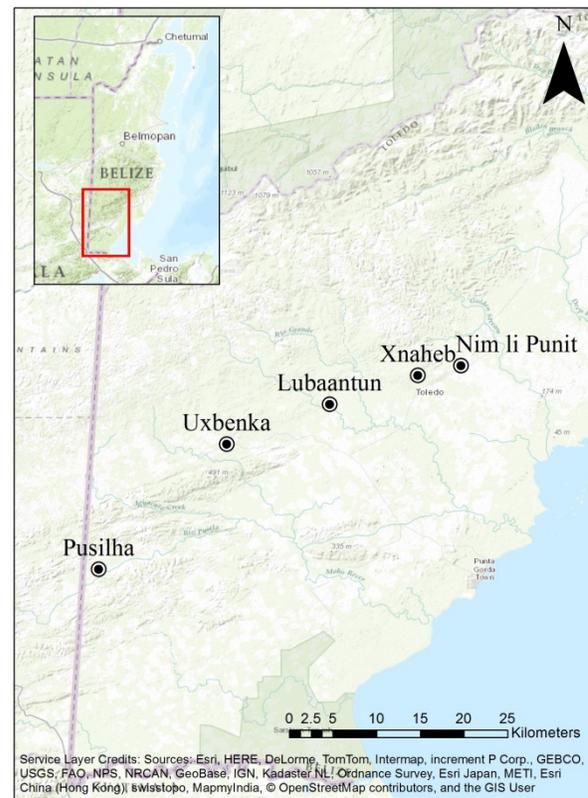


Figure 1. Principal sites of the Southern Belize Region.

Toledo District. Fundamental for all recent projects is Hammond's excellent typological description of the Late to Terminal Classic ceramics of Lubaantun (Hammond 1975:293-332). We stress that this is a ceramic typology rather than a chronology. Although Hammond hints at some temporal distinctions, his mentor J.

Eric Thompson preferred that the pottery of Lubaantun not be split into distinct phases.

Since Hammond's groundbreaking fieldwork in 1970, several important sites have been discovered in the Southern Belize Region. Chief among these are Nim li Punit, Uxbenka, and Xnaheb. Moreover, additional scholars have directed archaeological research or consolidation. These include Heather McKillop (1995, 2005), Richard Leventhal (1990), Peter Dunham (1990), Gary Rex Walters (Walters and Weller n.d.), members of the MASDP, Keith Prufer (Prufer et al. 2011; Prufer and Dunham 2009), and Geoffrey Braswell (Braswell et al. 2004; Braswell et al. 2005). Nonetheless, to date there is no detailed and published archaeological chronology for a site in the region. Specifically and most critically, we still lack both a complete ceramic sequence for a single site and a more general regional ceramic chronology.

Archaeological Chronology

What is meant by an archaeological chronology? An archaeological chronology is a description of how material culture of a particular site or region changed over time. For the Maya area, ceramics, architecture, iconography and—with somewhat less utility—chipped-stone tools have all been used to construct archaeological chronologies. What an archaeological chronology is *not* is a series of dates derived from radiocarbon assays, hieroglyphs, or other absolute sources. The Southern Belize Region has many hieroglyphic texts with Maya dates (Prager et al. 2014; Wanyerka 2009) and, thanks to recent work by Prufer and his colleagues, we now have many radiocarbon assays (Prufer et al. 2011; Aquino et al. 2013). Such chronometric data provide a scale or framework that can be used to calibrate an archaeological chronology, but they do not in themselves constitute a description of the changes of material culture over time and hence do not form an archaeological chronology. In this chapter, we hope to begin to sketch out a ceramic chronology for the Southern Belize Region. We have already done the same using obsidian procurement patterns and technological changes (Daniels and Braswell 2014). We begin by discussing what is known about the

occupational history of four of the major sites: Uxbenka, Nim li Punit, Pusilha, and Lubaantun.

Settlement History of Southern Belize

The earliest known human occupation of southern Belize dates to the Paleoindian period (c. 15,000 – 8000 B.C.), as evidenced by a single fishtail point recovered from a plowed field near Big Falls village, downstream from Lubaantun (Lohse et al. 2006:215, fig. 4b). A late Archaic Lowe point from the same general area also has been reported, and in 2013 an Archaic context with percussion flakes and cores was located by members of the Uxbenka project (discussed by Keith Prufer at the 2013 Belize Archaeology Symposium).

Uxbenka is the oldest known Maya community in Toledo District. The earliest construction there has been dated by radiocarbon to the period 60 B.C.-A.D. 220 (Prufer et al. 2011:213), but the ceramic sequence seems to begin at the end of this period or even slightly later (Jordan and Prufer 2014:320). Few of the carved monuments at Uxbenka contain readable dates, but some are argued to date to the Early Classic and others to the Late Classic on stylistic grounds (Wanyerka 2009:220-222). Uxbenka grew during the Late Classic and even has a limited Terminal Classic occupation (Aquino et al. 2013; Prufer et al. 2011: 219). Nonetheless, the paucity of diagnostic Terminal Classic ceramics—so common at Lubaantun, Nim li Punit, and in some groups at Pusilha—demonstrate that occupation of Uxbenka at that time was quite light (Jordan and Prufer 2014:322). In sum, the small Maya center of Uxbenka was occupied from about A.D. 200 until about A.D. 800, and perhaps saw limited settlement briefly before and after that time.

Nim li Punit is the second oldest known site in the Southern Belize Region, and was founded around A.D. 400 as evidenced by the presence of Early Classic pottery dating to this time period (Fauvelle 2012b:97). The rulers of Nim li Punit carved seven stelae during two short periods: A.D. 734-741 and A.D. 790-810 (Wanyerka 2009:446, 522). An eighth monument contains a rough and peculiarly carved date that probably corresponds to A.D. 830 (Wanyerka 2009:504). This final date probably was carved on an already standing

plain monument. There is some ceramic evidence supporting an occupation of Nim li Punit after about A.D. 830, but so far such a presence appears to have been light and located mainly in the West Group. In sum, Nim li Punit was occupied from about A.D. 400 or slightly later until about A.D. 850.

Pusilha is by far the largest site in southern Belize and the only one that can reasonably be called a city (Prager et al. 2014:250). Hieroglyphic texts at the site begin with the historical date of A.D. 571 (Prager et al. 2014:250), which is fully in accord with the ceramics of the site (Braswell et al. 2004:226-227; Bill and Braswell 2005). Most pottery at Pusilha dates to the Late Classic period, but we found a handful of pottery characteristic of the Early Classic (Bill and Braswell 2005:304). Although Pusilha is fundamentally a Late Classic site, the Gateway Hill Acropolis and the Moho Plaza contain ample evidence of Terminal Classic occupation or use (Braswell et al. 2004:226; Braswell et al. 2005:67). So far unique for inland southern Belize, Postclassic ceramics have been found associated with the “Bulldozed Mound” (Braswell et al. 2004:227). In sum, Pusilha was occupied from the late 6th century A.D. until sometime after A.D. 830, but also has a limited Postclassic occupation. In many respects, the pottery of Pusilha is the most distinctive in the region and is tied most closely with the southwest Peten.

Lubaantun has no firmly dated texts but Sylvanus Morley (1937; see also Wanyerka 2009:409-416) attributed three ballcourt markers on stylistic grounds to about A.D. 780-790. Ceramics at Lubaantun imply a short occupation that began sometime in the eighth century A.D. and continued into the Terminal Classic period (Hammond 1975:295). Hammond (1975:312) notes that Belize Red is not found in fill contexts dating to the earliest construction stages of Lubaantun. This firmly dates early construction in the Late Classic period, that is, before about A.D. 780 or 790, when Belize Red was first traded to southern Belize. Nonetheless, later construction phases at Lubaantun clearly date to the Terminal Classic, especially the years A.D. 780/790 – 830. As a whole, the pottery of Lubaantun is so similar to materials from Uxbenka that much of what is found at

Lubaantun seems to represent a Late to Terminal Classic extension of that site. Thus, it may be that people from the Uxbenka region moved to Lubaantun before the end of the eighth century. Lubaantun has a rich Terminal Classic occupation but was abandoned around A.D. 900 or perhaps somewhat later (Hammond 1975:296).

This above discussion highlights one important fact: although there is ample evidence of Classic period occupation in the Southern Belize Region, there are as of yet no known pure Preclassic contexts that demonstrate the presence of agricultural villages before about A.D. 200. To date, there are no known pre-Mamom, Mamom, or even pure Chicanel contexts at habitation sites in the Southern Belize Region.

Steps towards a Regional Ceramic Chronology

With the exception of isolated Paleoindian and Archaic contexts, the archaeological chronology of the Southern Belize Region begins in the Early Classic. In a public comment at the 2013 Belize Archaeology and Anthropology Symposium, Debra Walker argued that we should date the beginning of the Early Classic period to A.D. 159, a legendary date of great importance that appears in many retrospective hieroglyphic texts including one at Pusilha (Braswell et al. 2004:227, 2005:70; Prager 2002). This date also falls within the period of dramatic and probably climatically driven collapse seen throughout the Maya highlands and lowlands at the end of the Preclassic period (Kennett et al. 2012; Webster et al. 2007:12; Hodell et al. 2005:1421).

Early Classic Ceramics

The Early Classic pottery of southern Belize can be divided into three basic phases, which we tentatively call EC1, EC2, and EC3. The EC1 complex has been described by Jillian Jordan (Jordan and Prufer 2014) of the Uxbenka project, and to date has been identified only at that site and by Claire Novotny (2014) at Aguacate. As described by Jordan, the pottery of this time belongs to what Juan Pedro Laporte (1995) called the Peripheral Chicanel complex, which is a mixture of late waxy slipped

monochrome pottery of the Sierra Group with early polychromes and glossy Peten monochromes typical of the Tzakol sphere. In other words, the EC1 pottery of the Southern Belize Region is transitional between “pure” Late Preclassic and later Early Classic ceramics. What is key here, and what has hindered the identification of early Early Classic contexts in many peripheral parts of the Maya lowlands, is that Tzakol did not first appear outside of the central Peten as a complete complex. Instead, it was an elite subcomplex that gradually penetrated and changed local pottery complexes and traditions. The first appearance of such pottery probably occurred in the central Peten by A.D. 100. It then slowly spread—especially during the third, fourth, and even early fifth centuries—into more peripheral regions as notions of Classic period kingship and culture took root and became more common. This is particularly notable in the Belize Valley and Southern Belize. The appearance of Tzakol alongside late Chicanel pottery during EC1 demonstrates that permanent settlement of the Southern Belize Region began just as those ideas of divine kingship were spreading. We think this fits very well with Walker’s comment (cited above) about the Early Classic beginning in A.D. 159 when the Maya “tell us it did.” Moreover, in a relatively isolated and distant region, the transition to the Classic period took some time, perhaps two centuries. Jordan describes EC1 red-slipped bowls as having sharply everted rims (Jordan and Prufer 2014:320). Such sharply everted rims have not been noted at other sites in the region, supporting the contention that Uxbenka is uniquely early in date. Curiously, as Jordan reports, there are no clear “Protoclassic” shapes or decorative modes at Uxbenka (Jordan and Prufer 2014:320). Although “Protoclassic” pottery is not found everywhere, this does tend to support a start date of sometime in the third century A.D. for the ceramic chronology of Southern Belize. Agreeing with Jordan, we tentatively date EC1 to sometime after A.D. 200 until around A.D. 400.

EC2 pottery has been identified at Nim li Punit and is associated with the earliest known settlement of that site. It has also been found at Uxbenka (Jordan and Prufer 2014:320).

The EC2 complex closely resembles the pottery described by Laporte for the southeastern Peten. Aguila Orange, Balanza Black, and Triunfo Striated are all found, as are Orange-slipped polychromes (Jordan and Prufer 2014:321). The surfaces of sherds recovered from Uxbenka are very poorly preserved, but our own excavations at Nim li Punit have revealed that painted ceramics are fairly abundant. In EC2 contexts at that site, we have found Dos Arroyos Polychrome and what we tentatively identify as Actuncan Polychrome (Fauvelle 2012b). Also present are small quantities of cream-slipped sherds, and abundant amounts of what we call Toledo Unslipped. The most notable attributes of EC2 pottery are the basal flanges found on bowls. These are remarkably large, sometimes measuring up to 3 cm thick. Three notable vessels dating to EC2 times are slab-footed tripods, one of which was imported and two of which appear as rather poorly made Peten gloss ware vessels (Braswell 2012:6). The presence of these footed tripod vases helps date EC2 to about A.D. 400 to A.D. 500.

EC3 pottery is known from Nim li Punit and Pusilha, although at the latter site it appears in very small quantities. It may be that a distinct EC3 exists at Uxbenka, but Jordan so far has preferred to lump it together with EC2 (Jordan and Prufer 2014). The most obvious differences between EC2 and EC3 pottery are the loss of Actuncan polychrome and, especially, a great reduction in the size of basal flanges found on bowls. By EC3 times, these were rarely more than 8 mm thick.

Both EC2 and EC3 ceramic inventories contain a red-slipped ware that is a predecessor to the Late Classic Remate group. This appears most commonly as jars or bowls. We have not named the group at Nim li Punit, but Jordan calls it the Santa Cruz group at Uxbenka (Jordan and Prufer 2014:320). The surface color is buff to red and not at all glossy in appearance. The slip is generally thick and rather soft, but the fabric is well-fired at Nim li Punit. At Uxbenka, many Santa Cruz bowls have sharply everted rims (Jordan and Prufer 2014:320); these are probably early, dating to EC1 times. In great contrast are the red-slipped bowls of EC2 and EC3 times at Nim li Punit. These most often have a sharp incurving break on the rim. Perhaps this is a

temporal difference; perhaps it represents local ideas about bowl forms.

Half of our EC2 and EC3 pottery consists of unslipped pottery. At Nim li Punit, we call this Toledo Unslipped, which is a predecessor of the later Turneffe group. Toledo Unslipped pottery of EC2 and EC3 phases, however, exhibits far less variation than its Late Classic counterpart. One important distinction between the Early Classic and Late Classic is that there are no striated or stamped designs on EC2 and EC3 unslipped pottery at Nim li Punit.

Late Classic Ceramics

Ceramic and other archaeological data indicate that Nim li Punit, Lubaantun, and Pusilha were all occupied during the eighth century. The Late Classic pottery of all the sites in the region belongs to the Tepeu sphere, and all produced red-slipped decorated jars. Polychromes include Palmar Orange, which was dominant at Pusilha, and Louisville (similar to Zacatal), which was more common at Lubaantun and to a lesser extent at Nim li Punit (Fauvelle 2012a:66).

One important difference during the Late Classic is that almost none of the pottery at Nim li Punit contains carbonate tempered (Fauvelle 2012a:86). This is in stark contrast to Lubaantun, Pusilha, and Early Classic Nim li Punit where virtually all pottery is tempered with calcium carbonate.

Ongoing analysis of the Late Classic ceramic assemblage from four structures at Lubaantun has provisionally yielded three distinct phases on the basis of modes, forms, and decorative techniques. As noted by Hammond (1975:295), there is little evidence of Tepeu 1 material at Lubaantun. Instead, the sequence begins with Tepeu 2 pottery. Because LC1 pottery is found at Pusilha and Nim li Punit, we begin the Lubaantun sequence with a phase provisionally called LC2A.

The earliest and most uncertain Late Classic phase at Lubaantun is LC2A, which contains several forms that are unattested in later stratigraphic levels. These include a barrel-shaped vase with a pedestal stand (Figure 2b), nearly identical to those found at both Tikal and Uaxactun during Tepeu 3 times. The presence of such materials in a deep stratigraphic context

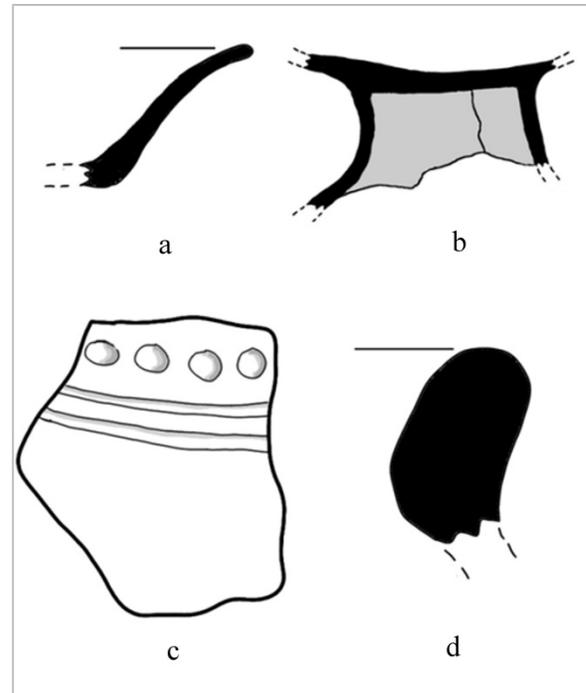


Figure 2. LC2A and LC2B pottery from Lubaantun: (a) Louisville/Zacatal Polychrome plate with out-curved rim and no basal flange; (b) Pedestal stand vase found in the earliest construction stage of Structure 34 at Lubaantun; (c) Remate Red jar with simple incised line and impressed circle designs; (d) Puluacax Unslipped bowl. Figure by Mark D. Irish.

within mound fill is curious and needs further exploration. Also common are outflaring or outcurving dishes that lack sign a basal flange, similar to Tepeu 2 period material from the Peten (Figure 2a; Smith 1995:169). Remate Red jars and bowls, ubiquitous throughout the occupational history of Lubaantun, are decorated with simple lines and circular impressions during this phase (Figure 2c). These are spaced about 1 cm apart, distinguishing them from the more elaborate unite stamped and comb raked designs of the Terminal Classic period, which are noticeably absent. Finally, Belize Red is extremely rare or absent in LC2A collections.

Unlike the LC2A, the LC2B phase contains no barrel-shaped vases with stands, and instead shows a greater diversity in plate forms. Unique to this phase are Louisville Polychrome plates with outcurving sides at very shallow angles, as well deeper plates with outflaring sides, similar to Tepeu 2 material from elsewhere in the lowlands. Plates continue to lack flanges, although some have small shallow

notches etched near the base. These might represent a transitional form between the plates of the LC2A and those of the Terminal Classic, which feature increasingly more pronounced basal flanges. There are several instances of carved scenes on the sides of vases, which are more typical of the Tepeu 3 period. We wonder if these sherds are intrusive. Remate Red jars from this period show increasing complexity in design, with incised lines running parallel to the rim and lines of small rectangles running perpendicular to it. Some early evidence of small unit stamping lacking zoomorphic features also dates to LC2B times. Belize Red first appears in significant quantities during this period, which limits LC2B to the last of the eighth century.

Cross-cutting LC2A, LC2B and the Terminal Classic at Lubaantun are certain forms and types which remain consistent throughout the occupational history. Foremost of these is Puluacax Unslipped, a friable utilitarian ware whose principal form is a shallow dish with outcurved rims and Z-shaped sides (Figure 2d). Found in great quantities at Lubaantun, Puluacax may have Early Classic antecedents at Uxbenka (Jillian Jordan, personal communication 2013). Also found throughout all Late Classic phases are Turneffe Unslipped jars and bowls. The most common form is a large, gently curving jar with a vertical neck and slightly outflaring rim.

Terminal Classic Ceramics

As elsewhere in the Maya lowlands, the Terminal Classic period is characterized by a marked reduction in ceramic richness, in the production of elite wares, and of variety in both forms and types. It is also marked by the appearance of new imports and of new forms and decorative modes. Belize Red plates (Figure 3b) are highly diagnostic of the first facet of the Terminal Classic, what we call TC1. At both Nim li Punit and Pusilha, it appears roughly at A.D. 780, and has characteristic Terminal Classic modes. Belize Red is quite rare at Uxbenka and found on the surface. At Lubaantun, Belize Red is relatively common, adding to the supposition that Lubaantun is later than major settlement at Uxbenka. Moreover, although Puluacax Unslipped appears at Lubaantun in all contexts, it is absent at Pusilha

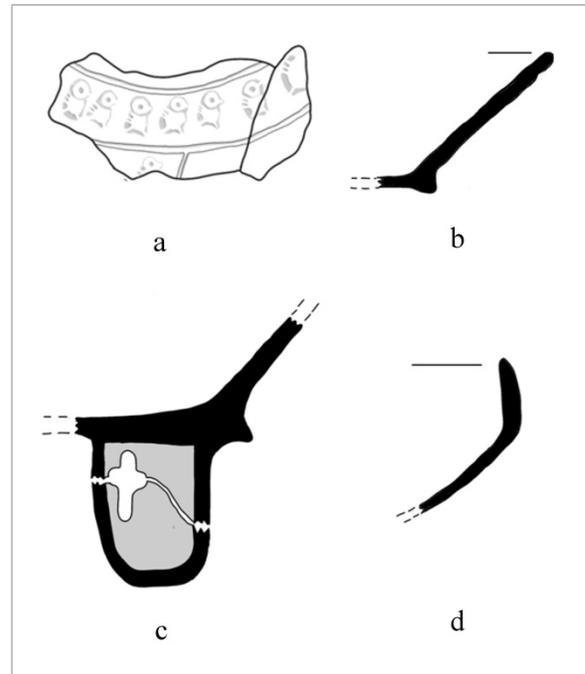


Figure 3. TC1 pottery from Lubaantun: (a) Remate Red jar shoulder with zoomorphic unit-stamps; (b) Belize Red plate with basal flange; (c) Louisville/Zacatal Polychrome plate with notched basal flange; (d) Hondo Red(?) bowl with incurved sides and rounded base. Figure by Mark D. Irish.

and Nim li Punit before TC1. This also tends to support the notion that much of the occupation at Lubaantun dates to the last 50 years or so of the Late Classic and to the Terminal Classic period.

The final Terminal Classic phase at Lubaantun, TC1, is identified by the presence Louisville/Zacatal Polychromes in plate and dish forms that feature a notched basal flange and outflaring rims (Figure 3c). Also present is a round bottom bowl form with in-sloping sides, a form diagnostic of Tepeu 3 pottery (Figure 3d). Additionally, decoration on Remate Red jars consists of tightly spaced rectangle and circle designs, often under zoomorphic stamps (Figure 3a). Unit-stamping on red-slipped jars and bowls is a decorative motif attested in coeval deposits from the southeast Peten (Sabloff 1975:164) and the Chiquibul Region (Pendegast 1970, 1971), indicating stronger ceramic ties with these regions than with the central Peten.

Based on stratigraphy at Nim li Punit, we also tentatively identify a TC2. At that site, Pabellon Model Carved and Fine Orange super-system pottery appear principally in contexts overlying and lacking Belize Red. This is most

notable in the West Group. If this division holds up, we tentatively date TC1 to about A.D. 780 to 830, and TC2 to A.D. 830+. At Pusilha, however, Belize Red appears alongside Pabellon Model Carved super-system pottery in two late burials.

Postclassic Ceramics

Postclassic pottery has been identified only at Pusilha, and there only at one structure, the “Bulldozed Mound” (Braswell et al. 2004:227). Like Postclassic pottery belonging to the New Town complex of the Belize Valley (Gifford 1976:289), the Ejar Complex of Copan (Bill 2014:98), and other similar complexes of Cancuen and the Petexbatun region (Foiás 1996:712), the Postclassic pottery of Pusilha lacks standardization and is very crudely manufactured.

Conclusions

There are still significant gaps in our understanding of the archaeological chronology of the Southern Belize Region. Nonetheless, we now know much more than we did at the beginning of this century. First, the earliest evidence for agricultural villages dates to the beginning of the Early Classic period and, so far, is limited to Uxbenka and perhaps the small site of Aguacate. The pottery of this time is closely related to that of the southeastern Peten and belongs to the Peripheral Chicanel tradition. By about A.D. 400 or so, Tzakol-sphere related pottery dominated the region. Late Classic pottery, especially the polychromes, are related to the Tepeu sphere of central Peten, but the closest ceramic ties are with the southeast and southwest, not with the Tikal or Calakmul regions, and there are no direct Late Classic ties with Caracol. Also missing—except for three foreign sherds at Pusilha—are ties with Late Classic Copan. The early Terminal Classic saw the abandonment of Uxbenka and great growth at Lubaantun. The Terminal Classic assemblage was less rich in terms of diversity, but new trade relationships were forged and novel imports arrived. It is likely that Caracol was the conduit through which Belize Red pottery reached Southern Belize during the early Terminal Classic period. By A.D. 830 or so, such connections attenuated. The great inland sites of

Toledo District were all abandoned by A.D. 900 but occupation continued in the cayes and along the coast.

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27 **HIGHWAYS, BYWAYS, CIRCUITS AND PATHS: MODELING MOVEMENT AMONG THE ANCIENT MAYA IN THE CENTRAL BELIZE WATERSHED**

Marieka Brouwer Burg, Eleanor Harrison-Buck, and Astrid Runggaldier

Movement was an integral social process underpinning ancient Maya subsistence, commerce and industry. Most economic considerations of movement place primacy on what and who does the traveling, the location of the source and the destination; however, the logistical and decision-making components of the journey are often glossed over. For example, in the Central Belize Watershed we assume the Belize River was the critical conduit connecting goods and people between the coast and inland, evidenced by the wide distribution of inland/upland and coastal/lowland goods in opposing regions. However, the river would not have been easily traversable in all seasons, requiring alternative overland and overwater routes. Little energy has been expended to identify these alternative routes, despite their obvious importance. In addition, there is a dearth of information concerning the location of routes linking trade and exchange between northern and central or southern areas of Belize. In this paper, we explore possible routes of movement through the landscape using GIS least cost path (LCP) analyses and circuit-based (CB) modeling. Such an analysis allows investigation into the movement of humans and commercial goods through multiple circuits or pathways in the landscape; locational prediction of undocumented “way-point” sites along these paths; and consideration of the parameters involved in past routing decision-making.

Introduction

The movement of people, goods, and ideas has long been an integral component structuring human life and the experience of the landscape. As a social process, movement (including migration, transhumance, trade, and exchange) can reveal much about a culture, defining desirable products, the flow of innovations, and underlying motivations causing people to move themselves or encourage movement of their peers. In the realm of Maya archaeology, studies of movement have focused on subjects ranging from human reshuffling during and after economic, social, and political upheaval (Demarest 2006: 30-32; Freiwald 2011; Jones 1989: 10, 23, 61, 116; Yaeger and Hodell 2008: 221), migration of language-speaking groups into new territories (Jones 1998: 11-12; Law 2014), and the flow of goods and services from one location to another (Demarest 2004: 160-163; Drennan 1984; Rouse 1986).

To “see” movement archaeologically, researchers look for the tell-tale signs of non-local goods at a site, which in the Central Belize Watershed includes materials such as obsidian (Hammond 1972; Healy et al. 1984; Rice 1984; Sidrys 1976), jade and serpentine (Freidel 1979; Garber 1983; Hammond et al. 1977; Kovacevich 2013; Pendergast 1979; *ibid* 1981), marine shell (Andrews 1969; Feldman 1974), salt (Andrews

1983; McKillop 2002), granite (Shipley and Graham 1987; McKillop 2004), basalt (Hammond 1975; Sidrys and Anderson 1976), and chert (Shafer and Hester 1986; *ibid* 1991). Accordingly, most considerations of movement in the past have focused primarily on *what* goods have traveled from which sourcing locations, and assumptions are made about *how* these goods moved from one place to another. We know from ethnohistoric accounts by the Spanish and from Classic Maya texts and imagery that human porters or traders were important fixtures in the transportation and exchange of desired goods through the entire Maya area, much as semi-trucks, trains, and container ships serve to move our commercial goods today (Hirth and Pillsbury 2013; Masson and Freidel 2013; Tokovinine and Beliaev 2013).

This chapter focuses on the *where* and *why* questions of human movement: what particular paths were chosen over others, and what criteria (or lack thereof) determined these routes? The overall aim is to derive information to facilitate the prediction of past conduits of human movement, and thus both positive and negative evidence of human mobility is considered; that is, where people went and how, as well as where people did not go and why. To begin to shed light on these questions, we draw upon multiple lines of evidence including the

literate and cartographic ethnohistoric record; recent ground-truthing fieldwork; and GIS-based analysis of potential routes through the landscape.

The Ethnohistoric Record

In thinking about pathways of movement in the past, one logical place to begin is with the most recent evidence: the ethnohistoric record. Grant Jones (1989) reconstructed an inland route¹ taken by the Spanish when traveling from Salamanca de Bacalar, through the Maya stronghold of Tipu in modern-day Belize, and west to Tah Itzá on Lake Petenitzá during the contact period (16th-17th centuries; Jones 1989: Map 2, xvi-xvii; Figure 1). Based on his reading of the ethnohistoric records, Jones estimates that the primary inland route—which included plenty of canoe travel—ran south through Chetumal Bay, down the New River and past the ancient Maya site of Lamanai to the end of the New River Lagoon. At the southernmost tip of the New River Lagoon, Jones posits that the inland route jumped south across what is today called Labouring Creek, on down through a portion of the Belize River East Archaeology (BREA) project study area, finally connecting to the Belize River around the colonial sites of Chantome, Zaczuz (also referred to as Zaczuz in Scholes and Thompson 1977 and Saksuus in Jones 1998), and Lucu. It seems that some of these colonial sites may have had pre-contact predecessors, suggesting that the ancient Maya site of Saturday Creek could possibly be the location of Chantome, and the site referred to in the BREA project as Ma'xan could correlate with Zaczuz. These ancient-colonial site associations are based mainly on location, site size, and in the case of Saturday Creek, temporal longevity (both sites mentioned here were occupied from the Late Preclassic until contact times). We suggest that the route taken by the Spanish also had similar longevity and assume that the newcomers were shown this route by native Maya inhabitants.

Historical Map Archives

In considering where the inland route would have passed, we draw upon historical maps from the 16th-18th centuries. In addition to the David Rumsey historical map collection (one

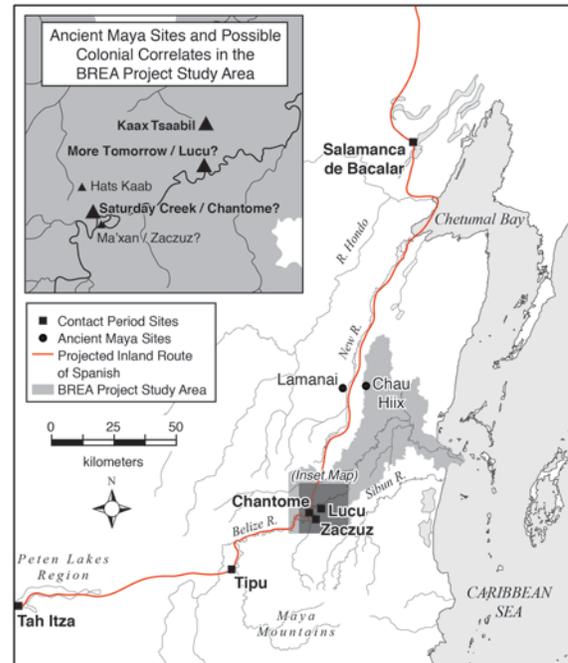
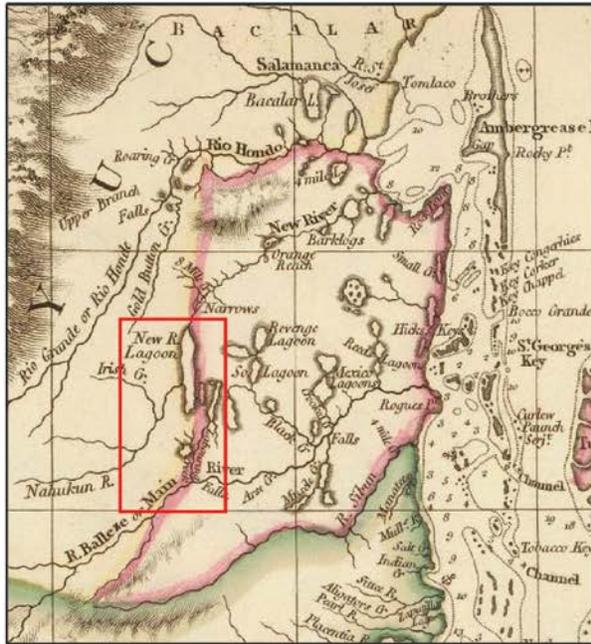
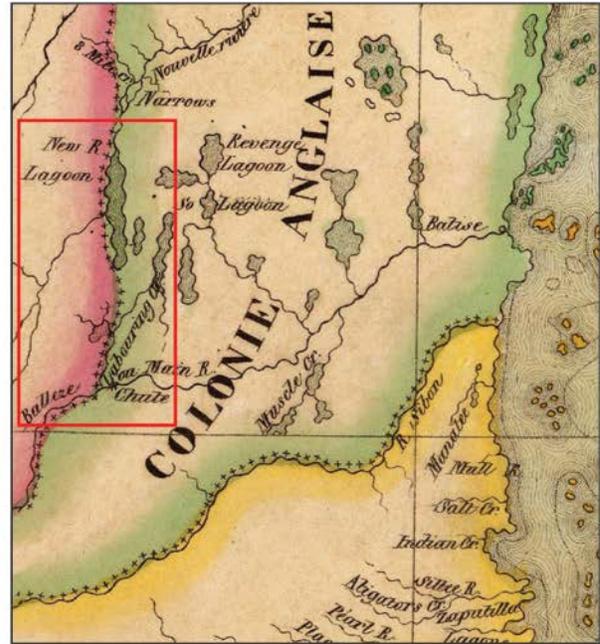


Figure 1. Map of northern and central Belize indicating the inferred route of the Spanish, as well as other archaeological sites mentioned in the text. Adapted from Jones (1989: Map 2).

of the world's largest private collections), one of us (Runggaldier) recently came across a number of intriguing maps at the Ludwig Von Mises Library that owns the Colección Carlos W. Elmenhorst at the Universidad Francisco Marroquín in Guatemala City. Figure 2a depicts a map by Arrowsmith from 1810, in which the western boundary of British territory (in pink) extends from Chetumal Bay (not labeled) west along the "Rio Hondo" and a tributary. The boundary line then turns south and passes overland toward the "New R. Lagoon" and continues down "Labouring Creek," on to the "R. Balleze" or "Main River." While Labouring Creek is incorrectly oriented north-south instead of east-west, it does connect to what appears to be an early cartographic rendition of Western Lagoon. We submit that these territorial boundaries correlate with known pathways of movement that had long structured the way that people moved through and experienced the landscape. Cartographers of the day were faced with a plethora of natural and cultural features to represent, but had to carefully choose which features to include on any given map. It therefore seems likely that the features chosen

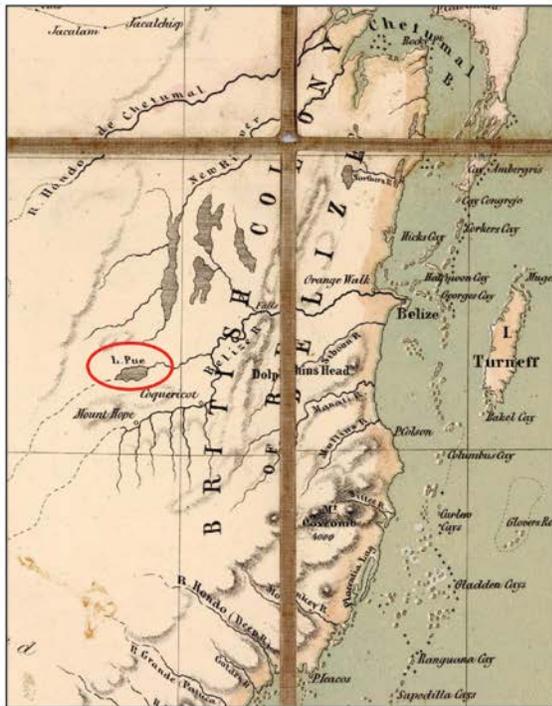


2a. "Chart of the West Indies and Spanish Dominions in North America," by A. Arrowsmith (1810).

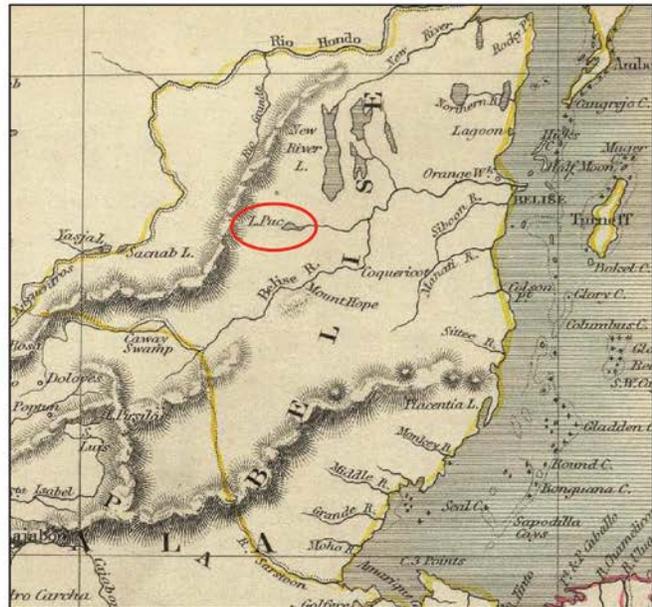


2b. "Partie due Guatemala, Amer. Sep.," by P. Vandermaelen (1827).

Figure 2. (a) Detail of Arrowsmith's (1851) "Chart of the West Indies and Spanish Dominions in North America;" (b) detail of Vandermaelean's (1827) "Partie du Guatemala, Amer. Sep.," Maps courtesy of the David Rumsey Map Collection and available at <http://www.davidrumsey.com/home>.



3a. "A New Map of Central America," by H. Kiepert (1858).



3b. "Central America," by R. M. Martin et al. (1851).

Figure 3. (a) Detail of Kiepert's (1858) "A New Map of Central America;" (b) detail of Martin et al.'s (1851) "Central America." Maps courtesy of the David Rumsey Map Collection and available at <http://www.davidrumsey.com/home>.

for representation must have been culturally significant and relevant to those using the maps (e.g., established routes, waypoints, and easy passages). Also noteworthy is that the southern boundary of British territory was the “R. Sibun,” undoubtedly another important conduit of movement. Another map by Vandermaelen (1827) shows a similar territorial boundary for “Colonie Anglaise” (Figure 2b). In both Figures 2a and 2b, there exists a small, oval-shaped lake through which the Labouring Creek flows to connect to the Belize River and which we believe is the same lake referred to as “Lac de Puc” in later maps (Figures 3a and 3b).

The placement of Lac de Puc to the west-south-west of the New River Lagoon is documented in other maps as well (Kiepert 1858; Martin et al. 1851), indicating that this lake was likely an important waypoint along the route from northern Belize to the Central Belize Valley. However, linking this water feature to a modern-day feature proved difficult. Three potential existing features were considered: Logger’s Camp Lake or Blue Lagoon in Yalbac, Jaegar and Whitewater/Freshwater wetlands, and Colorado Lagoon (Figure 4). Colorado Lagoon was ruled out because it does not connect to Labouring Creek today, nor is it round or oval in shape. The Logger’s Camp Lake/Blue Lagoon in Yalbac lands is a possibility since it is perennially wet, fairly sizeable, and lies west-south-west of New River Lagoon. However, this lake does not connect to Labouring Creek today, apart from temporal formation of *bajos* during the rainy season. The last possible candidate—and the one that we propose is the most likely for Lac de Puc—is the combined Jaegar and Whitewater/Freshwater wetlands (see Harrison-Buck et al. 2013:87 for a description). A large portion of this area becomes inundated seasonally and is located on Labouring Creek. The shape does not conform to the cartographic depictions of Lac de Puc, but this could be due to environmental changes in drainage, rainfall, and groundwater regimes over the last 200-300 years. In conclusion, we cannot argue that any of these potential water features represent with definitive certainty historical Lac de Puc; however, while we consider Whitewater Lagoon to be the most probable identification, all three features likely provided important stop-over or

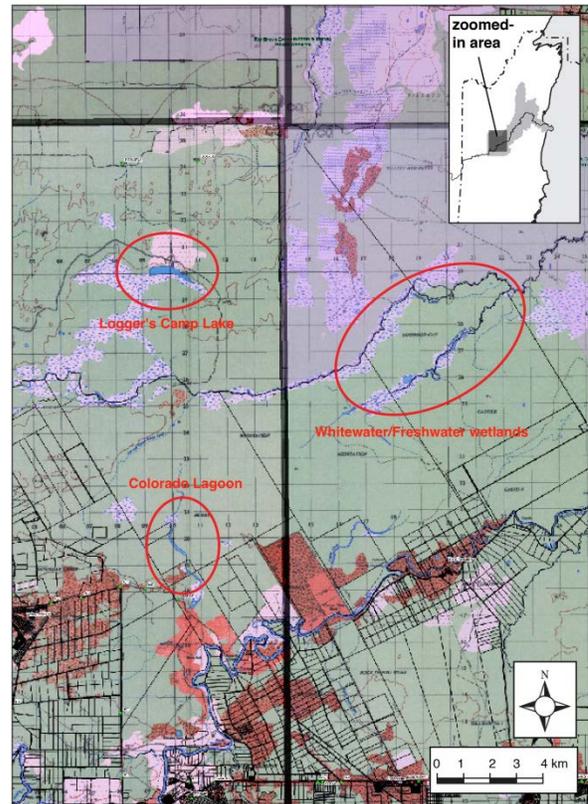


Figure 4. Map of Central Belize showing possible correlate water features for historic Lac de Puc.

waypoint locations for travelers to quench their thirst and rest during the trek between the New River Lagoon and the Belize River.

Current Fieldwork

Thorough reconnaissance of the area discussed above was undertaken in May-June 2014 in order to ground-truth the projected Spanish inland route as described in both literature and map archives. Apart from discovering and documenting many new anthropogenic mounds, and at least four new sites, the reconnaissance mission also determined that, if the Spanish had taken this route to the Belize River, they likely encountered some troublesome natural obstacles in the form of *bajos* or swamps (Figure 5). Today, the area is nearly impassable during the wet season, despite the fact that large tracts of land in the vicinity of Meditation have recently been cleared in preparation for cane field agriculture. This recent bush clearance has drastically modified both the natural and cultural landscape, jeopardizing the ability of

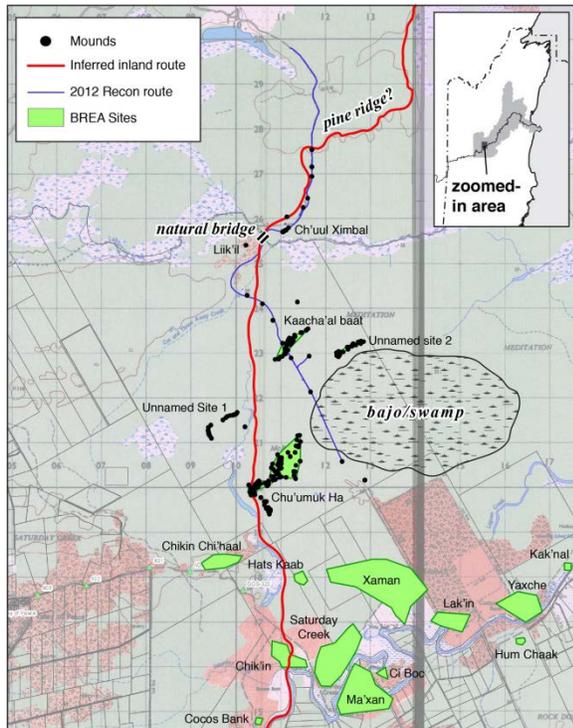


Figure 5. Map depicting recent reconnaissance work in the western portion of the BREA project study area, with inferred inland route of the Spanish indicated.

archaeologists to learn more about human movement and settlement in the region, and further impeding research on the ancient Maya themselves as well as the environments they inhabited and moved within.

Field reconnaissance also revealed that while many anthropogenic, mound-like features were exposed by bush clearance, a number of these features were completely lacking in cultural material. Thus, the generally-held contention that the Maya were “thick on the ground” during the Preclassic, Classic, and Terminal Classic Periods in the lowland area should not be assumed outright; the presence of a natural topographic rise does not unequivocally indicate habitation by human agents. This finding spurs the question: did the Maya select particular elevated areas for use based on specific characteristics and, by extension, what environmental and cultural features of a landscape were necessary for human pathways to be established? The latter question of criteria involved in selecting and maintaining human pathways of movement will be discussed in the next section.

In two previous reconnaissance missions, members of the BREA team investigated a natural travertine bridge on Labouring Creek, north-north-west of Saturday Creek by c. 9 km, to determine if the area could have been the Confederate site of New Richmond (Buck et al. 2013:41-55; Gantos 2015:20-30; see route indicated in blue on Figure 5). Spanish accounts describe leaving canoes at the southernmost extent of the New River Lagoon (known as Ram Goat Creek today) and then passing over a long pine ridge (or *pinal*) before fording Labouring Creek at a shallow “submerged natural bridge” (Jones 1989:138, 312; Scholes and Thompson 1977:45; see also the accounts of Francisco de Cárdenas Valencia written in 1639). The presence of bottle fragments dating to the 1800s, a metal teakettle, and a chamber pot from the same era were also recovered through surface collection of the area (see Buck et al. 2013). These findings could possibly corroborate historic records left by noted American expatriates B. R. Duval and Colin McRae, both of whom were involved in the initial settlement of New Richmond (Kaeding and DeGennaro 2011; DeGennaro and Kaeding 2011). Also intriguing was the presence of a number of mounds strewn with ancient Maya artifacts in the vicinity of the possible Confederate site, indicating that human presence with deep cultural longevity in this area could correlate to inland routes. However, it is also possible that the site of New Richmond was located further downstream (see Gantos 2015). Although historic distances were not always accurately or consistently recorded, Duval (1879) himself described the site of New Richmond as “three miles” above the confluence of the Belize River and Labouring Creek (Duval 1879:41).

GIS-Based Analysis of Inland Routes

Given the aforementioned ethnohistoric and ground-truthed information, a GIS-based analysis was planned to corroborate the results and predict the locations of other routes and waypoints. In previous work, Brouwer Burg et al. (2014) conducted a multi-criteria least cost path analysis for the BREA project study area, which explored the most likely pathways of movement from a source to a destination (in particular, between Late Preclassic sites in the

north, west, and central portions of the Belize). We draw upon this work as a foundation for the GIS-based analysis described here.

Least cost path (of LCP) analysis emerged in the early 2000s as a valuable technique for modeling the movement of both humans and other species through a landscape, and is used frequently by archaeologists interested in modeling movement in the past (see McCoy and Ladefoged 2009 for a review). The first and most important step in developing a LCP is to determine how much friction is required to move through different environments, and consequently a large portion of the modeling involves determining what criteria impacted peoples' decisions about landscape movement, and then establishing how much weight to assign these criteria (see Brouwer 2011:183-211 for discussion of these methods). For example, moving up a mountain generates more cost (or friction) to a traveler than walking down a mountain. Similarly, walking through lowland jungle represents more cost to the traveler than canoeing down a river.

To improve the robusticity of this technique, another multi-criteria LCP analysis was undertaken, pairing multiple lines of spatial data that are thought to have directly impacted peoples' decision concerning where and how to travel. These criteria were slope, ecosystem type, and water feature type (see Brouwer Burg et al. 2014, Figure 6: 266). Each surface was weighted according to a common scale, such that low relief, easily traversable ecosystems, and water features were weighted on the lower end of the friction scale. High relief and/or nearly impassable ecosystems and water features were weighted on the upper end of the scale.

Multiple LCP analyses were run for four different travel scenarios with starting and ending points at sites with Preclassic occupation: overland travel during the dry season (1) and wet season (2); overwater travel during the dry season (3) and wet season (4) (see Brouwer Burg et al. 2014, Figure 7:267). These proposed routes all indicate that if someone wanted to travel from northern Belize to the Belize River, into the interior of the Maya heartland, or down to the Sibun River Valley, the path of least resistance would pass through the heart of the BREA project transact centered on Saturday

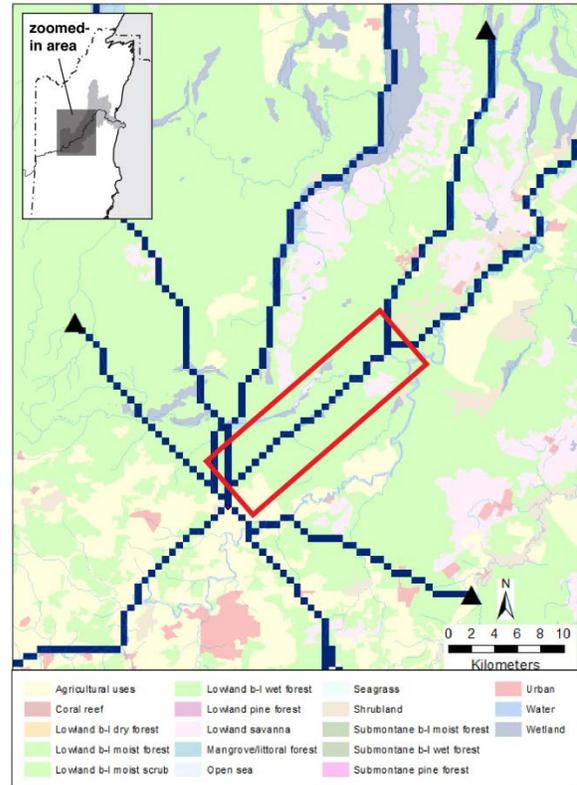
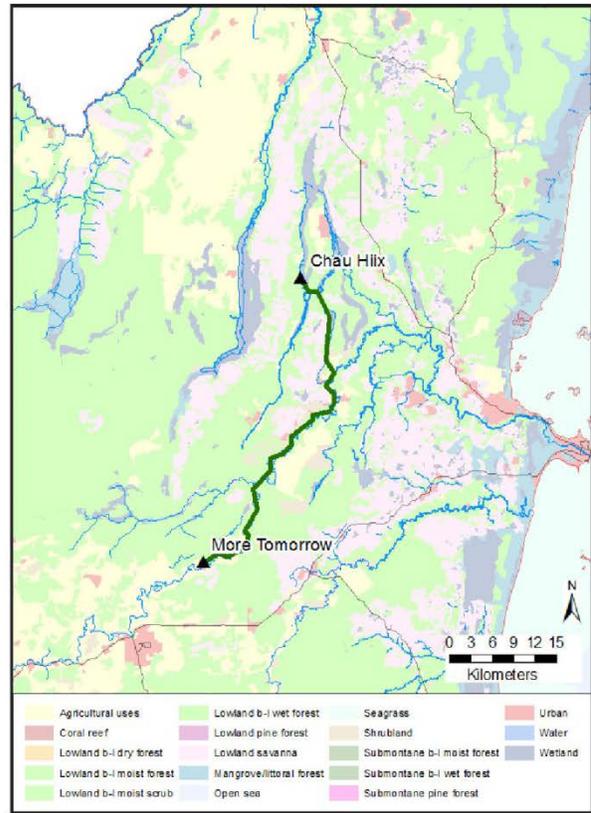


Figure 6. Close-up of alternative overwater route linking Chau Hiix and Saturday Creek. Blue pixels represents output of LCP calculation in ESRI ArcGIS 10, with a grid cell resolution of 500 m.

Creek. These analyses also suggest that the route Grant Jones (1989) proposes for the Spanish correlates with a least cost path (i.e., down New River Lagoon and Ram Goat Creek, crossing through Meditation and down to the Belize River). Additionally, the overwater analyses suggest an alternative route that may have been utilized during the wet season, extending from the western portion of the BREA project area to the northeast where the route connects with Spanish Creek and on to Chau Hiix, and Crab Catcher and Western Lagoons (Figure 6). This alternative route cuts east just south of the documented bajo/swamp area, before linking up with Whitewater/Freshwater Wetlands and on to the Spanish Creek system, and may be the route that survives in late 18th and 19th century maps. The most recent reconnaissance mission undertaken by the BREA team ground-truthed part of this path (Gantos 2015) that, along with the distance estimates from Duval's (1879) travelogue, seems



7a.



7b.

Figure 7. (a) Projected LCP overland route from Chau Hiix to More Tomorrow; (b) Projected LCP overwater route from Chau Hiix to More Tomorrow.

to present a real possibility for an alternative overwater route.

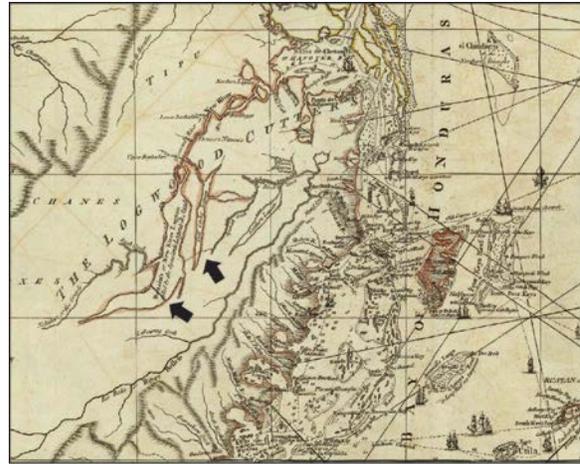
To further investigate alternative routes to those inferred from the ethnohistoric accounts, another LCP analysis was run in which the ancient Maya site of Chau Hiix was set as the starting point and the approximate location of the Colonial site of Lucu was used as the ending point (for the purposes of this study, it is estimated that the present-day town of More Tomorrow is located in the near vicinity of Lucu). Results of this second round of LCP analysis revealed that if the traveler’s initial goal was to move from Chau Hiix to More Tomorrow on foot, then the path of least resistance traverses a strip of lowland savanna before crossing over Labouring Creek and Whitewater/Freshwater wetlands (Figure 7a). If the traveler’s goal was to travel by canoe as much as possible, then the path of least resistance flows from Chau Hiix over to Western

Lagoon, linking up with the Belize River in the vicinity of the modern-day community of Double Head Cabbage (Figure 7b). This preferred overwater route using Western Lagoon as a conduit to get to the Belize River correlates with findings made in two separate studies (Pyburn 2003; Harrison-Buck 2014) that have identified potential man-made canals linking Chau Hiix to Spanish Creek and Black Creek. Visible in aerial and satellite imagery, these canals appear too straight to be natural and are thus likely to have been anthropogenic.

The cartographic record can again be referenced for ideas about how these manmade canals were built. A 1776 map by Thomas Jefferys refers to the entire area as “The Logwood Cutters,” which is in keeping with what is known about British loggers moving into the territory in the late 1700s and early 1800s to procure logwood, before the area was officially given to the British by the Spanish (Humphreys

1961) (Figure 8). Most intriguing is that New River Lagoon (called “Britain’s Lagoon” and “Laguna de Azul”) is shown bisected by an unmistakable straight, dark line. Two additional dotted lines connect the New River Lagoon to Crab Catcher Lagoon and Spanish Creek. Could these be the very same canals that are still visible today on digital imagery? If so, they could lead to barkadeers (i.e., timber collection points; Higgins 1998: 83) and may have been important conduits for transporting logwood and mahogany downstream during the Colonial Period (Campbell 2011). It is a distinct possibility that these canals match previously established ancient Maya routes for economic and/or transportation purposes. Furthermore, a number of small dots along the western side of New River Lagoon seem to represent settlements although no map legend is provided, so this hypothesis will remain a speculation.

LCP analysis has thus proven very useful both heuristically and predictively, as a device that promotes exploration of environmental and cultural criteria motivating human movement through the landscape, and by supplying a tool for informing future ground-truthing, survey, and excavation. However, LCP analysis has some significant limitations associated with it; most specific to this case study, is the inability to facilitate multiple pathways between two points (or sites) (Howey 2011:2523; Pinto and Keitt 2009:254). In addition, some rigid assumptions must be made about human processes: (1) that the traveler has complete knowledge of their landscape (McRae et al. 2008:2715); (2) that the traveler is able to follow the path of least resistance; and (3) that the traveler does not change their traveling preferences over time (Howey 2011:2524). As such assumptions can rarely be made about human movement, a group of spatial modeling researchers (many interested in animal movement) are now regularly applying circuit-based modeling (or CB), which draws upon theory from electrical engineering (McRae and Beier 2007; McRae et al. 2008). The basic premise is the same as for LCP analysis: moving through a landscape generates resistance or cost to the traveler. This type of modeling is also directly concerned with the selection and weighting of input criteria. However, in

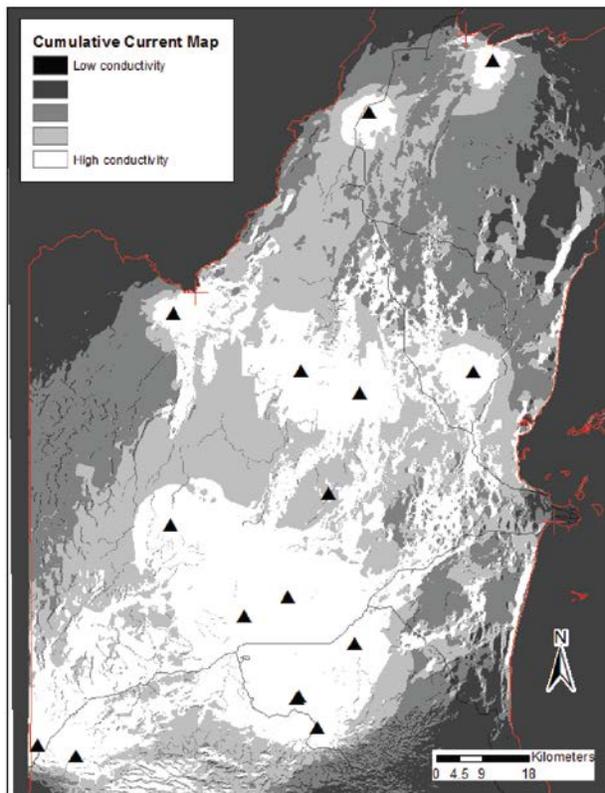


“Bay of Honduras,” by T. Jeffreys (1776).

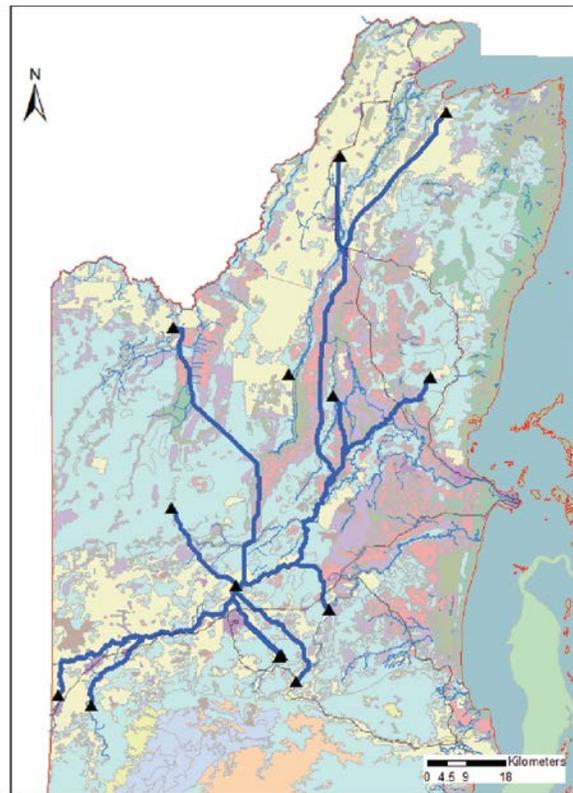
Figure 8. Detail of Jeffery’s (1776) “Bay of Honduras” map, showing the area of the Logwood Cutters and Canals (see arrows). Maps courtesy of the David Rumsey Map Collection and available at <http://www.davidrumsey.com/about>.

addition to modeling the resistance of particular landscapes, circuit-based modeling also considers how permeable or conductive landscapes are to movement (Koen et al. 2010).

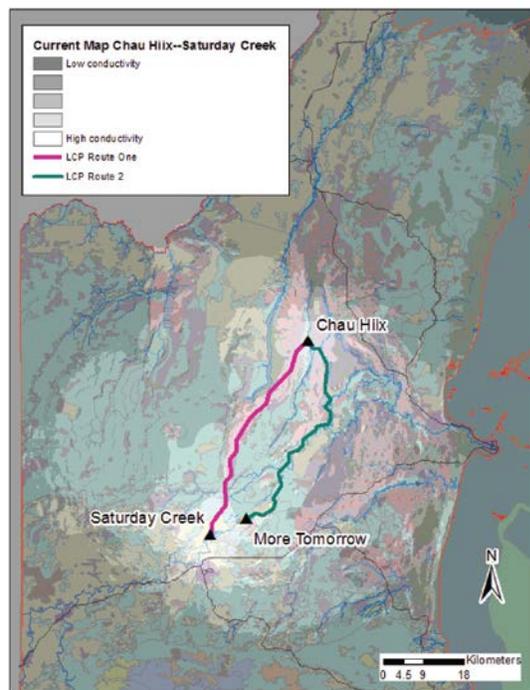
CB analysis produces current maps that depict areas of high-to-low conductivity. Many researchers feel that this type of modeling more accurately reflects the array of pathways available to a traveler, allowing for various environmental and cultural factors to impact routing decisions by individuals. Instead of returning a single optimal path, circuit-based modeling yields surfaces that scale all conduits across the landscape from low to high conductivity. Figure 9a illustrates the cumulative current map for a number of Late Preclassic sites in northern and central Belize, and Figure 9b depicts the results of the LCP analysis for the same sites. When LCP routes are overlaid atop CB outputs, it becomes clear that ancient travelers were confronted with a range of potential routes between two sites, and most likely they chose different routes at different times of year and throughout their lifetimes based on a range of external factors, whether natural or cultural. In Figure 9c, the LCP mirrors the route of high conductivity in the CB output; however, another potential route exposed by the CB output flows further east and correlates well with the alternative route discussed above.



9a.



9b.



9c.

Figure 9. Results of (a) CB modeling depicting cumulative current map; (b) LCP between same outset locations; (c) LCP routes overlain on current map.

To predict site locations along these north-south routes, a final line of evidence worth discussing concerns daily travel distances. The average person can walk about 3 km an hour; porters with heavy packs are expected to move more slowly, perhaps covering around 15 km a day provided they have a clear path to follow. If an ancient Maya porter or trader coming from the Petén interior bivouacked at Saturday Creek on their way north, for example, it would probably take them about three additional days to reach Lamanai or Chau Hiix. Their interim overnights would occur somewhere around Labouring Creek, perhaps in the vicinity of the elusive Lac de Puc. We predict, therefore, that sites will likely be found at the ends of these 15 km walked radii (Figure 10). Different ecosystems will have imposed varying levels of friction and subsequently time to one's route, so it is possible that more waypoints will be found between these two areas.

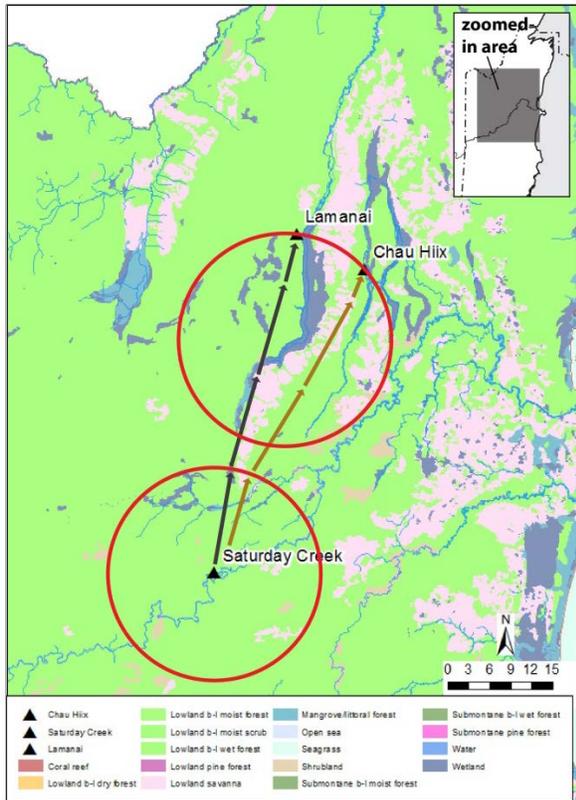


Figure 10. Average daily walking radii (indicated with red circles and arrows) between Saturday Creek, Lamanai, and Chau Hiix.

Conclusion

The Maya god of trade, Ek Cho, must have been frequently invoked in the Central Belize River Valley, an area that we contend was an important conduit and crossroads for ancient Maya and Colonial trade, exchange, and human transference. As described here, movement is a complex and difficult social process to model, one that involves many different dynamic and changeable factors. More research is needed on where and how regular movement occurred, and why people chose certain routes and pathways over others. Many new geospatial techniques provide archaeologists with powerful tools for harnessing and querying environmental and cultural datasets, yet the utility of ethnohistoric texts and maps should not be overlooked, nor the practice of good old-fashioned field reconnaissance for enriching and rounding out investigations. While landscapes have never been, nor will ever be, static entities, the increased rate with which we are losing

resolution on cultural and ecological heritage underscores the importance of multi-component research programs that can both proactively document and explore new sites, as well as reactively deal with the consequences of human disturbance and modification of the landscape.

¹ This inland route is assumed to be an alternative to the coastal route from Salamanca de Bacalar, down the coast of present-day Belize, and entering the Belize River at colonial Holzuz (Belize City; Jones 1989:233).

² For comparison, Inca *tampu* (refueling way stations along the Inca roads) were situated about a day's walk apart in distance (c. 15-25 km) along structured roads (D'Altroy 1992; Hyslop 1984).

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28 ***DRONES, MAPPING, AND EXCAVATIONS IN THE MIDDLE BELIZE VALLEY: RESEARCH INVESTIGATIONS OF THE BELIZE RIVER EAST ARCHAEOLOGY (BREA) PROJECT***

Eleanor Harrison-Buck, Marieka Brouwer Burg, Mark Willis, Chet Walker, Satoru Murata, Brett Houk, Alex Gantos, and Astrid Runggaldier

The Belize River East Archaeology (BREA) project has continued to focus on survey, mapping, and excavations of sites in the middle Belize Valley, particularly the ancient Maya site of Saturday Creek. Previously, we have suggested that Saturday Creek and its associated Hats Kaab “E-Group” marked an important crossroads in the middle Belize Valley. Here, we present an overview of our work this past season, which included re-mapping the site core of Saturday Creek using a Total Station and performing several test excavations. We also flew several unmanned aerial vehicles (otherwise known as “drones”) in the areas of cleared agricultural fields that surround the Saturday Creek site core. The drone mapping revealed an extraordinary density of mounds, particularly just north of the site core in the vicinity of the “E-Group,” indicating that this locale was a major focus of population aggregation in ancient times. The results of our mapping complement our previous GIS spatial analyses and studies of ceramic distribution patterns for this area in the eastern Belize Watershed. Combined, our studies leave little doubt that Saturday Creek and its vicinity marked a central node in the landscape, arguably because it served as a nexus between east-west and north-south trade and communication networks from Classic to Colonial times.

Introduction

The eastern Belize River valley appears to have a long history that extends from the Formative period through Colonial times. Here, we report on investigations carried out this year during our fourth season of the Belize River East Archaeology (BREA) project. The BREA study area encompasses the eastern Belize watershed between Belmopan and Belize City (Figure 1). We find that most of the ancient Maya settlement hugs the bank of the Belize River, likely because it served as the ancient “highway” between the coast and inland centers. While the main trunk of the Belize River serves as the anchor for our archaeological investigations, the Belize Watershed comprises numerous creeks and a large expanse of wetlands to the north. These bodies of water form a network of waterways that facilitated the movement of people and goods from Preclassic through colonial times (Harrison-Buck et al. 2012, 2013).

Ethnohistoric accounts suggest that while waterways were critically important, there were also several north-south overland routes that connected these rivers and creeks (Figure 2). Previously, we have presented the results of a least-cost path analysis conducted along one proposed route, which we refer to as North-South Route #1 (Brouwer-Burg et al. 2014). Elsewhere, we have suggested that Route #1

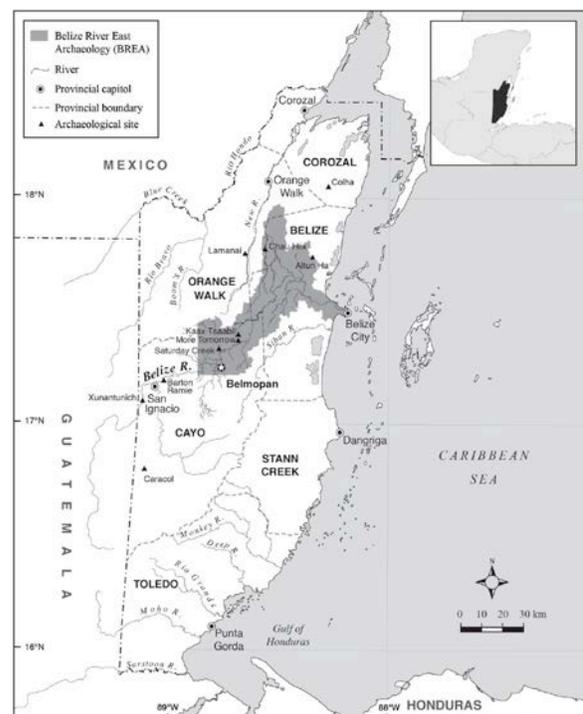


Figure 1. Map of the BREA study area (map prepared by M. Brouwer-Burg).

may represent a north-south overland route used by the Spanish during the sixteenth and seventeenth centuries (Buck et al. 2013; Harrison-Buck 2010; Harrison-Buck, Kaeding, and Murata 2013). Ethnohistoric accounts suggest this route extended from the Chetumal Bay south to the head waters of the New River,

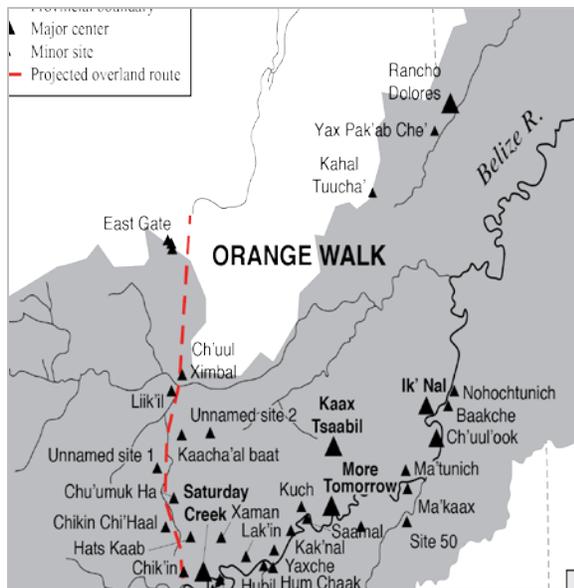


Figure 2. Projected Overland Route #1 (map prepared by M. Brouwer-Burg).

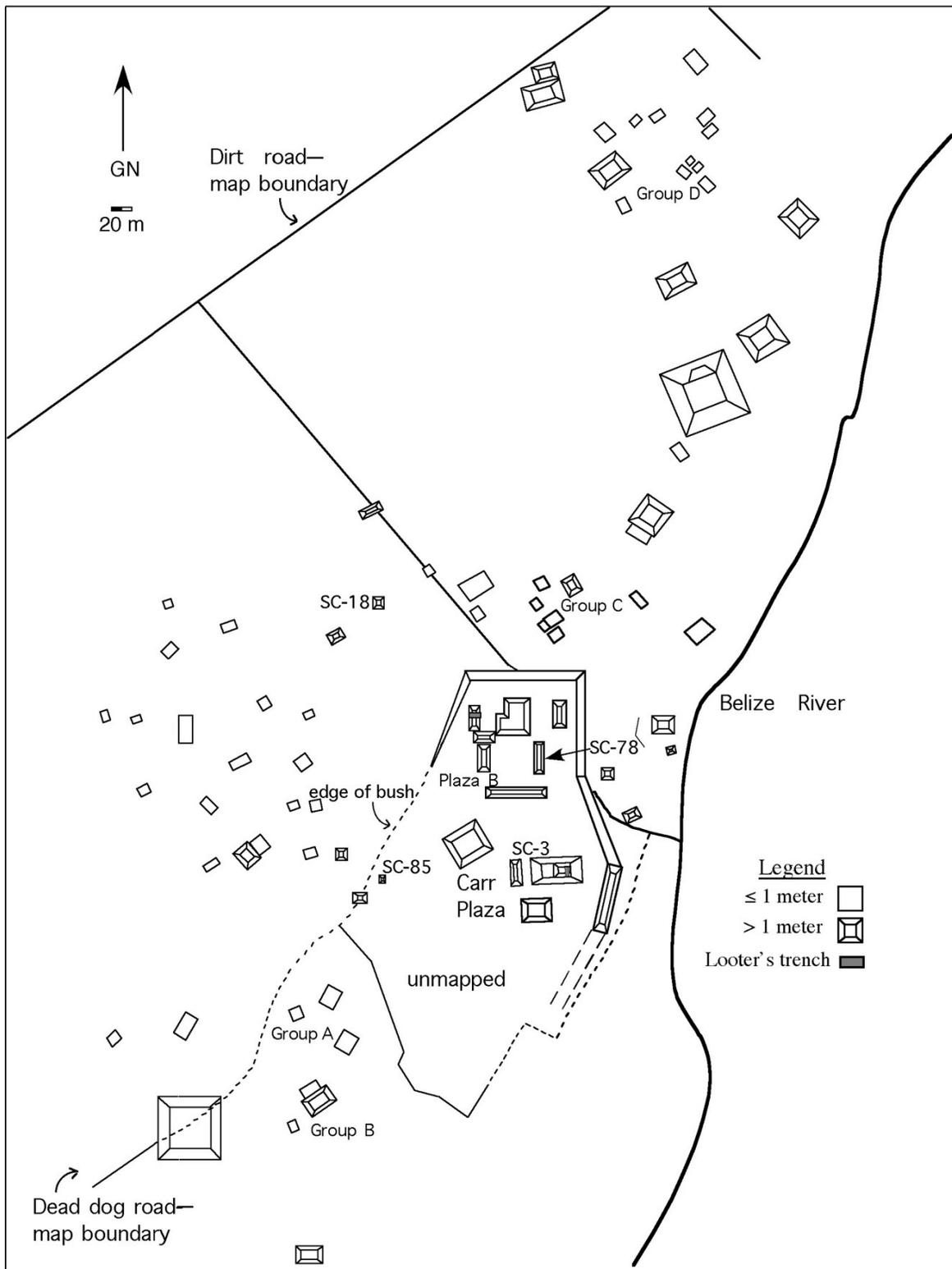
known as Ram Goat Creek, and that it went due south through swamp and pine savannah until it reached a partially submerged “natural bridge” of stone that the Spanish used to cross Labouring Creek (Jones 1989:138, 312 [Note 35]; see also Scholes and Thompson 1977:45). The route then headed overland south to a point in the middle Belize River that we believe is in the vicinity of Saturday Creek (Harrison-Buck, Kaeding, and Murata 2013).

We have spent the last couple field seasons ground-truthing this route and this season filled in more of the gaps along this projected path, which Brouwer Burg (this volume) discusses in greater detail. Here, we simply point out the clear string of settlement that we have identified thus far and note that it does indeed run roughly north-south in a linear path between Labouring Creek and the Saturday Creek site (Figure 2). Our survey of this area has not only refined the location of the north-south overland route based on the dispersal of the mounds, but also sheds light on the length of time this route may have been used. We conducted surface collection at each of these four sites and all of them revealed dense Terminal Classic ceramic material. Saturday Creek, Hats Kaab and Chum’umuk Ha are so far the only sites where we firmly identified Preclassic material.

According to the sixteenth century accounts, the overland route was said to enter the Belize River at the Maya town of Lucu in the mid-section of the Belize River (Jones 1989:287-288). According to the Spanish reports, Lucu was located right next to “the hamlet formerly known as Chantome” (Jones 1989:287-288), which we believe may have been the ancient site of Saturday Creek that was largely abandoned when the Spanish arrived (Harrison-Buck 2010). Jones (1989) notes a cluster of Contact period sites in this area of the middle Belize River. The density of settlement in this spot at the time of Contact is further support that the area around Saturday Creek marked an important crossroads linking the north-south overland route and the Belize River (Brouwer-Burg et al. 2014; Harrison-Buck 2010). This year, in addition to further reconnaissance along our projected north-south overland route we aimed to further investigate the site of Saturday Creek and its hinterland settlement with two primary goals in mind: 1) to map the site core of Saturday Creek and its surrounding hinterland settlement and 2) to investigate the possibility of Spanish Contact in this area.

Drones and the Mapping of Saturday Creek

Using an optical transit and stadia rod, the site core of Saturday Creek was mapped around fifteen years ago by Dr. Lisa Lucero and her team (Lucero 1999:10). Of the 100 mounds they recorded at Saturday Creek along on the northern side of the river, Lucero notes that her survey team was only able to map 75 of them (Figure 3). The BREA project spent three weeks in January 2014 and another four weeks this summer surveying and re-mapping the site core of Saturday Creek using a Total Station and GPS. This has allowed us to record detailed topographic information for the site core and more accurately tie in the site to our existing GIS map of the BREA study area. Figure 4 shows our topographic map of the site core that includes the southern section of the site core that was previously unmapped. Satoru Murata also created an interpolated digital elevation model of the site center (Figure 5). You can see that Saturday Creek has a sizeable site core with a main elite residence to the north, three large



Saturday Creek

Figure 3. Original rectified map of Saturday Creek site (after Lucero et al 2004: Fig. 6.2).

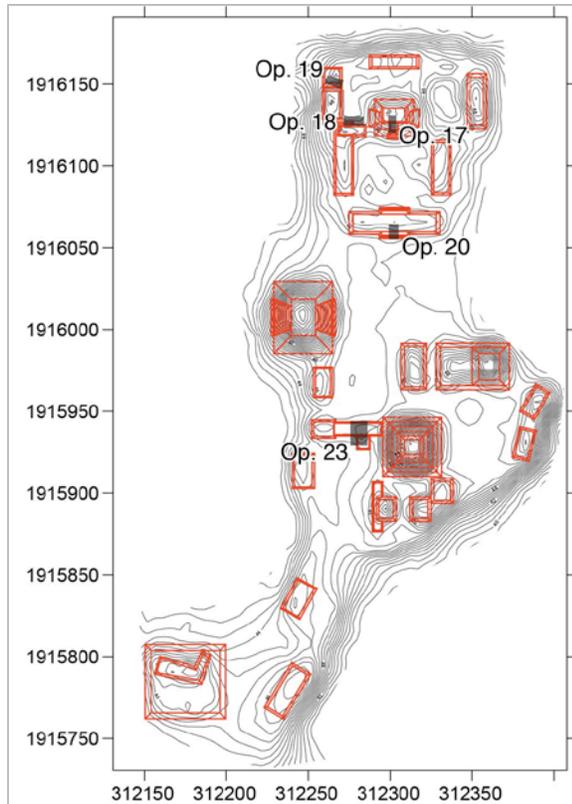


Figure 4. Topographic map of the Saturday Creek site core (map prepared by S. Murata).

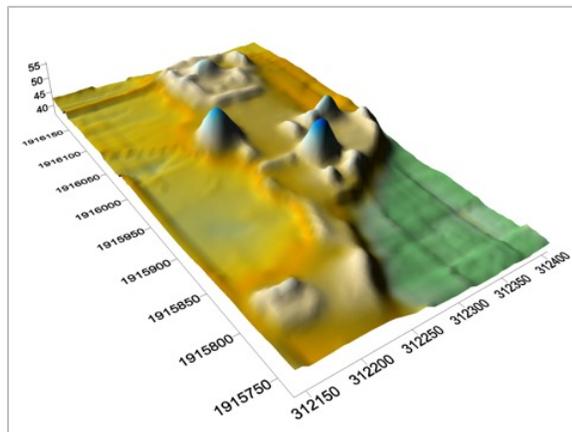


Figure 5. 3-D Image of the site core of Saturday Creek, looking northeast (map created by S. Murata).

pyramids, and a smaller pyramid attached to a ballcourt. In surveying the southern section of the site that was previously unmapped we identified another plaza group and several large structures, two of which may represent a second ballcourt at the site.

While much of the site core of Saturday Creek is in bush, most of the area outside the site

core has been cleared for agriculture. Unfortunately, the mounds in this area have been victims of extensive bulldozing and repeated plowing over the years and are at high risk of destruction. So our aim has been to get the settlement documented before further destruction occurred. Although destructive, the clearing makes for good visibility and we took advantage of this by mapping the area during the January season using several unmanned aerial vehicles (UAVs), otherwise known as “drones.” In less than two days, our drone specialists Chet Walker and Mark Willis flew an area around Saturday Creek that was a little over 7 square km. (Figure 6). They flew two different kinds of drones, a MikroKopter Hexakopter and an ardupilot fixed wing drone. These ready-to-deploy, light-weight UAVs have on-board systems comprising a digital camera, a GPS, and a radio receiver, which is controlled by a ground-based computer (a semi-rugged laptop). For high-resolution mapping, the goal is to generate a very dense digital terrain model (DTM), which requires a series of overlapping images to recreate the topography of the region. In just two days, a point for every 5cm on the ground was collected with the two UAVs, for a total of over 50 million points in the seven square km area. Using commercial photo-merging software, the individual photographs are merged by common points relative to the location of the camera. They establish control points marked with aerial photo targets that are placed across the area prior to flight. Under optimal conditions, they are able to establish the precise location of the imagery to within +/- 10 centimeters. The software then uses the estimated camera positions of all the tiled images to derive a 3D polygonal mesh of the ground surface and produces a digital elevation model (or DEM) that can be used in any GIS (Global Information System) or 3D mapping software such as Surfer.

At Saturday Creek the low house mounds are difficult to discern on the ground because of the repeated plowing over the years and removal of stone on the mounds. On the ground, we could tell it was a densely settled area around Saturday Creek but had no idea how dense until we saw the results of drone imagery. Figure 6 shows the subtle variations in surface



Figure 6. Drone DEM image of Saturday Creek hinterlands with red oval highlighting location of site core in bush (map prepared by Mark Willis).

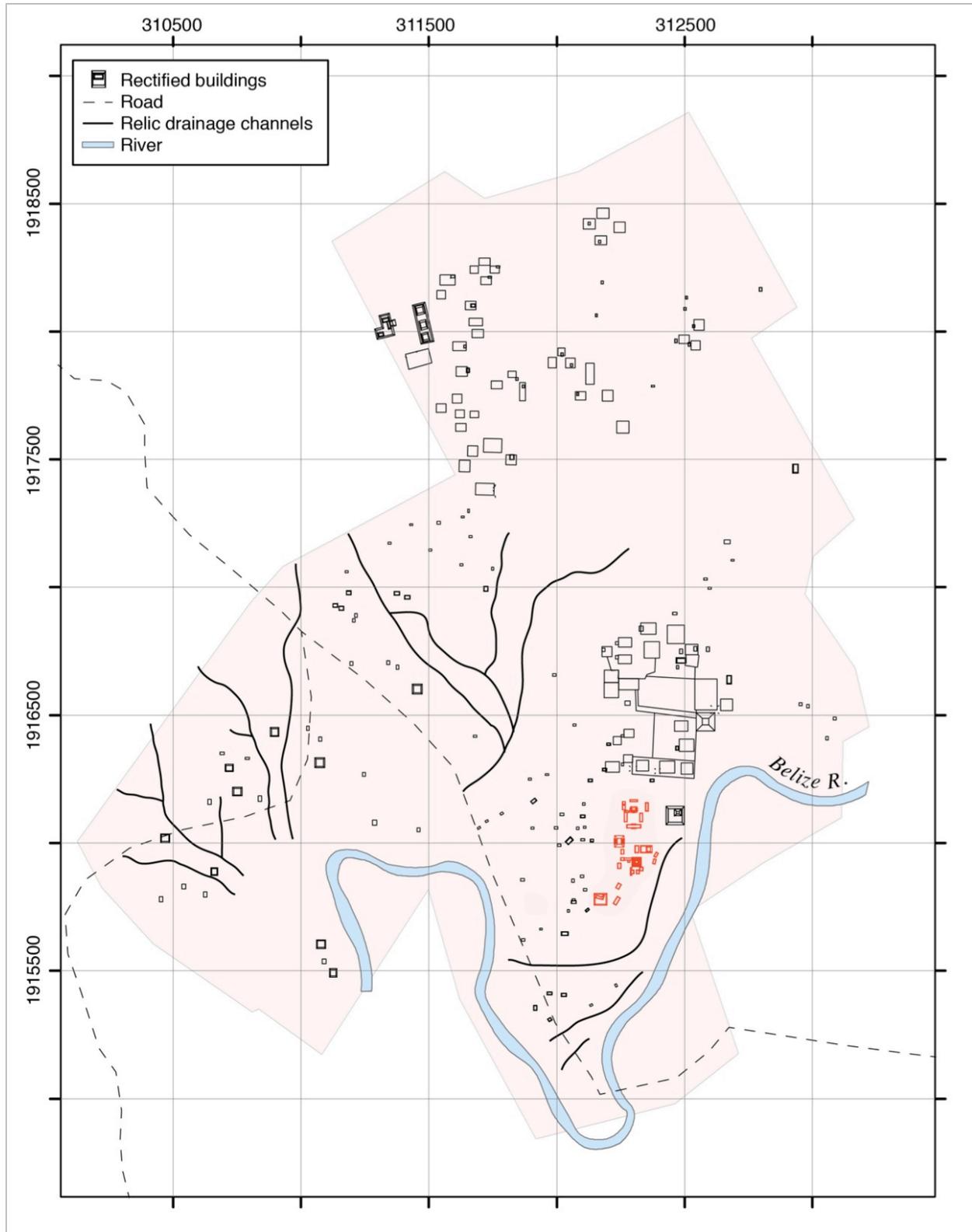


Figure 7. Rectified map of Saturday Creek and hinterland settlement (map prepared by S. Murata and M. Brouwer Burg).

topography that highlights the archaeological features when the varying light sources are changed and you can detect what appear to be hundreds of mounds packed into this small area. The densest settlement appears to be to the north of the site core just east-southeast of Hats Kaab, an E-Group or variant of an inline triadic shrine complex we have discussed in detail elsewhere (see Brouwer Burg et al. n.d.; Brouwer Burg et al. 2014; Runngaldier et al. 2013). We produced a rectified map of the drone survey based on a combination of the aerial imagery, elevation data from the DEM, and ground-truthing (see Figure 7). Figure 7 is a preliminary map that requires more systematic ground-truthing, which we plan to conduct in future seasons. However, a cursory inspection of the mounds and their associated ceramics shows that many of these structures were continuously occupied from Preclassic to Postclassic times, based on ceramic material found on the surface.

The take home message from our drone work is two-fold. First, unlike Lidar, drone imagery cannot see through the forest, but it is a far less expensive and clearly a very efficient tool for providing detailed maps of sites in large expanses of open fields. Second, we can firmly say that Saturday Creek was no small rural village, but rather, a large city center with a densely settled supporting population. We believe it served as a central node on the landscape and continued to be densely populated through time because of its location at the crossroads between the north-south overland route and the Belize River.

Archaeological Investigations at Saturday Creek

In addition to mapping the site core and conducting drone work in the Saturday Creek hinterlands, a second goal this season was to further refine our understanding of the Saturday Creek chronology and to investigate the possibility of Spanish Contact in this area. If we are correct that the Spanish account of “the site formerly known as Chantome” was Saturday Creek it would suggest that Saturday Creek was no longer occupied in the sixteenth century, but was still recognized as an important point in the landscape. If so, we would expect to find evidence of pilgrimage to the site core during the



Figure 8. Photo of Structure 11 at Saturday Creek (photo by E. Harrison-Buck).

Contact period. Yet, as others have noted, evidence of Spanish Contact is elusive at best and rarely visible on the surface prior to excavation (Pendergast et al. 1993). Therefore, this season we set up several test excavations in two different plaza groups at Saturday Creek (Figure 4). Four units were placed in the north plaza (Operations 17, 18, 19, and 20) and another unit was placed in the South Plaza group (Operation 23). Excavations in the North Plaza revealed a primarily Late Classic (A.D. 600-800) occupation with a small amount of terminal debris dating to the Terminal Classic (ca. AD 800-900). Our investigations in the South Plaza revealed a later occupation beginning in the Terminal Classic. Operation 23, measuring 6 m (east-west) x 8 m (north-south), exposed the southern edge of Structure 10 and the western half of Structure 11, a low square platform that appears to have stairs on all four sides of the structure (Figure 8). Excavations revealed near the surface several special deposits of whole or partially intact marine conch shell. The associated ceramic material found on the surface of the structure and over top of the plaza surface on the western side of Structure 11 consisted mostly of broken censer material dating to the Postclassic period. Some clues that these deposits date to the Late Postclassic comes from the presence of Palmul Incised vessels, Chenmul Modeled censers, and other unusual anthropomorphic censer fragments (see Figure 9). The architectural configuration and associated censer material suggests that the structure served as a Late Postclassic shrine building.



Figure 9. Late Postclassic ceramics from Op. 23 (photos by M. Brouwer Burg).

To the north of the Postclassic shrine, there is an east-west platform (Structure 10) that bounds the northern side of the South Plaza. Operation 23 exposed a small portion of the southeast corner of this platform. In the final phase of Structure 10, we identified a cache deposit (Special Deposit 1) that was placed in the fill of the southeast corner of the platform (Figure 10). The cache consists of a dense concentration of burned and fragmentary animal bone, which appears to be mostly marine shell, resting on an incised Postclassic vessel fragment that resembles the incised orange-redware chalices found in Late Postclassic contexts at Lamanai (Pendergast 1981:Fig. 15). The cache was capped by fragments of an unslipped jar and within the bone deposit we found three jade beads, a bone pendant that may be part of a rosary, and a quartz crystal artifact that appears to be the top of a bottle stopper (Figure 10). It resembles those still used today in the Catholic church as stoppers for spouted sacred vessels containing holy water or for chrisal bottles



Figure 10. Historic quartz (?) bottle top found in Special Deposit 1 in Operation 23 (photo by M. Brouwer Burg).

used for holy anointing oil. Both are essential for baptisms and other blessings for healing and purifying persons, places, and objects and were used by the Spanish Catholic priests during the early Colonial period. This represents our first clear evidence of Spanish Contact at this site, which we suggest may be the Contact period site of Chantome.

Discussion

At Lucu, which we believe is in the vicinity of Saturday Creek, the Spanish described the Maya people there as greeting them “lovingly and calmly” (their words not mine). While it is certainly nice to know that we are likely excavating the remains of some very pleasant people according to the Spanish, it is clear from the ethnohistoric accounts that the Maya people engaged with them differently wherever they went and their response to the Spanish was quite variable. For instance, just a few kilometers up river at the Contact period Maya town of Zaczuz the Spanish built a church, but according to the Spanish accounts the Maya tore down the bell and threw it into the

underbrush as an act of resistance (Jones 1989:217). Following a series of Maya rebellions in 1668, “Franciscans, reportedly accompanied by soldiers...baptised 600 individuals of all ages” at Tipu, one of the main Contact period Maya towns located farther upstream in the upper Belize Valley (Jones 1989:115). Jones (1989:248) surmises that the Belize Valley inhabitants at Tipu and elsewhere acquiesced to some of these missionary efforts to “stave off military rule and permanent Spanish religious presence.” In lieu of a permanent Spanish priest, religious assistants who were considered *principales* or native elites were trained by the Spanish clergy “as teachers of catechism to the young, as scribes, and even as substitutes for the priest at times of baptism and burial” (Jones 1989:108). These individuals held elite status, derived from their role as scribes and religious specialists. While they held powerful responsibilities for the Church, they also are consistently described by the Spanish as leaders of Maya rebellions involved in “idolatrous” behavior, such as native rituals and recording native histories in codical-style manuscripts (Chuchiak 2010; Hanks 2010; Harrison-Buck 2014:684-685; Jones 1989:107-108; Knowlton 2008). As a native religious leader with access to doctrinal knowledge and sacred vestments of the Spanish Church, it may well have been a *maestro* (perhaps one living nearby at Zacuz or Lucu) who was responsible for the Maya ritual deposit at Saturday Creek. This would explain the selective incorporation of the crystal stopper from a Spanish holy water or chrismal bottle that, conceivably, could have been in the possession of the village’s maestro.

Elizabeth Graham (1998:29) observes: “The bias in archaeology has been to emphasize the political role of Christianity as a religion of the state, and thereby to interpret pre-Columbian elements in religious material culture as resistance phenomena.” She suggests that by dichotomizing the Maya experience at the time of Contact as either rejection or acceptance is too overly simplistic. This perspective underplays the native conceptualization of their own universe and their proactive response and creative reconfiguration of indigenous values in the midst of a changing world (Graham 1998:29-30). The ethnohistoric accounts when coupled

with the archaeological remains demonstrate that the Maya were not simply reactive, but proactive (Graham 1998:29). The incorporation of a glass stopper that may have contained holy water or wine was likely one reason for its selective use in the special Maya deposit at Saturday Creek, but its association with other precious materials, such as jade and its ability to sparkle brightly in the sun (which it still does) reflects indigenous values. Arguably, its sacred value as an object expresses native beliefs rather than Christian ones.

In conclusion, we believe the ethnohistoric and archaeological data together support the identity of Saturday Creek as Chantome and its settlement in the vicinity as Lucu, which the Spanish described as the location where the overland route entered the Belize River and where there was a cluster of Maya settlement at the time of Contact (Jones 1989. Scholes and Thompson 1977). We will continue to investigate Saturday Creek and its vicinity in the future as we believe this area has the potential for shedding light on our understanding of the impact of early Spanish Contact and Christianization and how this area in the middle Belize Valley was connected with other Contact period settlement like Tipu and Lamanai, facilitated by a network of rivers and our north-south overland route.

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29 CARA BLANCA: THE CERAMICS OF TERMINAL CLASSIC PILGRIMAGE AND RITUAL

Jessica Harrison

This paper presents an analysis of the ceramics recovered from Cara Blanca Pool 1 and Pool 20 during the 2014 season. Ceramic chronology suggests that the ritual structures at these sacred pools were used during the Terminal Classic. The artifacts recovered in the summer 2014 excavations are almost exclusively ceramics, primarily water jars and large serving vessels. The finds indicate that Cara Blanca was an important site for communal water rituals in a time of environmental instability. The diversity of ceramic types and forms we observed suggests that people from distant communities may have made the pilgrimage to Cara Blanca to participate in these rituals.

Introduction

The 2014 Valley of Peace Archaeology (VOPA) Project field season focused on expanding the initial 2013 exploration of Cara Blanca Pool 1 Structure 1. The 2014 season excavations focused at Pool 1 Structures 1, 3, and 4 as well as Pool 20 M208, a large platform with two superstructures (Figure 1). Our goals were to better understand the history of Structure 1, to assess the possibility of pilgrimage to the pools, to explore the poolside structures adjacent to the plaza at Pool 1, and to test the Pool 20 structures to understand the nature of settlement at the lake-like pool in contrast to settlement at the *cenote*. Answers to our research questions come primarily from ceramic data. This is partly because the vast majority of artifacts we recovered were ceramics, but also due to the fact that analysis of ceramics provides insight into the nature of settlement that is sensitive to temporal change. This paper focuses on the settlement at Pool 1, including two ritual structures that were built, used, and abandoned during the Terminal Classic (C.E. 800-950). The ceramic analysis has implications for better understanding hinterland ritual and material production during the Terminal Classic in central Belize.

Located to the north of Laboring Creek in the Orange Walk District, Cara Blanca consists of 25 water bodies running east-west along the base of a steep limestone cliff; *cenotes* (sinkholes) are found in the center whereas lakes are located on the eastern and western edges (Lucero and Kinkella, in press). There is very little settlement at the pools, and the nearest center Yalbac lies 8 km to the west of the pools. Research at Cara Blanca began in 1998 with a



Figure 1. Cara Blanca Pools 1, 6, and 20.

program of survey and mapping, although the primary focus of the VOPA project was survey and excavation at Yalbac and Saturday Creek, as well as a dive program at Cara Blanca. Excavations at the pools started in 2013 with Pool 1 Str.1. The 2014 field season expanded excavations to other structures at Pool 1 and Pool 20, as well as a dive exploration of Pool 6 (see Larmon and Lucero, this volume). Five ritual structures at two sites, Pool 1 and Pool 20, have been tested. This paper examines the ceramic assemblage recovered from both sites during the 2014 season.

Pool 1 Structure 1

Pool 1 Str. 1, the water temple, was built adjacent to the *cenote*. The northeastern half of the structure has fallen into the pool, while looters trenches have impacted the southern half of the temple. We excavated the four remaining rooms, placing 1 m wide trenches through the floors in Rooms 1, 2, and 3 and exposing the uppermost floor of Hallway 4 (Figure 2, Figure 3). Very few lithic artifacts were recovered from Str. 1, although we did find a blue and pink chert biface in the Room 3 collapse. This biface, along with three broken *metates* recovered from

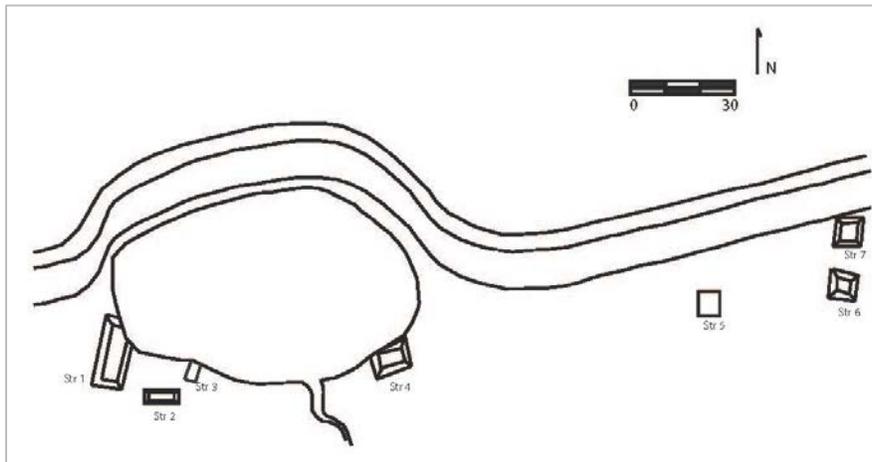


Figure 2. Plan view of Pool 1 structures.

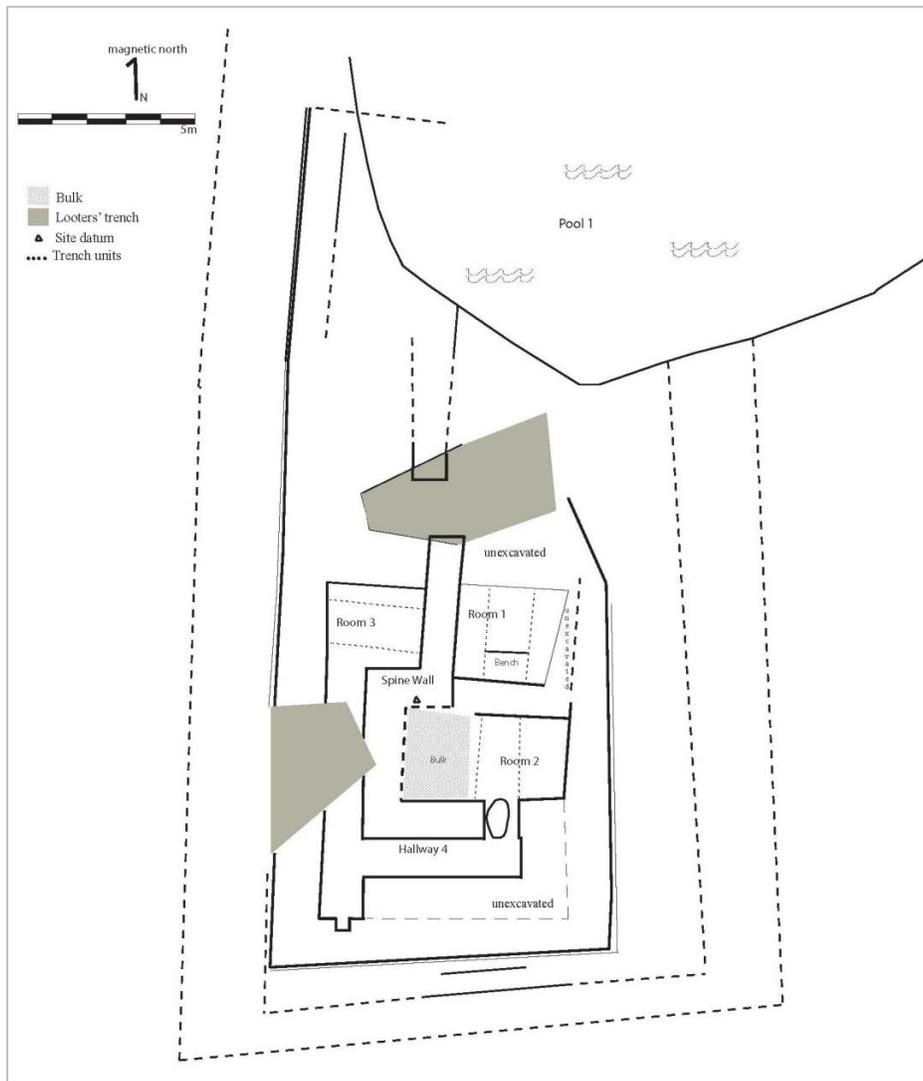


Figure 3. Plan view of Pool 1 Str. 1.

Table 1. Str. 1 ceramic frequencies for the 2014 season.

Alexanders Unslipped	4
Belize Red	7
Cayo Unslipped*	191
Dolphin Head Red	2
Palmar Orange Polychrome	4
Roaring Creek Red	1
Sibun Red Neck	3
Tu-tu Camp Striated	2
Vaca Falls Red	7

* Total includes both Late Classic and Terminal Classic lip treatments.

the base of the eastern wall in 2013 and a single obsidian blade, are the only lithics we found at Str. 1. Although obsidian blades are all but ubiquitous at Classic Maya sites, we only found two obsidian artifacts at Cara Blanca, an exhausted core at Pool 1 Str. 3 and a blade at Pool 20. The lack of stone tools and almost exclusive presence of pottery artifacts speaks to the special nature of Cara Blanca.

Three traits of the Str. 1 assemblage characterize all of the Cara Blanca excavations. The Str. 1 assemblage is dominated by jars, with bowls, dishes, and plates occurring in much lower proportions. A second is the distinct style of Vaca Falls midbreak bowls found throughout excavations at Pools 1 and 20. A third characteristic of our assemblages is the presence of more volcanic ash temper than expected even in Late Classic II and Terminal Classic assemblages (Gifford et al. 1976). While slipped types such as Belize Red are typically made with ash temper, even unslipped the storage vessels such as Cayo Unslipped jars were tempered with ash or a mix of ash and calcite, rather than the expected calcite temper described by Gifford et al. (1976). As will be discussed in further detail below, Cara Blanca's unslipped jars diverge from the traits we expect to see based on standard type-variety descriptions. This is significant because we see a number of unique stylistic innovations in pottery production that set Cara Blanca apart from other contemporary sites in Belize.

The Str. 1 ceramic assemblage consists of mixed Late Classic II and Terminal Classic types, complicating our chronological refinement of the structure's history (Table 1).

Many of the types found in Terminal Classic contexts, such as Belize Red and Cayo Unslipped, are introduced much earlier and remain common throughout the Late Classic transition to the Postclassic. The almost complete lack of black-slipped wares, such as Achote Black and Mount Maloney Black, further distinguishes the Cara Blanca assemblage from that typical of other contemporary sites in central Belize (LeCount 1996). Despite these differences, ceramic chronology places the structure's construction and abandonment in the Terminal Classic. The lowest stratum we excavated and the earliest occupation level of Str. 1, the construction fill of Room 2, contains a mixture of Roaring Creek Red, Sibun Red Neck, and Dolphin Head Red sherds.

While the Maya incorporated Late Classic vessels into the construction and use of Str. 1, there is no evidence that the temple or associated Pool 1 structures were built during the Late Classic. Every stratum of the temple either dated to the Terminal Classic or was bracketed by strata containing Terminal Classic diagnostics such as Cayo Unslipped jars with beveled lips, Sibun Red Neck jars, or Vaca Falls Red. A test pit placed in the plaza between Strs. 1 and 3 corroborates this conclusion, as we excavated to sterile soil at the level of the water table without encountering any Late Classic occupation.

Ancient Maya people called upon past and present in constructing the world of daily life. Ancestors and ancestral histories were not distant, ephemeral things; ancestral forces charged the present with meaning. We found a single Early Classic vessel, a Dos Arroyos polychrome plate with an applique button on the exterior (Figure 4). The Dos Arroyos plate, which had a fresh break and was likely deposited as a whole vessel that broke while we removed the heavy collapsed slabs above, is intriguing because it is the only vessel from Str. 1 that does not date to the Late or Terminal Classic. The plate appears to have been removed from an earlier cache and incorporated into the fill below the Room 1 bench, as it survived the 500 year interval from its creation to its final deposition in the bench intact.



Figure 4. Dos Arroyos Polychrome plate.

In addition to the re-accessed Dos Arroyos plate dedicatory cache, the temple was the stage for termination rituals. We encountered several ceramic clusters in Str. 1, each placed on top of the uppermost floor of a room. The clusters appear to be termination deposits, as they are placed on the last floor construction and buried beneath collapsed roof slabs and topsoil. In Rooms 2 and 3, the clusters are placed against the northern wall of the room, while the Hallway 4 (see Figure 3) clusters are placed near a step, concentrated along the southern and eastern edges of the passage. At least some of the vessels were broken and placed in separate clusters. While the Cayo Unslipped jars in Room 2 and Hallway 4 appear to have been left intact, we found part of the rim and body of the Fat Polychrome ‘jaguar’ vessel in Room 2 and the base and opposite side of the body in Hallway 4 (Figure 5). While the temple was subjected to post depositional processes including looting, forest growth and fallen trees, and animal burrows, the Fat Polychrome was broken before being distributed in different rooms. The Hallway 4 clusters are placed at the only exit from Rooms 2 or 3, and were, perhaps, the final offerings placed in the temple before it was abandoned.

We also found eight clusters within the Room 1 bench; six on top of the floor below the bench and an additional two in the fill below that floor. These clusters consist of Terminal Classic types including Palmar Orange Polychrome, Vaca Falls Red, and square-lipped Cayo



Figure 5. Hallway 4 clusters.



Figure 6. Room 1 clusters.

Unslipped (Figure 6). These clusters reinforce the importance of the bench in Room 1 and emphasize the significance of the single Early Classic plate that was interred with these vessels.

Pool 1 Structure 3

Structure 3 lies on the eastern edge of the plaza, 20m from Str.1 and 5 m south of the pool. The structure is a long, narrow platform measuring 5.2 x 1.8 m. Excavation at Str. 3 sought to expose the platform and understand how it relates to Str. 1. Excavations at Str. 3 began late in the season, and quickly revealed that the platform was covered in a sherd blanket (Figure 7). The blanket consisted of 3,274 sherds, which appear to come from smashed, incomplete vessels. Of the 3,274 sherds, we found only 216 rims, suggesting that very few complete vessels were selected for use in the ritual. There was significant burning throughout our excavation of the platform surface, and many of the sherds were charred and could not be identified. It is interesting to note that the



Figure 7. Structure 3 sherd blanket.

most charred sherds were in the center of the platform, while sherds on the northern and southern edges of the platform were not burned. All of the identifiable sherds date to the Late Classic II or Terminal Classic, including Mountain Pine Red, Roaring Creek Red, Cayo Unslipped, Tu-tu Camp Striated, and Chunhuitz Orange. The sherd blanket vessels were mostly jars and bowls, although the fragmentation and heavy charring of the sherds may have obscured our analysis. The Str. 3 jars are more heavily eroded and contain more calcite temper than the well-preserved ash tempered jars at Str. 1.

The Str. 3 assemblage is likely the remains of a termination ritual conducted to ritually kill the platform. Termination deposits include smashed pots and often valuable materials such as jade and *Spondylus* shell, and are frequently burned (Inomata and Stiver 1998, Walker 1998). While we can only speculate that Str. 1 was intentionally pulled down based on the total collapse of the roof and stacked patterning of fallen vault stones, the Str. 3 sherd

blanket is a much clearer moment in the history of Cara Blanca. The platform was covered in vessels that were intentionally smashed, and a fire was lit in the center of the platform. Finally, large boulders were placed on top of the broken, charred vessels. The fire was large and burned hot, but was controlled and does not appear to have spread beyond the platform as we did not find evidence for widespread burning outside of the platform boundaries. This indicates that the fire was intentional and anthropogenic, rather than a forest fire. Why the platform was terminated is unclear, but the structure had a short life history and was abandoned abruptly in the Terminal Classic.

Pool 20 M208

Excavations at Pool 20 focused on M208, a large platform built into the slope of a natural hill. Two structures were built on top of M208. M208 Structure 1 sits on the northern edge of the platform, and M208 Structure 2 lies to the west. We excavated a trench through the center

of M208 Str.1 and followed the wall along its southern edge. Further excavations included a test in the center of M208 Str. 2 and a test in the platform center. The Pool 20 ceramic assemblage was similar to that of Pool 1, and tentatively dates to the Terminal Classic based on diagnostic types found in the topsoil and platform fill, including Sibun Red Neck, Chunhuitz Orange, and Palmar Orange Polychrome (Figure 8). The Pool 20 assemblage is somewhat more diverse than the Pool 1 assemblage, and includes Daylight Orange: Daylight in addition to Cayo Unslipped, Tu-tu Camp Striated, Indian Creek Polychrome, and Vaca Falls Red midbreak bowls. Red-slipped vessels dominate the assemblage. Sibun Red Neck jars are most common across all of the M208 excavations, but we also found Cayo Unslipped: Variety Unspecified (Red) and Runaway Creek Red-Lipped jars.

While we found no evidence for an earlier occupation at M208, we did find a partial Hermitage Group basal flange dish which may have been part of a reaccessed Early Classic dedicatory cache. Unlike the Dos Arroyos plate, the Hermitage Group dish was not carefully placed in a new architectural context. Instead, the dish was in the topsoil on top of M208 Str. 1, mixed with Late Classic II and Terminal Classic ceramics (Figure 9). If the Early Classic vessel was part of an ancestral cache that was re-opened, why was the dish not reinterred in a new ritual deposit? Perhaps the answer is the unusual construction of M208. The platform is built into a natural hill, and while M208 Str. 1 has a wall on the southern edge, the construction appears to consist primarily of the natural earthen surface plastered over to approximate a stone structure. If the dish was incorporated into the construction of M208 Str. 1, it was buried under such a shallow plaster surface that time and bioturbation left the vessel on the surface along with the other heavily eroded topsoil artifacts. The ceremonial re-opening of earlier caches is found at both Pool 1 Str 1 and Pool 20 M208, and speaks to the importance of the Terminal Classic occupations of these poolside structures.

Comparing the Assemblages

While there are slight qualitative differences between the Pool 1 and Pool 20



Figure 8. Pool 20 M208 rims.



Figure 9. Pool 20 M208 Hermitage Group vessel.

assemblages, the similarities are striking. Using the rims that could not be refitted to calculate vessel type percentages, the assemblages are nearly identical. The overall Pool 1 assemblage consisted of 65% jars, 20% bowls, 9% dishes, and 6% plates (n=417), while the Pool 20 assemblage was comprised of 68% jars, 20% bowls, 8% dishes, and 4% plates (n=148) (Figure 10). Small Late Classic residential sites in central Belize have an expected ceramic form distribution of 28% jars, 49% bowls, and 23% plates (Lucero 2001: 30). These assemblages are clearly not residential. Superficially, the ceramic assemblages from Pools 1 and 20

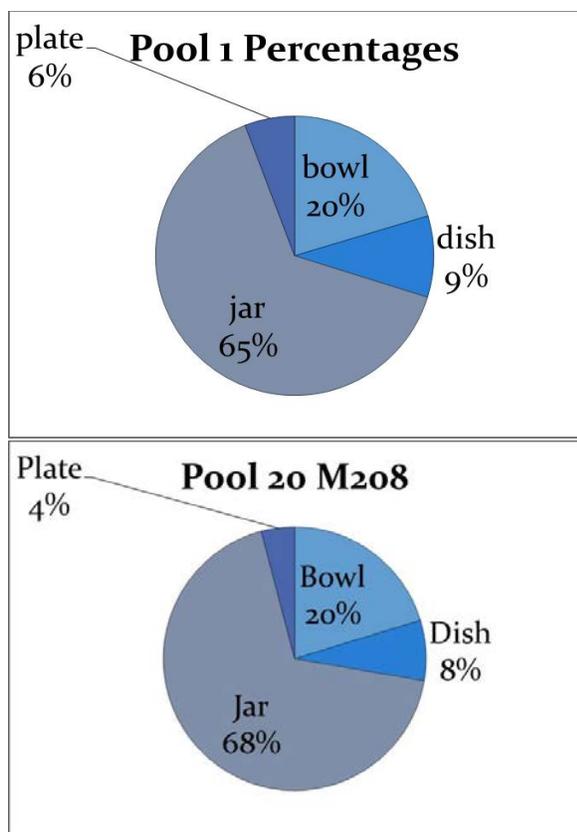


Figure 10. Comparison of Pool 1 and Pool 20 assemblages.

Table 2. Comparison of Rim Diameters.

Site	Minimum (cm)	Maximum (cm)	Average (cm)
Pool 20	8	55	24
Pool 1	12	28	18

appear to be remarkably similar, with jars accounting for nearly 70% of the total rims recovered. However, the orifice size and diameter of the Pool 1 and Pool 20 jars shows a notable difference between the two seemingly identical assemblages.

Table 2 presents the range and average rim diameters for our excavations at Pools 1 and 20. While jars dominate both assemblages, the Pool 20 jars have an average rim diameter of 24 cm, with a range of 8 to 55 cm. Pool 1 Str.1 jars have narrower, more standardized rim diameters, with an 18 cm average and 12 to 28 cm range. Most of the Str. 1 jars have a rim orifice between

15 and 25 cm, with a few outliers that are larger or smaller. The Str. 1 jars were most likely used to store water, perhaps from the *cenote*. Vessels used to store liquids have narrower orifices to prevent spilling, while jars used to cook or store dry goods tend to have wider orifices (Lucero 2001: 15). Though jars dominate the assemblages of Pools 1 and 20, they appear to have different purposes at each pool, although some P20 jars were certainly used to store water. Moreover, occupation at the two pools emphasizes different types of jars. While Pool 20 has Sibun Red Neck jars throughout the excavation contexts, Cayo Unslipped jars are the hallmark of Pool 1 and are the majority of what we have recovered from Pool 1 Str 1. What exactly the preference for Sibun Red Neck or Cayo Unslipped jars means is open to interpretation, but the two pools clearly have distinct yet related roles in the sacred landscape of Cara Blanca.

Parsing the Late Classic to Terminal Classic Transition

One characteristic of the Cara Blanca assemblage that drew our attention over the course of two field seasons is the diversity of Cayo Unslipped rim treatments. We recovered Cayo Unslipped rim sherds with squared, beveled, and sometimes incised lips, in addition to rounded and pointed lips more typical of the earlier Late Classic I vessels (Figure 11). The diversity of Cayo Unslipped rim treatments within a single context suggests that potters from different communities with distinct stylistic traditions may have influenced the assemblage. Bartlett and McAnany (2000) note that different Late Classic communities in Northern Belize prefer distinct surface treatments that varies by site. The coming together of diverse Terminal Classic communities could explain the presence of such varied lip treatments at Cara Blanca. While the vessels with rounded and pointed lips would usually indicate a Late Classic I date, these sherds are found in the same contexts as Terminal Classic types including Sibun Red Neck jars, the Fat Polychrome bowl, and square-lipped Cayo Unslipped jars. Although we find a number of earlier types, the ceramic chronology, from the lowest stratum of fill to the surface



Figure 11. Diverse Cayo Unslipped jar rim treatments.



Figure 12. Jar rim with mixed Cayo Unslipped and Tu-tu Camp traits.

collapse, pins the Cara Blanca structures to the Terminal Classic.

Another Late Classic type that we find mixed with Terminal Classic ceramics is Mountain Pine Red. In an assemblage dominated by red-slipped ceramics, Mountain Pine Red bowls are more common than Roaring Creek Red or Dolphin Head Red vessels. As with the round-lipped Cayo Unslipped jars, Cara Blanca's Mountain Pine Red serving vessels are invariably found in contexts that can be tentatively placed in the Terminal Classic through ceramic chronology. Were these vessels conserved from earlier Late Classic assemblages and incorporated into Terminal Classic ritual contexts or did some communities maintain earlier ceramic production traditions into the Terminal Classic? Although Mountain Pine Red is eventually replaced by Dolphin Head Red and Roaring Creek Red, it does persist into the

Terminal Classic in the Sibun (Harrison-Buck 2007: 283). This is likely a result of the extreme regional diversity typical of Terminal Classic ceramic assemblages. While communities in the Belize Valley ceased to produce Mountain Pine Red, communities elsewhere may have chosen either to continue making or to conserve these vessels.

Stylistic Innovation

Some of the unslipped jars we excavated at Str. 1 seem to merge traits of both Cayo Unslipped and Tu-tu Camp Striated. Both types have unconventional pastes and tempers, with lighter tan or buff pastes and ash temper appearing far more often than the expected brown pastes and calcite temper (Gifford et al. 1976). One vessel has the form of a Terminal Classic Cayo Unslipped jar, with the addition of vertical incisions on the neck typical of Tu-tu Camp Striated (Figure 12). This merging of traits is a stylistic innovation, possibly resulting from the convergence of different people, communities, and ideas at the sacred pools. The intersite variation in ceramic styles noted by Barlett and McAnany (2000) seems to have converged at Cara Blanca as diverse people and traditions gave shape to new ceramic styles, simultaneously maintaining and challenging traditional pottery making by embracing less common pastes and more costly tempers. People constantly recreate their world through their participation in the meshwork composed of interactions with people, other-than-human beings, and things (Ingold 2007: 2011). Prehispanic Maya potters engaged in the continuous process of innovation and creation found fuel for the creation of novel pottery styles in their participation in the singular sacred happenings at Cara Blanca.

Discussion and Concluding Remarks

Cara Blanca's ceramic assemblage raises several interesting points for consideration. Although the temple was used in the Terminal Classic, the ancient Maya drew on ancestral history in their interactions with Str. 1. One means of accessing ancestral power and memory was through heirlooms such as pottery retained and passed down through decades or centuries. Heirlooms are powerful objects, frequently the

material tools of daily life, that link social life in the present to ancestral worlds (Lillios 1999: 237). The builders of Pool 1 Structure 1 called upon the power of ancestral histories and memories to bind the temple to the supernatural. During the Terminal Classic occupation, the builders of Str. 1 hearkened to earlier times in dedicating the temple. The act of reaccessing the vessel and incorporating it into a new construction draws on memories of ancestral rituals, binding the builders to historical events and memories of great importance.

Another important characteristic of Cara Blanca's ceramic assemblage is the way in which whole and partial vessels are differently used in termination rituals. The ceramic clusters we found throughout Str. 1 contain both complete and partial vessels. Each room we excavated included complete Cayo Unslipped jars which were both upright and inverted. Mixed with these complete jars were partial polychromes, including the jaguar vessel. In contrast, the sherd blanket covering Str. 3 appears to have been composed of incomplete vessels, based on the near absence of rims compared to all other sherd types. Why the Maya chose to use entire vessels in Str. 1 and partial vessels in Str. 3 is unclear, but we can speculate that the two structures were terminated in different manners and under different circumstances.

Finally, the similarities between the Pool 1 and Pool 20 assemblages are striking. While there are superficial differences, such as the prevalence of unslipped jars at Pool 1 compared to red-slipped jars at Pool 20, the assemblages are more alike than different and stand apart from the archetypical Terminal Classic assemblage suggested by Gifford. The Cara Blanca ceramics include almost no black-slipped wares, and are dominated by large storage vessels. Slipped wares are almost exclusively red-slipped, suggesting a cosmological importance to vessel color and ritual performance at Cara Blanca. Further research will help us understand who built and administered Cara Blanca, and whether or not pilgrims traveled from far-flung communities to interact with the pools and associated ritual structures.

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30 **THE HISTORY OF CARA BLANCA, POOL 6: LOGGING AT THE MYSTIC POOL**

Jean Larmon and Lisa J. Lucero

This paper presents the findings from the 2014 Valley of Peace Archaeology (VOPA) field season underwater explorations at Pool 6, Cara Blanca, Belize. Pool 6, the largest of the 25 pools in the Cara Blanca project area, is an ecologically diverse pool with an occupation history spanning both the prehistoric and historic periods. This field season, we were able to explore the natural and historic significance of the pool, providing insight into the depth and breadth of human activity in the immediate vicinity. The primary goal of this season's work at Pool 6 was to identify and record the history of the pool before it is further impacted by agricultural development within Yalbac Ranch property. This season's work ultimately shed light upon the essential role that Pool 6 played in colonial logging operations on the present day Yalbac ranch.

Introduction

We accomplished much in our two-month 2014 field program at the Cara Blanca pools, including completing excavations of the water temple at Pool 1, testing other structures at Pool 1, exploring Pools 1, 6, and 20, and trenching a 2+m tall structure near Pool 20. Rather than attempting to detail the entire season, here we focus on the results of underwater explorations at Pool 6 (Figure 1). Pool 6, the largest of the 25 pools in the Cara Blanca project area, is an ecologically diverse pool with an occupation history spanning both the prehistoric and historic periods. With the expertise of divers Tony Rath, Martin Spragg, CJ Graham, Bob Slizeski, as well as the skill and knowledge of Jose Vasquez and Stanley Choc, we were able to explore the natural and historic significance of the pool, providing insight into the depth and breadth of human activity in the immediate vicinity. The primary goal of this season's work at Pool 6 was to identify and record the history of the pool before it is further impacted by nearby agricultural development by the Spanish Lookout Community Corporation Ltd. (SPLC). This season's work ultimately shed light upon the essential role that Pool 6, called the mystic pool, played in colonial logging operations on the present day Yalbac ranch.

Study Area: Yalbac Ranch

The Cara Blanca pools are located in central Belize spanning the base of a steep limestone cliff. The pools consist of both lakes and *cenotes*, or karstic sinkholes, and are on land currently owned and managed by Yalbac Ranch and Cattle Corporation. The land has long been

accessed for its abundant arboreal resources (Kinkella 2003). More recently, agricultural development in the ranch land area has threatened the historic integrity of the pool context. Yalbac Ranch sold c. 55,000 acres of land to SPLC after 2010, when Hurricane Richard and subsequent wildfires made sustainable logging impossible. Though Pool 6 is not part of the land purchased by SPLC, it is possible that run-off from agricultural practices and associated activities could affect the pool. A 61 m buffer zone has been implemented around all of the Cara Blanca pools in order to minimize any potential negative impact (Ministry of Forestry, Fisheries, and Sustainable Development, Department of the Environment 2014:6-23).

The prehistoric and historic occupation of the Cara Blanca region runs deep (Harrison, this volume; Kinkella 2003; Lucero 2011). Though the historic context is the subject of this report, and of the 2014 field season, it is important to note the site's deeper history.

Prehistoric Background

The area surrounding Pool 6 is rich with prehistoric significance. Maya settlements in the surrounding Yalbac Ranch land are numerous, the most notable of which is the Yalbac center that is located approximately 9 km to the southwest. The Valley of Peace Archaeology (VOPA) field crew has exposed a water temple and additional ritual structures just 4 km to the west, adjacent to Pool 1 (Harrison, this volume). There are also Maya structures near Pool 6 (Figure 2). A previous survey by Andrew Kinkella (2009) noted a cluster of settlements



Figure 1. Showing Cara Blanca region with Pool 6 circled in red. Adapted from Lucero and Kinkella, in press:32.

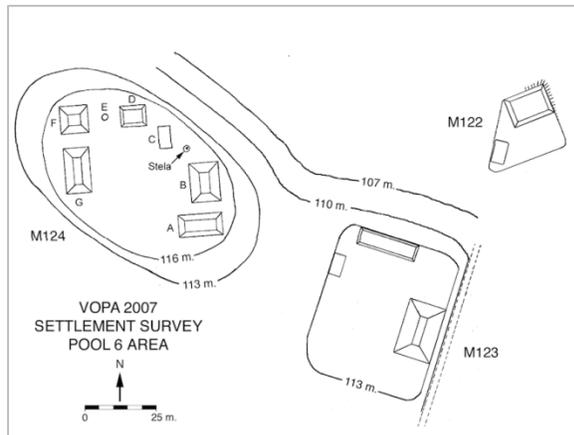


Figure 2. Map of Maya settlement near Pool 6. Adapted from Kinkella 2009:164.

300 m north of the mystic pool (M122-124). M124, the largest of the small settlements, consists of a half-dozen structures positioned around a central plaza and dates to the Late Classic period (250-950 C.E.). A plain stela in the southwestern portion of the site and an associated altar suggests that it might have been a significant settlement (Kinkella 2009:165). To the northwest of M124 there is a settlement with a possible ballcourt structure, though no excavation has been done to confirm this (Kinkella 2009:165).

Because of the size and accessibility of Pool 6, it was likely a daily source of water for Late and Terminal Classic populations. Inhabitants of the surrounding settlement would have been able to access the pool for ritual, drinking, cooking, and washing needs (Kinkella 2009:166-167). Pool 16 lies approximately 300 m to the west of Pool 6. It is much smaller, at 23 m in diameter and only 13.5 m at its deepest point (Kinkella 2009:160-161). The shallow nature of the pool makes it possible that it did not exist during the Late Classic Maya period. If

it did, however, its small size and steep sloping sides make it a true *cenote* (Kinkella 2009:161). The small pool is removed from any easy access point and therefore would likely not have acted as a daily water source but rather a ritual space accessed only for its sacred qualities (Kinkella 2009:167). It is also important to note that loggers often used prehistoric Maya settlements as temporary camps (Kinkella 2003:51). Though the prehistory of the mystic pool is significant, no prehistoric artifacts or features were noted during this field season and the historic properties remain the focus of this chapter.

Historic Background

Yalbac Ranch property, within which the Cara Blanca pools are located, has a long history of logging activity. As noted by Kinkella (2003), from the late 1700's to the early 1800's logging work in Belize was primarily done by slaves brought from Africa by the British. The complex dynamics of Afro-Belizean slaves, British loggers, called Baymen, and Spanish colonizers found fruition in logging operations, particularly during the 18th century (Restall 2014). In 1838, slaves were emancipated and many slave owners joined together to form logging companies that controlled access to logging land. From 1875-1970, Yalbac Ranch was owned by the Belize Estate & Produce Company (B.E.C.), which owned one-fifth of the country and was the most powerful logging corporation at the time (Kinkella 2003:51). The primary location of B.E.C. logging operations was in Gallon Jug, Belize, 15 miles to the northwest of the Cara Blanca pools. In the early 19th century, materials were transported by train from Gallon Jug to Hillbank and the New River Lagoon, 18 miles to the northeast of Cara Blanca, where logs were nailed together to form rafts and floated towards Belize City (Smith 2013:13). Today, the land is still logged by the current owners, Yalbac Ranch.

Logging was Belize's first major business enterprise (Smith 2013:1). Early in logging history, logwood (*Haematoxylon spp.*) was the primary resource accessed, as the wood was valued and used in the creation of a distinct red dye. It experienced two peaks in sales: the early/mid 1600's – 1750's and the late 1800's.

Logwood grew in the coastal lowlands, as well as inland near rivers and lagoons. Cara Blanca would have been an ideal location for logwood camps, suggesting that the Pool 6 area may have been accessed in the late 17th century for its arboreal resources. In the 1770's, mahogany (*Swietenia macrophylla*), became the focus of loggers. Mahogany logging required logs to be cut into manageable sizes, moved to the banks of rivers, floated to the mouth of the river, squared-off (flitched), and loaded onto a ship for transport (Smith 2013:3). Logs were sometimes flitched before they were sent down the waterway to the coast (Jeff Roberson, personal communication, 2014).

The development of the logging enterprise and the depletion of resources near the coast forced those seeking work to settle and work inland on rivers, as opposed to by the sea with easy access to transport (Smith 2013:2). Though logwood and mahogany were the primary resources, many secondary resources were also accessed, including: cedar (*Cedrela spp.*), sapodilla (*Achras sapota*), pine (*Pinus caribaea*), salmwood (*Cordia alliodora*), cypress (*Podocarpus guatemalensis*), mamey (*Pouteria sapota*), rosewood (*Dalbergia stevensonii*), banak (*Myristica panamensis*), Santa Maria (*Calophyllum calaba*), yemeri (*Vochysia hondurensis*). Santa Maria and mahogany, among other resources, were logged from the Cara Blanca project area in historic times (Kinkella 2003:52; Jose Vasquez, personal communication, 2014).

Pool 6

Pool 6 is the largest of the 25 Pools in the Cara Blanca project area, measuring approximately 375 x 158 m and from 1 m to 17-18 m deep. Though multiple days were spent in the pool and visibility varied with the amount and velocity of recent rainfall, there was 15 - 18 m of visibility in the clearest conditions. Upon entering the pool, we immediately noted two depressions, one towards the center of the pool and the other in the northwestern corner. While it is now more lake-like than *cenote*, Pool 6 formation likely involved the collapse and connecting of two *cenotes*. The pool itself is lush with water lilies (*Nymphaea ampla*) (Figure 3), an indicator of potable water. Water lilies act

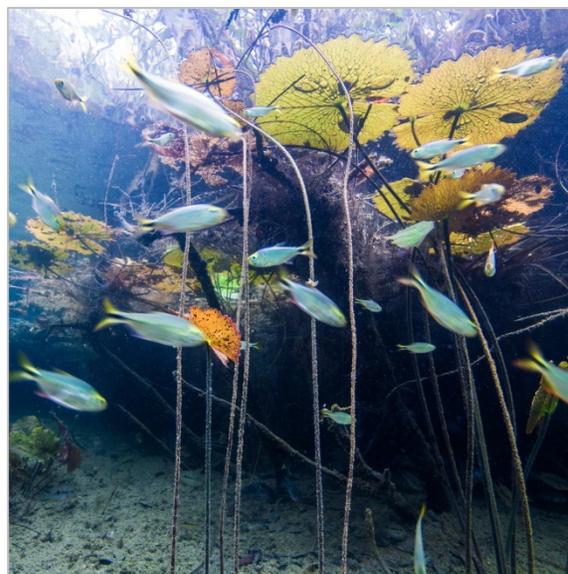


Figure 3. Water Lilies in Pool 6. Photograph by Tony Rath.

as bioindicators, only able to survive in clean, still, and relatively shallow water (Lucero 1999). The presence of water lilies indicates that water is clean enough for drinking. It is also possible that they have properties that help to maintain the quality of water (Lucero 1999). For this reason, water lilies were important plants to the ancient Maya and are often depicted in the iconography typically associated with Maya kings and water temples (Ishihara et al. 2006; McDonald and Stross 2012). The high quality of the water in Pool 6 supports the interpretation that it acted as an important source of water to both prehistoric and historic visitors.

On the eastern boundary of the pool, an underwater cave was located. Caves acted as sacred spaces for the ancient Maya, as portals to the underworld (Ishihara 2008; Moyes et al. 2009; Taube 2004). Because of the cosmological significance of caves, rituals were often performed in caves, and archaeological traces of ritual practices are frequently found within them (e.g., Moyes et al. 2009). Further exploration of the cave could illuminate how prehistoric populations utilized Pool 6. The cave was too difficult to explore with the equipment that the divers had available and, therefore, will have to be explored in future field seasons. Finally, a 3+ m core was extracted from Pool 6 during the 2010 VOPA field season. Fossil pollen has been extracted from the core and is



Figure 4. Showing location of wood “wall” in Pool 6. Photographs by Tony Rath.

currently being processed in the University of Illinois at Urbana-Champaign Palynological Laboratory. Although the samples initially appeared poorly preserved, further processing has produced much cleaner samples. The identification of vegetative history for the region will help to contextualize the conditions within which prehistoric and historic peoples were inhabiting and utilizing the space.

The History of Logging at Pool 6

The underwater exploration at Pool 6 revealed primarily historic artifacts and features. Early in the season, Tony Rath and his dive team located what appeared to be a wall on the southern edge of the pool (Figure 4). Submerged in just over a meter of water under a thick layer of mangrove vegetation, the wall first appeared to be cut stone. Upon further examination, however, we noted that it was a wood block, measuring .5 x .48 x .17 m. The top of the wood block is .5 m below the surface of the water. While it is possible that the block was exposed during periods of drier conditions or a lower water table, this scenario is unlikely.

Several additional pieces of shaped wood were recovered from just east of the block we recovered. Nestled between the openings of two perpendicular outlets, which will be discussed further below, we noted and photographed a diverse array of artifacts. Many of the fragments were squared off, wooden blocks of varying sizes. Some appeared to have been cut with a saw. We located a wooden post (Figure 5) and numerous unshaped logs with saw marks, and we recovered a link of iron chain (Figure 6). The chain was employed to hold together logs as they were floated towards Belize City for transport to Britain (Camille 2000:105; Smith 2013:3).

Among this collection of shaped wood, we noted a squared block of Santa Maria wood (Figure 7). The squared off nature of the Santa Maria, a species often logged for use in construction projects (Smith 2013:20; Jose Vasquez, personal communication, 2014), is reminiscent of the squared off logs exported from Belize. A carbon sample from the Santa Maria block returned 2-sigma radiocarbon date ranges of 1681-1937 C.E. The large range of dates returned could be due to the sample being



Figure 5. Wooden post located in Pool 6. Photograph by Tony Rath.



Figure 6. Chain-link used in logging operations.

immersed in carbonate-rich water, a phenomena that has been previously noted in freshwater samples (Philippsen 2013). Though this presents us with a large range of possible historic occupation, it does allow us to place the anthropogenic activities occurring within the period of colonial logging. In addition, the squaring of lumber, in particular mahogany, only



Figure 7. Saw cut, squared-off Santa Maria located just north of outlets.



Figure 8. Oxen yoke found in Pool 6.

occurred before the 1900's (Camille 2000:105), further dating the historic artifacts.

The most chronologically significant artifact recovered was a small oxen yoke. The yoke, which was photographed and returned in order to preserve its condition, measured .2 x .8 .4 m; the length of the inner portion of the yoke was .25 m (Figure 8). Prior to 1805, loggers were restricted to logging in the immediate vicinity of a water source. Slaves used wooden sleds to transport logs until the ox was introduced to Belize in 1805. The introduction of oxen allowed logging companies to extend the distance from operations to water to 8 miles from the nearest water source (Smith 2013:5). Oxen were no longer used after 1909, when machines were introduced for hauling, increasing land accessible for logging to a 15-mile radius of the waterway (Smith 2013:5). The identification of the oxen yoke suggests that the area was utilized for logging practices



Figure 9. Showing outlets extending east and south of the pool and location of shaped wood at opening of outlets. Photographs by Tony Rath.

between 1805 and 1909. Of course, it is possible that logging operations were occurring in the vicinity prior to the introduction of oxen.

Outlets

Perhaps most intriguing were the two outlets radiating out from the southeastern portion of the pool (Figure 9). The first is north-south trending, the entrance of which is 11 m east of the original wood block. At the entrance, this outlet is 8 m wide, though it narrows to < 1 m further down the canal. The canal, with a flow of approximately 1.5 knots, extends south to Laboring Creek. The outlet itself runs remarkably straight and appears to be artificial. Just beyond the entrance to the canal, the vegetation on either side clears and it opens into a swamp-like area. We attempted to survey this area, the swampy conditions, however, made

survey impossible. The canal quickly became impassable and we were unable to explore further. The entrance to the second outlet is 15 m to the west of the first outlet entrance. This outlet is east-west trending and is much more stagnant. It does not appear to extend more than 50 m beyond the pool. It is important to note that all of the shaped wood noted within the Pool, was located at the entrances to these two outlets. This strengthens the idea that it was the locus for logging activity to which the artificial canals were essential. Though the land adjacent to the canals was difficult to survey, drier conditions might make the land passable. It is possible that this area was used as a temporary work site for loggers accessing the canals.

There are instances of artificial canals being built throughout Belize and their presence could indicate a deep investment in the land and,

perhaps, longer or more permanent historic occupation (Finamore 1994:101). The north-south trending canal would have been used to transport logs from inland to the coast to increase the area within which logging could occur. As logging operations intensified, loggers moved further inland and were forced to transport their product from greater distances. Though natural water sources were often used to float logs towards the coast, the construction of artificial canals allowed for logging operations to expand.

Concluding Remarks

This season's exploration of Pool 6 brought to light the historical significance of the Cara Blanca pools, highlighting the role they played in the logging trade. We recorded multiple fragments and blocks of shaped wood that aided in the transport of logs (likely logwood, mahogany, and Santa Maria) from inland to the coast. The artificial outlets recorded offer insight into the manipulation of the landscape for the purposes of logging. Historic occupants would have floated logs down the artificial outlet to Labouring Creek, which is just c. .5 km south of Pool 6, eventually merging with the Belize River. Once on the coast, logs were stored in a storehouse at the mouth of the Belize River before being sold to ships from England, the Dutch colonies, and some North American cities (Smith 2013:1). Many resources sought by loggers could be found inland near rivers and lagoons, making Pool 6 an important location for logging operations immediately surrounding the pools, as well as on the ridges to the north. Though much of the research regarding the Cara Blanca project area has focused upon the prehistoric significance, this season's surveys emphasize the breadth of information that can be gleaned from a close examination of the Cara Blanca pools.

Further research at Cara Blanca, Pool 6, will illuminate both the prehistoric and historic significance of the pool and surrounding land. Future field seasons will provide the opportunity to further explore the land to the south of the pool – access to the outlets and main pools would have provided ample opportunity for habitation or frequent use that could have left a material record. Future efforts will focus on

further contextualizing the historic artifacts located during this field season. This includes exploring the outlets that extend to the south and east. The ecological context and diversity of the pool also warrants further investigation. The fully submerged cave identified by divers provides an opportunity for further underwater exploration.

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31 **IDENTIFYING ABANDONMENT PROCESSES THROUGH TERMINAL RITUAL DEPOSITS AT AGUACATE UNO, BELIZE**

Emma Koenig

This study examines terminal deposits as the result of micro-scale processes of collapse at the Maya site of Aguacate Uno, Belize and posits that contextual comparisons of artifact assemblages from terminal deposits can lead to a better understanding of site-specific activities surrounding the final years of occupation, abandonment, and revisitation. Considering the fact that terminal deposits have many similar attributes, notably high concentrations of ceramic sherds, it is important to take into account the context and content of materials found in them in order to determine the activities that led to their creation. This paper examines ritual events as one of the many activities that produced terminal deposits and is concerned with recognizing material and contextual differences between different types of terminal ritual deposits and distinguishing these deposits from refuse. Using this contextual approach, the terminal ritual deposits at Aguacate Uno support the interpretation that the site was differentially abandoned during the Late to Terminal Classic periods.

Introduction

The Maya “collapse” is a term given to the events and processes associated with the widespread decline and abandonment of lowland Maya sites during the Late and Terminal Classic periods from AD 800 to 900. It has been widely accepted that site collapse is most often a gradual process rather than a single, rapid event, and variability in the nature and timing of site declines can be attributed to an array of macro- and micro-scale processes (Demarest et al. 2004). Macro-scale processes are the large-scale social causes of the collapse such as the decline of divine kingship, warfare, and emigration, while micro-scale processes are practices that reflect group dynamics in specific contexts such as shifts in household demographics, the decommissioning of previously occupied space, and the reorganization of civic and domestic life. One of the most commonly recognized results of these micro-scale processes are terminal deposits found on top of ultimate structure, stair, floor, or bench surfaces.

Over the last decade it has become clear to Mayanists how difficult it is to identify what specific activities produced terminal deposits due, not only to the similarities in deposit contents, but the variability in deposit contexts within and between sites (Houk 2000; Navarro Farr 2009). Central to this issue is whether terminal deposits were the result of ritual activities, elite trash deposition, or something else entirely. Consequently, a wide array of behavioral types has been created to classify terminal deposits. The most common of these

types are dedication rituals, revisitation rituals, termination rituals, problematic deposits, and refuse. In this paper, I examine four terminal deposits at the site of Aguacate Uno and test whether they are the result of specific ritual activities by comparing the frequencies of artifact classes in these deposits to each other and a known trash deposit.

Reconsidering Terminal Ritual Deposit Classifications

In Maya archaeology, the term “terminal” denotes the last depositional event and is distinct from “terminal ritual deposit,” which is a special kind of terminal deposit associated with ritual practices. Dedication and revisitation rituals are the most clearly defined terminal ritual deposits in the literature. Dedication deposits are most often seen as caches placed within architectural features (Mock 1998). Marshall Becker (1992) defines both caches and burials as earth offerings, and in order to be considered a cache, cultural materials must be found in association with modified architectural elements or features (i.e., placed into existing architecture or covered by new architecture). Revisitation deposits have been recently identified in Maya sites (Stanton and Magnoni 2008), and based on ethnographic observations they were understood to be highly localized practices that contain a specific set of materials depending on the visitor (L. Brown 2004). Archaeologically, the most identifiable objects associated with revisitation deposits are incense burners (Navarro-Farr 2009), but a variety of objects may be associated with them

such as obsidian blades used for sacrifice (M. K. Brown 2010), lithic eccentrics, ceramic vessels, and ancestor bundles (Navarro-Farr et al. 2008). Two other terminal deposit types that need to be considered are termination rituals and problematic deposits. Generally Mayanists recognize termination rituals as “acts of killing, sacrificing, capturing, or exorcising spiritual force from such [built or made] places or things” (Freidel 1998:189) found on or within structures (Pagliaro et al. 2003:78). They are commonly subdivided into reverential and desecratory terminations. In reviewing the literature, the main identifying attribute of desecratory termination deposits is the presence of scattered, disarticulated human bone or sacrifice (Harrison-Buck 2012; Navarro-Farr 2008; Pagliaro et al. 2003; Stanton et al. 2008), while reverential termination rituals need not include bone. However, the distinction between reverential and desecratory remains largely subjective; and therefore, I refer to all termination rituals as unspecified termination deposits unless attributes are present to further subdivide them into reverential or desecratory terminations.

“Problematic deposit” is a generic term first defined by the Tikal Project for enigmatic deposits (Culbert 1993). They have been described from many sites across the lowlands, and are usually associated with periods of abandonment and collapse. Following Culbert (1993), most archaeologists (Clayton et al. 2005; Houk 2000; Stanton et al. 2008) define problematic deposits as midden-like artifact accumulations, often found in elite complexes that incorporate ritual materials. These kinds of deposits are interpreted as either trash or ritual deposits and therefore have become “problematic” (Stanton et al. 2008:227). The most common feature of these deposits is the high density of ceramic sherds; however, other artifact classes are often present such as lithics and bone, the presence of which suggests domestic trash. Since they cannot be clearly separated from termination deposits by archaeological context or assemblage content, problematic deposits are defined to be unspecified termination deposits. Both are defined in the same way—refuse-like artifact accumulations associated with elite architecture

that may include ritual and/or elite items.

A Material Model for Terminal Ritual Deposits

Because differentiating between terminal ritual deposit types is so ambiguous, I created a material model based on artifact classes to identify specific types. The first step was to identify and summarize the contexts, artifacts, and features associated with specific terminal ritual deposits described in the literature (Table 1). These are compared with refuse to establish discrete material and contextual correlates for different types of terminal ritual deposits so that their purpose or intent may be better understood. It is noted that there are many overlapping attributes between terminal ritual deposit types; however, the data presented in Table 1 suggests that archaeologists recognize some distinctions between them. Dedication rituals must be cached deposits where material remains are associated within architectural features and/or sequences. Revisitations most often exhibit burning and contain incensarios. Desecratory termination rituals must include disarticulated human bone. Unspecified terminations can exhibit attributes from all of the other deposit types, which makes this category of ritual a kind of “catch all” for these specific contexts. In my review of the literature reverential terminations, unlike desecratory terminations, had no clear identifying feature or material attribute. Therefore, ritual deposits should only be defined as reverential or desecratory when clear contextual or material evidence is present.

The second step was to statistically compare the contents of terminal ritual deposits to each other and to trash. Significant statistical differences in terminal ritual deposits can help link individual deposits to specific behavioral types. Although terminal deposits are similar to elite trash accumulations, all Mayanists agree that these deposits are unlike trash materially. So one of my aims is to test if and how terminal ritual deposits are different from trash. The creation of this model allows for statistical comparisons between terminal deposits to be made, which can help in the overall interpretation of micro- and macro-scale processes of abandonment at Maya sites. Four terminal deposits found at the site of Aguacate

Table 1. Categories of terminal deposits and their attributes (Freidel and Schele 1990; Garber et al. 1998; Harrison-Buck 2012; Mock 1998; Piehl 2005; Navarro Farr 2009; Navarro Farr et al. 2008; Pagliaro et al. 2003; Stanton et al. 2008)

Category Attributes	DEDICATION	REVISITATION	DESECRATORY TERMINATION	UNSPECIFIED TERMINATION	REFUSE
Eccentrics	X				
Obsidian Blades	X				
Caching	X				
Material Layering	X			X	
Material Centering	X			X	
Whole Vessels	X	X			
Human Bone	X	X	X		
Prestige Objects	X	X	X	X	
Within Architecture	X	X	X	X	
Burning		X*	X	X	
Sacrifice		X	X	X	
Alteration of Portable obj.		X	X	X	
Structure Dismantling			X	X	
Structure filling			X	X	
Smashed Pottery			X	X	
High sherd Concentration			X	X	X
Limestone Marl			X	X	
Broken projectiles			X		
Broken shell				X	
Broken groundstone				X	
Outside Architecture					X
Faunal Bone					X**
Mixed chronology					X
High Lithic concentration					X

*Evidenced by incensario fragments

**Especially in middens

Uno provided an ideal case study to test my material model for terminal ritual deposits.

Aguacate Uno

Aguacate Uno is located in the Cayo District of Belize about 20 km north of the modern town of San Ignacio (Figure 1). The University of California, Los Angeles Maya Archaeological Project (UMAP) and Foothill College Belize Program field schools, directed by Drs. John Morris, Samuel Connell, and Andrew Kindon conducted excavations at the site between 2009 and 2011. Aguacate Uno is a minor center consisting of a main plaza surrounded by two pyramid complexes in the

north and south and two range structures on the east and west sides. The field school uncovered four terminal deposits associated with the site's north and south complexes (Figure 2). I sampled these deposits and analyzed all artifact classes from them between May and July 2013. More complete descriptions of excavation, sampling, and artifact analyses can be found in my master's thesis (see Koenig 2014).

Aguacate Uno Terminal Deposits

Deposit 1. Operation 4, Sub-Operation A (Op. 4A) focused on Structure A-4, located directly west and slightly behind the large pyramid, Structure A-3 (Grey 2009; Koenig

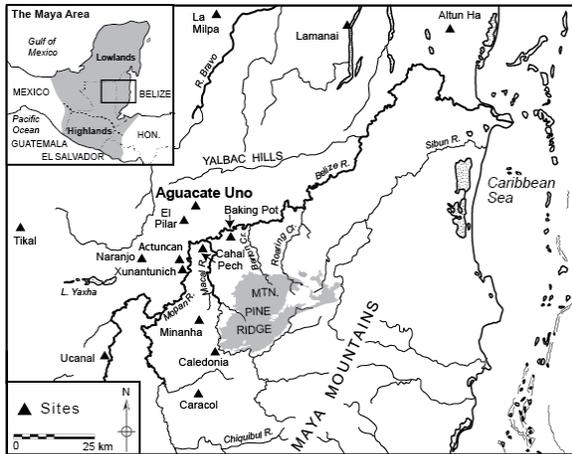


Figure 1. The location of Aguacate Uno within the Maya Area and Belize River valley (after LeCount and Yaeger 2010:Figure 1.1).

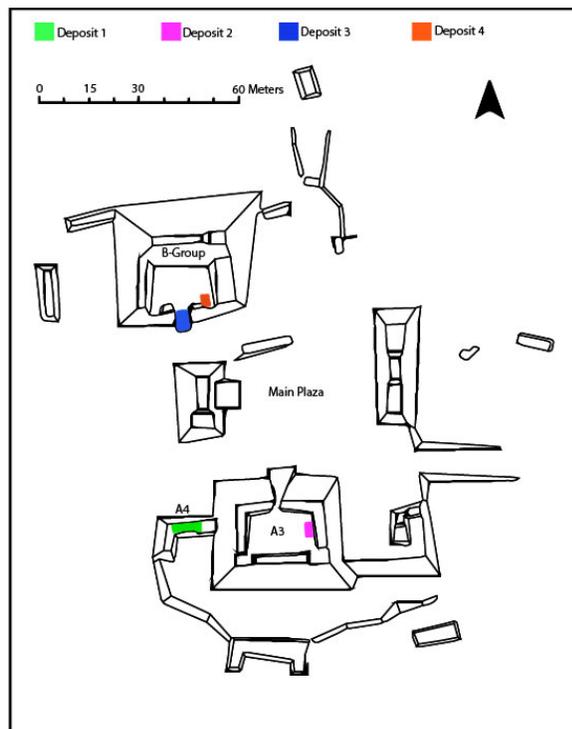


Figure 2. Aguacate Uno site map with deposit locations highlighted.

2010). Excavations between 2009 and 2010 exposed the entire interior of Structure A-4. During excavations three analytical units were encountered: humus, collapse, and terminal deposits. The humus layer was 10-20 cm thick and consisted of a dark, organic rich soil with many roots. At the bottom of the humus the collapse layer began. This collapse layer was a loose, light colored (10YR 7/2) limestone marl.

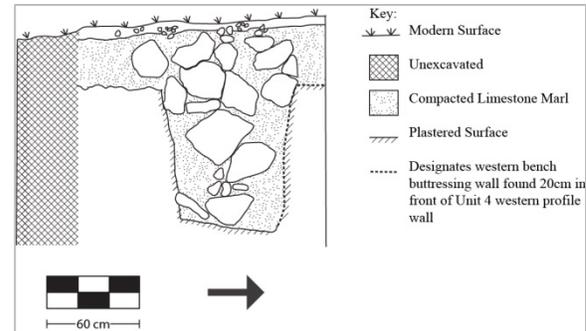


Figure 3. Operation 4 Sub-Operation A, Unit 4 western profile depicting the purposefully filled interior of Structure A-4.



Figure 4. Photo of the main ceramic smash of Deposit 1 inside Structure A-4. This smash was located in front of the bench, seen at the top (north) of the photo (photo by Ann-Marie Gamez).

This marl matrix was consistent throughout the interior of the structure, contained very few artifacts, and included many large, possible vault, stones (Figure 3). The collapse covered interior architectural features, mainly a large (4 m x 1.6 m) masonry bench. After excavating through the limestone marl collapse, terminal deposit debris (Deposit 1) was found directly on the floor throughout Structure A-4 (Figure 4). The main concentrations of Deposit 1 were located in and in front of the doorway to the structure. These remains were mostly smashed ceramics including two large fragments of a cylinder vase described below. Overall, the architectural preservation within the structure was pristine probably due to the intentional in-filling of the room with white marl and limestone blocks.

Deposit 1 had the least amount and least diverse materials compared to the other three

Table 2. Deposit 1 Ceramic Tempers, Wares, Groups, Types, and Chronology

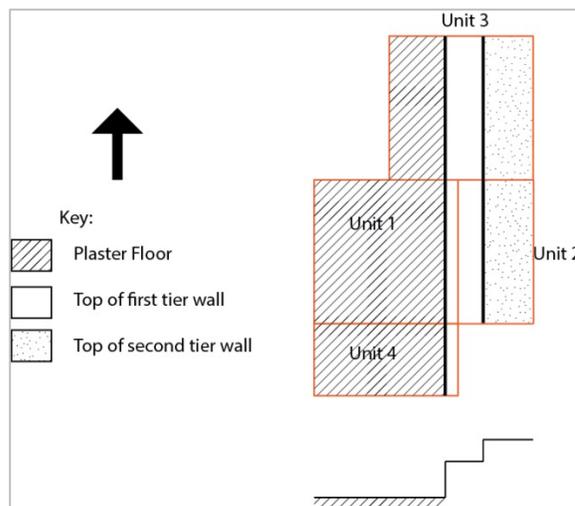
Temper	Ware	Group	Type	n	Chronology
Ash	Peten Gloss	Palmar	Cabrigo Cream	1	Late Classic
Carbonate	Uaxactun Unslipped	Tu-Tu Camp Striated	Tu-Tu Camp Type Tzimin Variety	1	Late Classic
Carbonate			Unsp. striated	78	
Carbonate			Unsp. plain	29	
Carbonate			Unsp. Red/Brown Slip	9	
Carbonate			Unsp. Red/Brown Wash	13	
Carbonate			Unsp. Black-on-Red Bichrome	1	

deposits. Ceramic sherds made up 94.5% (n=208) of the total materials from all artifact bags analyzed. The other materials in Deposit 1 included six chert lithics (2.7%), two obsidian blades (0.9%), three ground stone artifacts (1.4%), and one marine shell adornment (0.5%), which has been classified as a prestige item because it is considered a regional import.

Out of the 208 sherds, 95 of these were refits, which brought the adjusted ceramic count to 132. Only one reconstructible vase was found smashed in Deposit 1. Interestingly, it was the only ash tempered ceramic within the deposit and was determined to be a local Cabrigo Cream vase. Besides the Cabrigo Cream vase, only one other rim sherd was diagnostic, and it was a Tu-Tu Camp Striated, Tzimin variety jar. Both types relatively date the deposit to the Late Classic period (Table 2).

Deposit 1 had a total of 11 lithic artifacts: three chert reduction flakes, one chert blade, one chert biface, two obsidian blades, one mano, two weights, and one natural chert stone. One of the obsidian blades is from the Pachuca source in Central Mexico—identifiable by its distinctive green color. The mano was quartered, and the biface was halved and may have been intentionally broken. The only prestige item found in Deposit 1 was a marine shell adornment with two drill holes (Carolyn Freiwald, personal communication, 2013).

Deposit 2. Operation 10, Sub-Operation D (Op. 10D) began in 2011 on top of Structure A-3 the large southern pyramid (Koenig 2011). The goal of the operation was to investigate elite activity areas in key places across the top of the pyramid. Four units (1-4) were placed centrally along the eastern side of the interior courtyard.

**Figure 5.** Operation 10 Sub-Operation D schematic and cross-section.**Figure 6.** Photo of Deposit 2 in front of the eastern terraced wall. Note the placed whole vessel in the top center of the deposit.

Excavations in Units 1-4 uncovered three stratigraphically similar contexts: humus, collapse, and terminal deposits. Once the collapse was removed it was clear that the eastern side of Structure A-3's interior courtyard

Table 3. Deposit 2 Ceramic Tempers, Wares, Groups, Types, and Chronology

Temper	Ware	Group	Type	n	Chronology
Carbonate	Pine Ridge Carbonate	Dolphin Head	Dolphin Head Red	6	Late Classic
Carbonate	Pine Ridge Carbonate	Vaca Falls	Vaca Falls Red	3	Late and Terminal Classic
Carbonate	Pine Ridge Carbonate	Vaca Falls	Roaring Creek Red	2	Late and Terminal Classic
Carbonate	Uaxactun Unslipped	Tu-Tu Camp Striated	Tu-Tu Camp Type Tzimin variety	3	Late Classic
Carbonate	Peten Gloss	Achote	Achote Black	3	Late Classic
Carbonate	Unspecified	Sotero	Orange-Walk Incised	2	Early Late Classic
Carbonate			Unsp. striated	86	
Carbonate			Unsp. red slipped	12	
Carbonate			Unsp. plain	202	
Ash	British Honduras Volcanic Ash	Belize	Belize Red	5	Late to Terminal Classic
Ash	British Honduras Volcanic Ash	Belize	eroded	15	Late to Terminal Classic
Ash	Vinaceous Tawny	Chunhuitz	Chunhuitz Orange	3	Late to Terminal Classic
Ash	Vinaceous Tawny	Chunhuitz	Benque Viejo Polychrome	1	Late Classic
Ash			eroded	7	

was bounded by a two-tiered wall 90 to 100 cm high (Figure 5). From excavations it is still unclear if this wall was part of a platform face or not.

As collapse was removed in front of the wall in Unit 1 a dense artifact deposit, mostly ceramic sherds, was encountered (Figure 6). The Deposit 2 terminal deposit was excavated in two layers, with the second layer consisting of debris laying directly on top of the plaster floor. During excavations it was clear that at least one whole vessel was part of the deposit. This vessel appeared to have been deliberately placed on the floor instead of smashed. Another cluster of sherds was determined to be a single vessel after reconstruction in the lab. Also, found within the deposit matrix were 26 human teeth and other eroded bone fragments.

Deposit 2 had a total of 661 items: 458 ceramic sherds (69.3%), 26 chert lithics (3.9%), two obsidian blades (0.3%), one ground stone artifact (0.2%), 94 faunal bones (14.2%), 79 human bones (12%), and one soapstone carving (0.2%), which I have classified as a prestige item because its material is considered exotic.

There were 458 ceramic sherds in Deposit 2, of which 30 percent (n=139) refit. This brings the adjusted sherd count to 350. All diagnostics

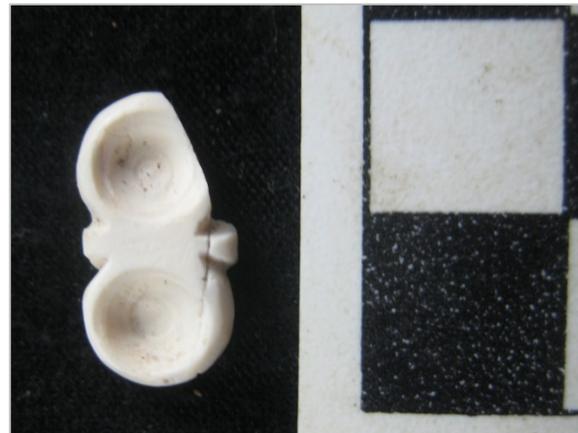


Figure 7. Soapstone carving found in Deposit 2 (photo courtesy of Eric Fries).

were late facet Late and Terminal Classic period type-varieties except for two Orange-Walk Incised vase fragments that date to the early facet of Gifford's (1976) Tiger Run Ceramic Complex (Table 3). The whole vessel and reconstructible vessel found within the deposit were Chunhuitz Orange bowls with only small amounts of orange slip preserved.

Other materials include 29 total lithic materials: seven chert reduction flakes, eight chert cortex removal flakes, nine functional flake tools, two obsidian blades, one mano, and

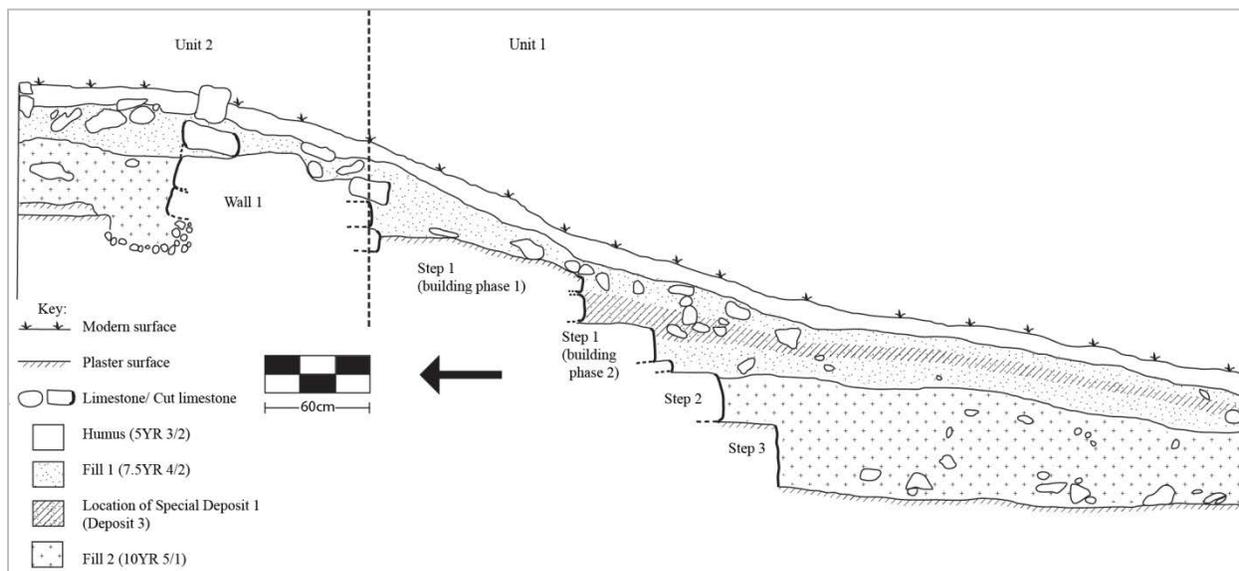


Figure 8. Eastern profile of Operation 11 Sub-Operation A.

one burnishing stone. Only Deposit 2 had identifiable human bone ($n=79$), and there was quite a bit of it given that there was no formal burial pit found in the vicinity. Twenty-six of these human bone fragments were teeth consistent with the dentition of a single individual (personal communication Carolyn Freiwald). Additionally, 53 large mammal bones, 40 unknown bone fragments, and a single *jute* shell were found.

Only one prestige object within the deposit was identified. This was a very small (< 2 cm) stone carving (Figure 7). The stone material was soft and easily breakable which caused it to be classified by Eric Fries as possibly soapstone, which is an exotic material to the region. It has been suggested it may be a nose plug fragment (Andrew Kindon, personal communication, 2011).

Deposit 3. In 2010 Operation 11 Sub-Operation A (Op. 11A) commenced in the northern B-Group (Carpenter 2010). A 2 x 5 m trench, Unit 1, was placed to expose the southern entrance stairway and transition into the medial terrace. This trench was extended north with Unit 2 (2 x 2 m) to fully understand the transition into the medial terrace.

Immediately high frequencies of ceramic and lithic artifacts were found in the humus layer. As the soil color changed, excavations exposed the terminal plastered step (Step 1

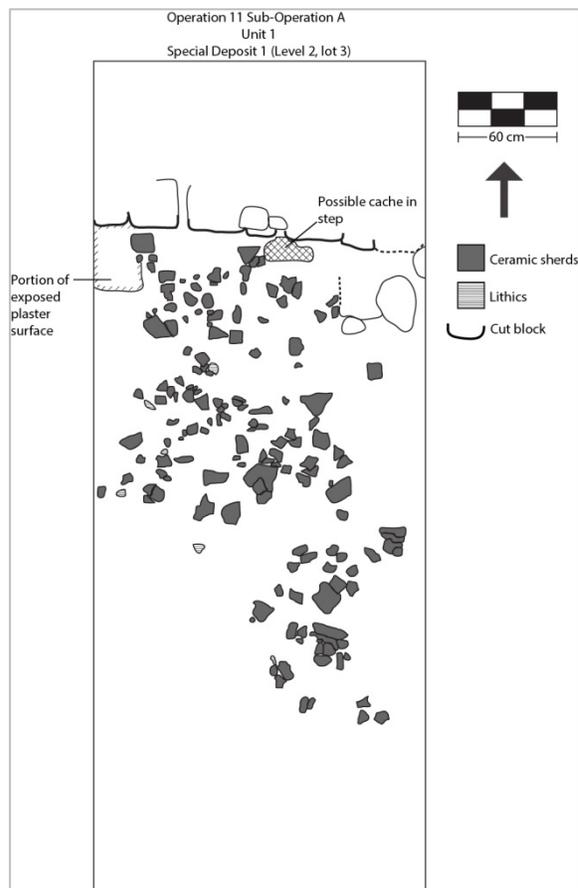


Figure 9. Plan view of Deposit 3 above the southern stairway into the B-Group.

Table 4. Deposit 3 Ceramic Tempers, Wares, Groups, Types, and Chronology

Temper	Ware	Group	Type	n	Chronology
Carbonate	Pine Ridge Carbonate	Dolphin Head	Dolphin Head Red	18	Late Classic
Carbonate	Pine Ridge Carbonate	Dolphin Head	Silver Creek Impressed	1	Early Facet Late Classic
Carbonate	Pine Ridge Carbonate	Vaca Falls	Vaca Falls Red	19	Late to Terminal Classic
Carbonate	Pine Ridge Carbonate	Vaca Falls	Roaring Creek Red	3	Late to Terminal Classic
Carbonate	Pine Ridge Carbonate	Vaca Falls	Kaway Impressed	4	Terminal Classic
Carbonate	Pine Ridge Carbonate	Vaca Falls	Duck Run Incised	3	Terminal Classic
Carbonate	Pine Ridge Carbonate	Garbutt Creek	Garbutt Creek Red	9	Late to Terminal Classic
Carbonate	Pine Ridge Carbonate	Garbutt Creek	Rubber Camp Brown	1	Late Classic
Carbonate	Uaxactun Unslipped	Tu-Tu Camp Striated	Tu-Tu Camp Type Tzimin variety	9	Late Classic
Carbonate	Uaxactun Unslipped	Cayo	Cayo	6	Terminal Classic
Carbonate	Uaxactun Unslipped	Cayo	Unsp.	6	Late Classic
Carbonate	Uaxactun Unslipped	Cayo	Alexander	4	Late Classic
Carbonate	Uaxactun Unslipped	Cayo	Unsp.	1	Late Classic
Carbonate	Peten Gloss	Achote	Achote Black	10	Late Classic
Carbonate	Peten Gloss	Achote	Cubeta Incised	12	Late Classic
Carbonate	Peten Gloss		Unsp.	52	Unknown
Carbonate			Unsp. striated	1441	
Carbonate			Unsp. plain	438	
Carbonate			Unsp. red slipped	460	
Carbonate			Unsp. red/brown slipped	4	
Carbonate			Unsp. brown slipped	15	
Carbonate			Unsp. orange slipped	4	
Carbonate			Unsp. red/orange-on-black slipped and incised	1	
Ash	British Honduras Volcanic Ash	Belize	Belize Red	21	Late to Terminal Classic
Ash	British Honduras Volcanic Ash	Belize	Unsp.	352	Late to Terminal Classic
Ash	British Honduras Volcanic Ash	Belize	Unsp. red slipped and incised	2	Late Classic
Ash	Vinaceous Tawny	Chunhuitz	Chunhuitz Orange	4	Late Classic
Ash	Vinaceous Tawny	Chunhuitz	Benque Viejo Polychrome	3	Late Classic
Ash	Vinaceous Tawny	Chunhuitz	Unsp.	9	Late Classic
Ash	Vinaceous Tawny	Chunhuitz	Unsp. orange slipped and incised	1	Late Classic
Ash	Vinaceous Tawny	Chunhuitz	Unsp. black-on-red slipped	1	Late Classic
Ash			Unsp. eroded	101	
Ash			Cream and Red Slipped	1	
Ash			Red-on-Orange Slipped	1	
Ash			Brown Slipped	3	
Ash			Unsp. punctated	1	

building phase 1) abutting Wall 1 (excavated in Unit 2) that formed the entryway into the medial terrace (Figure 8). In front of this first step and above Step 1 building phase 2, clusters of artifacts began appearing (Figure 9). Excavators described the large amounts of ceramics and lithics as a trash dump, specifically Special

Deposit 1. This terminal deposit, which I label Deposit 3, was located on the stairway but it did not rest on the plaster surface of Step 1 building phase 2. There was a layer of soil accumulation found between the deposit and the steps; this means that Deposit 3 most likely accumulated after the B-Group was abandoned.

Deposit 3 had the most artifacts out of all the deposits (N=3,418). Almost 90% of the deposit was ceramic sherds (n=3,071), and 8.3% was made up of chert artifacts (n=282). The remaining materials included 17 obsidian blades, three ground stone fragments, 37 faunal bone, and eight prestige items—all shell adornments.

Out of 3,071 sherds only three percent (n=82) refit, which brings the adjusted sherd count down to 3,020. One hundred and thirty-seven rim sherds were found in the deposit, which allowed many ceramic types to be identified. Many Late and Terminal Classic types were present (Table 4). The majority of sherds were classified as Pine Ridge Carbonate types. Ash wares included Belize Red, Chunhuitz Orange, and Benque Viejo Polychrome types.

Deposit 3 had the most lithic artifacts (n=302) out of all the deposits. It included 17 obsidian blades, 82 chert cortex removal flakes, three chert cores, 120 chert reduction flakes, 71 functional chert flake tools, one chert bifacial chopper, two mano fragments, one metate fragment, two rounded stones (possibly weights), one burnishing stone, and one natural chert stone. The number of obsidian blades is very interesting even if the proportion within the deposit is still very low (0.5%). Seventeen blades is a much higher count than the other three deposits.

Thirty-seven faunal bones were found in Deposit 3. Carolyn Freiwald identified the majority (75.7%) of the bones as whitetail deer fragments. One large mammal bone, one large bird bone, and two unknown bones were also identified. One *Nephronaias* shell and four other unknown shells were also in the deposit (Carolyn Freiwald, personal communication, 2013).

Eight worked shell fragments were identified as prestige items because they were most likely used as adornments. Four of the shells were polished *Pomacea*, a type of freshwater apple snail (Carolyn Freiwald, personal communication, 2013). Three shells were *Nephronaias*; two were cut to create serrated edges, and the third had a drill hole. The final piece was a shell bead made of unknown shell that had been burned.

Deposit 4. In 2011 Operation 11



Figure 10. Deposit 4 during excavations.

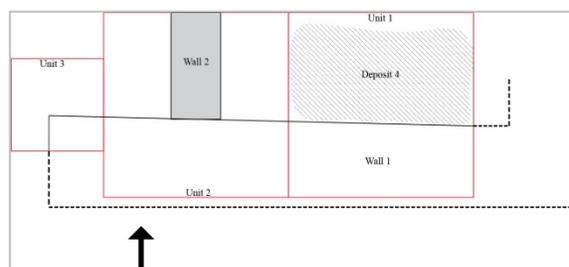


Figure 11. Operation 11 Sub-Operation C unit and excavation feature schematic.

continued with Sub-Operation C (Woods 2011). A 2 x 2 m, Unit 1, was placed in the southeast corner of the B-Group on the interior side of the medial terrace mound to target architecture associated within the medial terrace. The goal was to expose the eastern end of Wall 1 found in Operation A of 2010 and to determine if this wall was part of room blocks on the medial terrace. Excavations aimed to provide evidence for activities in the B-Group since its function was unclear. The top of Wall 1 was found just below the humus layer. Excavators followed the wall down on its north side into the interior of the medial terrace, and between 60 and 100 cm down, in front of Wall 1, a very dense artifact

deposit was found. The terminal deposit (Deposit 4) was at least 20 cm thick, and it sat directly on the plaster floor (Figure 10). Unit 2 (2 x 2 m) was extended to the west of Unit 1 so that Wall 1 and the deposit could be followed. Surprisingly, no materials were found on top of the plaster floor in Unit 2. However, Wall 2 was discovered, but it is still unclear if the two walls form a room block or not (Figure 11).

Deposit 4 had a total of 2,827 artifacts: 2,649 ceramic sherds (93.7%), 117 chert lithics (4.1%), five obsidian blades (0.5%), two ground stone fragments (0.07%), 46 faunal bone (1.6%), four prestige items (0.1%) including a jade earspool fragment, greenstone earspool, serrated shell, and a spiral carved mammal bone, and four miscellaneous items (0.1%) including a ceramic figurine head, ceramic bird figurine, spindle whorl, and slate fragment.

Out of 2,649 ceramic sherds, seven percent (n=177) refit causing an adjusted count of 2,526. Deposit 4 had a very diverse assemblage of ceramic type-varieties compared to the other deposits (Table 5). This diversity is especially evident among ash wares. Like the other deposits, Belize Red, Chunhuitz Orange, and Benque Viejo Polychrome types were identified. However, other Late Classic ash ware types were also present including Gallinero Fluted and Big-Falls Gouged Incised. One reconstructible unspecified ash polychrome cylinder vase was also identified. These are highly decorated types, typically found in elite households. In addition, a full range of common domestic types were also identified including Terminal Classic diagnostics such as Roaring Creek Red, Kaway Impressed, and Cayo Unslipped Type Cayo Terminal Classic variety.

One hundred and twenty-six lithic artifacts were found within Deposit 4. Chert reduction flakes (n=66), chert cortex removal flakes (n=33), and chert functional flake tools (n=18) make up over 90% of the lithic materials. In addition to these chert objects, five obsidian blades (3.9%), one mano (0.8%), and one metate fragment (0.8%) were associated with the deposit.

A full range of other artifact classes was recorded. Forty-six faunal bones and shell were found. Thirty-two of these (69.6%) are large mammal bones, 12 (26.1%) are of an unknown

bone type, and two shells, one *Pomacea* and one unknown type, round out the deposit. Four prestige and four miscellaneous items were also identified. Items were considered miscellaneous if their construction did not warrant their classification as prestige goods. These included two figurine fragments, a ceramic spindle whorl, and slate fragment. A jade earspool fragment, a greenstone earspool, a serrated shell adornment, and an intricately spiral-carved mammal bone were identified as prestige goods (Figure 12).

Comparative Data

To be able to test my model and identify the terminal deposits from Aguacate Uno as ritual the assemblages were compared to a known refuse assemblage from Actuncan, Belize. In 2011 Angela Keller performed phosphorous testing in Plaza H of Actuncan to identify high organic content areas that could indicate trash accumulations (Keller and Craiker 2011). Koenig led excavations in an identified high phosphorous area in the northwest corner of the plaza in 2012 (Chambers-Koenig 2012), and found a concentrated but thin (20 cm thick) accumulation of mostly ceramic and lithic debris. Based on the high phosphorous levels and the artifact accumulation the deposit was determined by Keller to be refuse debris possibly placed there to delineate public and private space between the plaza and residential groups. All levels of the refuse deposit were sampled for this research. The total sample contained 3,594 artifacts, 3,171 ceramic sherds (88.2%), 414 chert lithics (11.5%), two obsidian blades, two ground stone, and four prestige items. Artifact class counts and frequencies are included in Table 6, which compares all deposits discussed above.

Results

If Aguacate Uno's terminal deposits were created through ritual acts, then artifact class frequencies will be statistically different than those from refuse contexts. Further, if the terminal deposits are different from each other, then the material differences can be used to help assign them to specific types of ritual deposits based on my model. To test artifact class differences between contexts, multiple chi-square tests of homogeneity were performed. It

Table 5. Deposit 4 Ceramic Tempers, Wares, Groups, Types, and Chronology

Temper	Ware	Group	Type	n	Chronology
Carbonate	Pine Ridge Carbonate	Dolphin Head	Dolphin Head Red	1	Late Classic
Carbonate	Pine Ridge Carbonate	Vaca Falls	Vaca Falls Red	3	Late to Terminal Classic
Carbonate	Pine Ridge Carbonate	Vaca Falls	Roaring Creek Red	3	Late to Terminal Classic
Carbonate	Pine Ridge Carbonate	Vaca Falls	Kaway Impressed	1	Terminal Classic
Carbonate	Pine Ridge Carbonate	Garbutt Creek	Garbutt Creek Red	1	Late amd Terminal Classic
Carbonate	Pine Ridge Carbonate	Mount Maloney	Mount Maloney Black	1	Late Classic
Carbonate	Unspecified	Sotero	Sotero Red-brown	1	Late Classic
Carbonate	Uaxactun Unslipped	Tu-Tu Camp Striated	Tu-Tu Camp Type Tzimin variety	10	Late Classic
Carbonate	Uaxactun Unslipped	Cayo	Cayo (Terminal Variety)	1	Terminal Classic
Carbonate	Uaxactun Unslipped	Cayo	Unspecified	15	Late Classic
Carbonate	Uaxactun Unslipped	Cayo	Alexander Type Alexander Variety	4	Late Classic
Carbonate	Uaxactun Unslipped	Cayo	Alexander Type Beaverdam Variety	1	Late Classic
Carbonate	Uaxactun Unslipped	Cayo	Alexander Type Croja Variety	1	Late Classic
Carbonate	Uaxactun Unslipped	Cayo	Unspecified (Red)	2	Late Classic
Carbonate	Peten Gloss	Achote	Achote Black	6	Late Classic
Carbonate	Peten Gloss		unsp.	11	
Carbonate			Unsp. striated	1480	
Carbonate			Unsp. plain	325	
Carbonate			Unsp. red slipped	255	
Carbonate			Unsp. brown slipped	11	
Carbonate			Unsp. red and orange slipped	1	
Carbonate			Unsp. black and cream molted slip	9	
Ash	British Honduras Volcanic Ash	Belize	Belize Red	11	Late Classic
Ash	British Honduras Volcanic Ash	Belize	Gallinero Fluted	1	Late Classic
Ash	British Honduras Volcanic Ash	Belize	Big Falls Gouged-incised	8	Late Classic
Ash	British Honduras Volcanic Ash	Belize	Belize Type Planton-Punctated variety	1	Late Classic
Ash	British Honduras Volcanic Ash	Belize	Type Unsp.	119	Late Classic
Ash	British Honduras Volcanic Ash	Belize	Belize Red Type incised variety	3	Late Classic
Ash	Vinaceous Tawny	Chunhuitz	Chunhuitz Orange	2	Late Classic
Ash	Vinaceous Tawny	Chunhuitz	Benque Viejo Polychrome	9	Late Classic
Ash	Vinaceous Tawny	Chunhuitz	Type Unsp.	8	Late Classic
Ash	Vinaceous Tawny	Chunhuitz	Unsp. red-on-orange slipped	1	Late Classic
Ash	Peten Gloss	Palmar	Cabrito Cream	5	Late Classic
Ash			Unsp. polychrome	80	
Ash			Unsp. gouged polychrome	1	
Ash			eroded	120	
Ash			Unsp. black slipped	4	
Ash			Unsp. red and black slipped	10	

was determined that Deposits 2, 3, and 4 are statistically different than refuse (Table 7; Koenig 2014:89-94). No chi-square tests for homogeneity could be run between Deposit 1

and refuse materials because artifact class frequencies in Deposit 1 are too small. This fact alone indicates that Deposit 1 was likely not trash and distinctly different from other



Figure 12. Prestige and Miscellaneous items found in Deposit 4. a) Jade earspool fragment; b) Human figurine head; c) Bird figurine; d) Spiral carved mammal bone (photos courtesy of Lisa LeCount and Eric Fries).

Aguacate Uno terminal deposits. Comparing deposits to each other, Deposit 1 could not be included in the statistical tests because of sample size. However, Deposits 3 and 4 are significantly different ($\chi^2 = 50.53, p < .001$) from each other. This difference appears to be caused by differences in ceramic and lithic proportions. Deposit 3 has higher than expected lithics and Deposit 4 has higher than expected ceramics. Because it was necessary to highlight the presence of human bone in Deposit 2, I was unable to perform statistical tests between it and Deposits 3 and 4 because of expected cell counts.

I also compared differences in primary vessel forms found within each deposit to determine how the deposits were statistically different from each other (Table 8). Again, due to sample size Deposit 1 could not be analyzed. Nonetheless, I found that the primary vessel forms found within Deposits 2, 3, and 4 were significantly different ($\chi^2 = 90.93, p < .001$). Deposit 2 has a higher proportion of dishes and plates, especially compared to Deposit 4. Deposit 3 has a higher proportion of bowls, especially compared to Deposit 4. Deposit 4 has a much higher proportion of vases than the other

two deposits. Jars appear constant across deposits. The significantly higher frequency of vases in Deposit 4 and serving bowls in Deposit 3 further suggest that these deposits are not consistent with normal refuse assemblages and that the activities that produced them are different in some way than those of everyday life.

Discussion

By examining and comparing the contexts and contents of the four deposits found at Aguacate Uno, the nature of abandonment practices and their ritual purpose can be inferred. Although I was unable to determine if Deposit 1's contents were *statistically* different from other deposits its context provides a strong argument to interpret the practices that resulted in its deposition as a reverential termination of an elite room. The limestone marl and block fill used to bury this room was relatively sterile of artifacts, which suggests that this fill was intentionally different than the make-up of other kinds of civic fill. Additionally, the materials within the deposit are very different than that expected of trash, which is often composed of diverse and abundant materials. These data suggests that Deposit 1 is an unspecified termination; however, I argue that the context of the deposit indicates that Structure A-4 was reverentially terminated. The intentional filling of Structure A-4 with white marl and sterile fill showed no signs of violent or desecratory actions. In fact, it appears that the goal of the ancient Maya was to preserve the architectural elements inside the structure—mainly the large masonry bench. The same type of reverential termination—filling of elite structures—has been found at many sites in Belize including Xunantunich, Minanha, and La Milpa (Hammond and Tourtellot 2004; Iannone 2005; Yaeger 2010).

Deposit 2 was found on the summit of the elite residential compound Structure A-3 in front of the eastern interior courtyard wall. While there was no evidence of desecration, such as defaced stones and burned floors or artifacts, the smashed pot along with the scattered bone leads me to interpret Deposit 2 as a desecratory termination ritual. I remain cautious about this classification; however, because no other human

Table 6. Material Overview between Deposits (1, 2, 3, and 4), and Refuse

	Ceramic		Lithic		Obsidian		Ground-stone		Faunal Bone		Human Bone		Prestige		Misc.		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Deposit 1	208	94.5	6	2.7	2	0.9	3	1.4	0	0	0	0	1	0.5	0	0	220	100
Deposit 2	458	69.3	26	3.9	2	0.3	1	0.2	94	14.2	79	12	1	0.2	0	0	661	100
Deposit 3	3071	89.8	282	8.3	17	0.5	3	<0.1	37	1.1	0	0	8	0.2	0	0	3418	100
Deposit 4	2649	93.7	117	4.1	5	0.2	2	<0.1	46	1.6	0	0	4	0.1	4	0.1	2827	100
Refuse	3171	88.2	414	11.5	2	<0.1	2	<0.1	1	<0.1	0	0	4	0.1	0	0	3594	100

Table 7. Chi-Square Tests of Homogeneity Results Between Deposits and Refuse

Deposit 2 vs. Refuse	$\chi^2 = 988.9, p < .001$
Deposit 3 vs. Refuse	$\chi^2 = 69.744, p < .001$
Deposit 4 vs. Refuse	$\chi^2 = 158.865, p < .001$

Table 8. Chi-Square Test of Homogeneity between Deposit Vessels Forms

	Vase		Jar		Bowl		Dish/Plate		Total	
	n	%	n	%	n	%	n	%	n	%
Deposit 2	2	10.5	5	26.3	8	42.1	4	21.1	19	100
Deposit 3	6	4.7	35	27.6	68	53.5	18	14.2	127	100
Deposit 4	80	48.2	51	30.7	28	16.9	7	4.2	166	100

$$\chi^2 = 90.93, p < .001$$

bone was identified within the other Aguacate Uno deposits, it is clear that Deposit 2 is different from the others. Therefore, the human bone should be weighted strongly in interpreting the activities that produced the deposit (Harrison-Buck 2012; Pagliaro et al. 2003).

Deposits 3 and 4 are the most ambiguous, both contextually and materially; therefore, they are the most difficult deposits to interpret. Compared to each other they are significantly different in ceramic and lithic proportions, as well as primary vessel forms. Overall, the cultural materials found in Deposit 4 can be considered more indicative of elite, ritual, or other special activities than those in Deposit 3. There were very high proportions of polychrome and other decorated types of ceramic sherds in Deposit 4 as compared to Deposit 3, as well as other special items including jade, figurines, and worked shell and bone. The only special items found in Deposit 3 were shell adornments, but there are two distinguishing materials found in it that may help determine the ritual purpose:

obsidian and faunal bone. The presence of these items suggest that Deposit 3 was likely a revisitation deposit; however, the lack of discreet offering areas and the wide-spread distribution of ceramic above the stairs contradict this interpretation. Furthermore, the similar proportions of obsidian and faunal bone within Deposits 3 and 4 indicate these materials are not distinguishing features.

Contextually, both Deposits 3 and 4 were found associated with the northern B-Group complex. Deposit 3 blocked the entrance to the medial terrace, and Deposit 4 terminated interior spaces. This juxtaposition suggests that the ancient Maya may have created both deposits to terminate this structure. No evidence for desecration was found associated with either deposit. Therefore both deposits are classified as unspecified termination rituals because the evidence available does not indicate specific intentions.

Abandonment Processes at Aguacate Uno

The material evidence contained within the four terminal ritual deposits at Aguacate Uno suggests two micro-scale modes of abandonment: reverential termination of Structure A-4 and desecratory termination at the summit of Structure A-3. Both Structure A-4 and A-3 are considered part of an elite residential compound where Structure A-4 functioned as some kind of ancillary structure to Structure A-3, the main building. These findings are interesting because they suggest that the elite architectural group was both respected and violated. Unfortunately, it is unclear when and what type of ritual—reverential or desecratory termination—occurred first based on the relative ceramic dates from both deposits. At Xunantunich (Yaeger 2010), after the desecratory termination of the ruler's residence, the site underwent a revitalization by local groups. The desecratory termination of Aguacate Uno's elite residence exhibited in Deposit 2 may reflect a similar act, one that was aimed against the ruling elite. This scenario supports a shift in social organization at Aguacate Uno during the Late to Terminal Classic periods similar to that seen at other central Belizean sites.

Conclusion

This study provides an outline for the analysis and classification of terminal ritual deposits found at Aguacate Uno, Belize, to better understand the micro-scale processes of the Classic Maya collapse that occurred across the lowlands during the Late and Terminal Classic periods. Archaeologists are still trying to understand the activities that produced these assemblages and have proposed two general models of activities that created them: the accumulation of refuse and ritual activities. One way to resolve the ambiguities of terminal deposits is to quantitatively distinguish them from regular artifact assemblages so that they can be confidently interpreted and discussed as ritual. I created a model of terminal ritual deposits by inferring material correlates from ritual type attributes found in the literature. The results of the analysis of four Aguacate Uno terminal deposits supports my model and suggests that differences in ritual practices

proposed in the literature do exist. The statistical comparisons of materials within these deposits to a refuse assemblage from Actuncan suggest that the terminal deposits at Aguacate Uno were ritual in nature. Additionally, the comparisons between the Aguacate Uno deposits allowed for a more material focused interpretation of the abandonment processes that occurred at the site.

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32 **INVESTIGATING URBAN FORM AND KINGSHIP: PRELIMINARY RESULTS OF THE 2014 CHAN CHICH ARCHAEOLOGICAL PROJECT**

Kelsey E. Herndon, Gregory Zaro, Brett A. Houk, David Sandrock, Ashley Booher and Edgar Vasquez

In 2014, the Chan Chich Archaeological Project (CCAP) and the Belize Estates Archaeological Survey Team (BEAST) pursued multiple research agendas within the 145,000-acre Gallon Jug/Laguna Seca permit area. At Chan Chich, research into the evolution of the dynastic architecture at the site began with Structure from Motion mapping of Structure A-15 and it continued with excavations designed to identify dynastic architecture associated with a Terminal Preclassic tomb excavated in the Upper Plaza acropolis in the late 1990s. This multi-season investigation will assess changes in architecture attendant to the emergence of divine kingship. Concurrently, the CCAP conducted the first excavations in Courtyard A-3, a courtyard attached to the south side of the Upper Plaza. Additionally, a two-year research project began on the processional architecture at Chan Chich, including excavations on the site's two sacbeob. Away from the site center, BEAST surveyed seismic lines in the permit area and attempted to locate the site of El Infierno, reported in the early 1970s and lost ever since. This paper summarizes the results of the 2014 investigations.

Introduction

Chan Chich is a moderately sized ancient Maya city located in the Three Rivers adaptive region of Belize. The site is approximately 4.25 km east of the Belizean border with Guatemala and sits along Chan Chich Creek. The 2014 season of the Chan Chich Archaeological Project targeted four specific objectives aimed at expanding our understanding of the form and history of this ancient Maya city and its surrounding landscape. The first objective was the initiation of the Chan Chich Dynastic Architecture Project (CCADAP) in the Upper Plaza at Chan Chich (Figure 1). This effort included the Structure from Motion (SfM) mapping of Structure A-15, excavation of the Upper Plaza surface, and excavations of the surrounding monumental structures. CCAP also included excavations in Courtyard A-3 at Chan Chich and preliminary investigations of the site's two causeways and associated structures. Additionally, the Belize Estates Archaeological Survey Team (BEAST) continued survey on the Gallon Jug and Laguna Seca properties.

Chan Chich Dynastic Architecture Project (Operation CC-12)

The 2014 season initiated the CCDAP, a multi-year pursuit aimed at tracking the evolution of kingship and dynastic architecture at Chan Chich. The site has a long history of occupation, beginning in the Middle Preclassic

and continuing through the Terminal Classic (ca. 800 BC to AD 850). Importantly, excavations of the Upper Plaza in the late 1990s uncovered the tomb of a Terminal Preclassic king buried beneath a small shrine platform (Robichaux 2000), representing one of the earliest Maya kings in the eastern Maya lowlands (Houk et al. 2010). The small shrine structure that was originally constructed over the tomb was eventually buried under subsequent construction episodes as the Upper Plaza was built up into an elite acropolis.

Although we now have an informed understanding about the important relationship between divine kingship and monumental architecture in the Maya lowlands during the Classic period, we still know little about the relationship between the earliest Maya kings and the oldest royal architecture. The purpose of the CCDAP is to explore the relationship between a Terminal Preclassic Maya king and the earliest monumental architecture at the site and to trace the evolution of the dynastic architecture from its Terminal Preclassic origins to the Late Classic period (Houk and Zaro 2014).

The first component of CCDAP was to use SfM to map and create 3D models of Structure A-15 and the looters' trenches/tunnels that run through this monumental building (Willis et al. 2014). Structure A-15 is the tallest structure at Chan Chich and makes up the boundary between the Upper Plaza and

Courtyard A-3. The Terminal Preclassic Tomb 2 was excavated near the northern base of

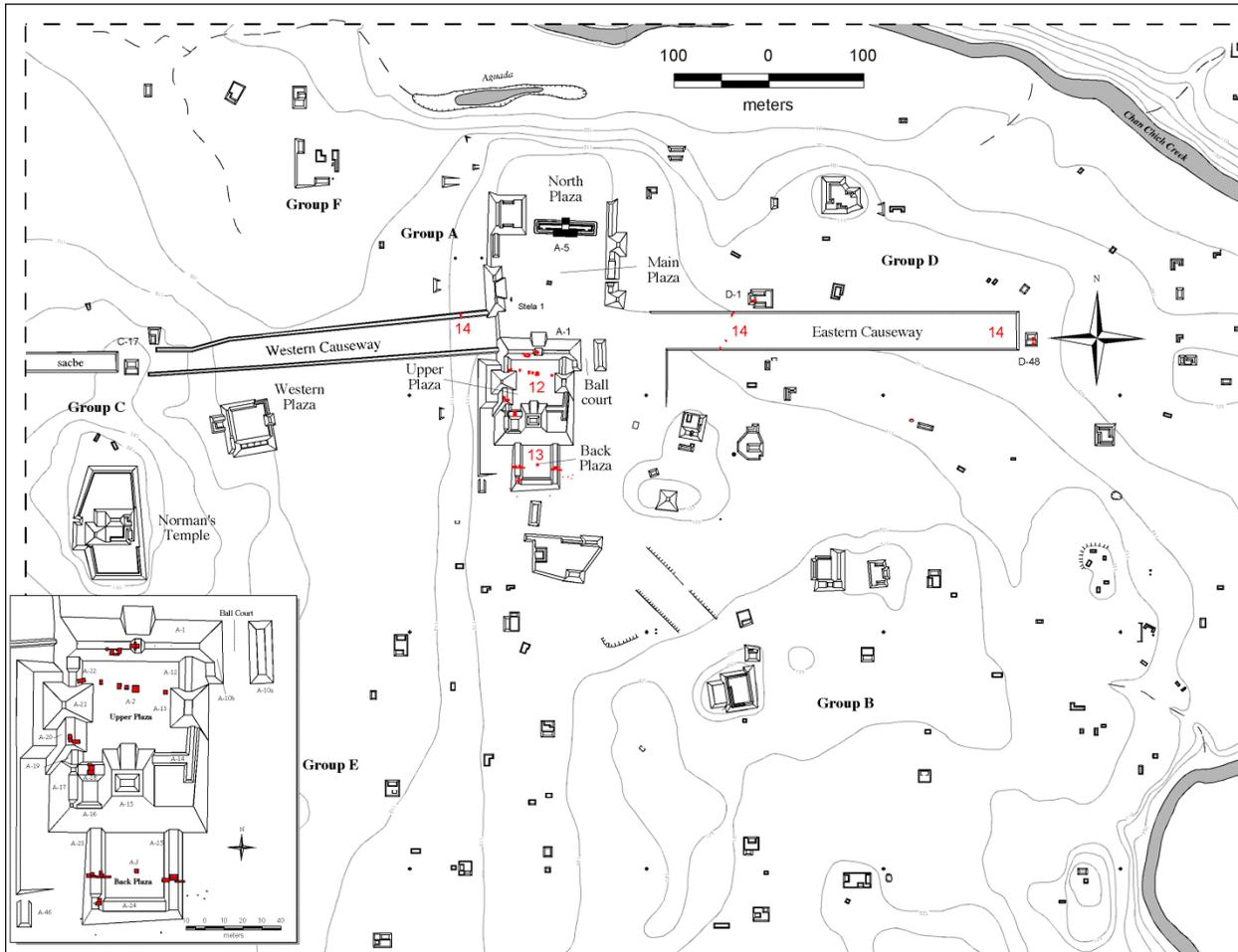


Figure 1. Map of the site core of Chan Chich showing the locations of 2014 excavations and an inset of the Upper and Back Plazas area. The numbers 12, 13, and 14 refer to Operations CC-12, CC-13, and CC-14, respectively.

Structure A-15, indicating that this is an important locale in understanding the relationship between kings and the built environment with which they were associated. Five looters' trenches/tunnels run through this mound giving a partial glimpse of the complex construction history of the structure. By digitally mapping and modeling the ruin, including the looters' trenches/tunnels, we will be able to trace each construction phase of Structure A-15 through a 3D model and ultimately delineate the changing form of the building through time.

SfM software uses a set of algorithms to identify and correlate feature points in overlapping photographs. The program can then use photographs of the same object, taken from

multiple viewpoints, to calculate the relative position of these points in three-dimensional space. This processing creates a dense point cloud that can be manipulated in various programs. In total, 1,799 photographs were used to create the 3D model of Structure A-15 and its five looters' trenches/tunnels. After processing, a 3D model containing approximately 44,000,000 individual topographic points was created. The model was georeferenced using ground control points visible in the photographs and then imported into ArcGIS (Willis et al. 2014).

Many aspects of Structure A-15's construction history are obvious in these data (Figure 2), although full analysis is pending. However, we can say that using pole aerial

photography to photograph inaccessible parts of the looter's trenches allowed us to model



Figure 2. SfM orthophoto, view to the south, of the interior of the uppermost trench and tunnel on the eastern side of Structure A-15 showing various architectural features, after Willis et al. (2014:Figure 2.7). The room exposed in the tunnel (upper right in image) is not accessible and had never been documented before.

previously unknown architectural elements, including a large vaulted room (Willis et al. 2014). Moving forward, we will begin to trace specific architectural elements throughout all five looter's trenches allowing us to infer the complete form of the architecture for each construction episode of this complex structure, ideally dating back to the Terminal Preclassic period and the construction of Tomb 2.

Excavations in the Upper Plaza and the surrounding monumental architecture revealed extensive information about the final form of the plaza as well as earlier manifestations of the built environment (Herndon et al. 2014). Excavations targeted Structures A-1, A-18, A-20, and A-22, and the plaza surface. This short summary only discusses the work in the plaza and at Structures A-1 and A-18.

Excavations into the Upper Plaza surface were designed to further investigate a stone platform face or linear wall-like feature that was first identified by excavations in 2013 (Kelley et al. 2013). In 2014, we exposed this feature

running east-west across three quarters of the northern portion of the Upper Plaza (Herndon et



Figure 3. Photograph of the platform face or wall buried in the Upper Plaza in Suboperation CC-12-O, view to the north.

al. 2014). It is likely an early south-facing platform buried by subsequent plaza renovations, but its inclusion within a large layer of construction fill may suggest alternatively that it is part of a large construction pen (Figure 3). In addition to the wall-like feature, excavations uncovered as many as nine earlier plaster

surfaces (Herndon et al. 2014). These floors correspond with those identified in earlier excavations (Kelley et al. 2012, 2013) and date to as early as the Middle Preclassic period.

Structure A-18 is a small structure adjacent to the northwest corner of Structure A-15. Excavations revealed a large room with an off-centered doorway facing south into a small courtyard. Beneath the surface of the doorway was a thick layer of construction fill containing a crudely constructed crypt enclosing the skeletal remains of a single individual (Burial CC-B13). No other artifacts were recovered from this burial, making temporal association difficult at this time (Herndon et al. 2014). Ceramic analysis of materials from associated and overlying strata is currently pending and may offer more secure chronological information.

Structure A-1 is the most massive structure at Chan Chich and forms the boundary between the large, public Main Plaza and the smaller, more restricted Upper Plaza. Prior excavations suggested that the final construction episode of Structure A-1 took the form of two large, tandem range structures with four rooms on either side and an additional transverse room at one end facing the central landing (Robichaux et al. 2000). Excavations in 2014 uncovered the eastern end of the western spinewall instead of the hypothesized central-facing room, suggesting Structure A-1 comprises two tandem range buildings with eight rooms, each separated by the central landing. Beneath the central landing, excavations revealed a cut into the penultimate phase floor. Inside the cut was Cache CC-C01, consisting of 17 obsidian blades, and a crudely constructed crypt containing the remains of a single human interment (Burial CC-B11) and four complete Achote Group ceramic vessels (Figure 4) suggesting a Late Classic age for the burial (Valdez and Sullivan 2014). Additional artifacts uncovered in the crypt include ceramic sherds, lithic flakes, three obsidian microblades, and a small piece of pink shell (Herndon et al. 2014).

Courtyard A-3 (Operation CC-13)

The 2014 season marked the first excavations in Courtyard A-3, a large courtyard located south of the Upper Plaza and separated from it by Structure A-15. Courtyard A-3 is

approximately 7 m lower in elevation than the Upper Plaza and is surrounded on the west,



Figure 4. Four complete vessels excavated from BU CC-B11, preliminarily assigned to the Late Classic Achote Group. Clockwise from upper left corner: Vessel 1, Vessel 3, Vessel 2, and Vessel 4.

south, and east by three low-lying platforms, Structures A-23, A-24, and A-25, respectively. The 2014 excavations of Courtyard A-3 aimed to establish a history of the form and function of this space via excavations of Structures A-23 and A-25, and the courtyard surface (Vazquez et al. 2014).

Excavations into the courtyard surface revealed only one Late Classic construction episode before reaching bedrock; however, Structures A-23 and A-25 consisted of at least two Late Classic construction episodes (Vazquez et al. 2014).

The final form of Structure A-23 consists of a terraced substructure topped by low masonry walls in the central part of the building. Excavations revealed two separate areas of dense, ashy soil with many fragmented vessels, including several Tinaja Red jars (see Valdez and Sullivan 2014). Additionally, deer bone, ground stone, and broken bifaces that were repurposed as knives were also recovered, indicating that this structure may have been used for food preparation. Excavations at the southern end of the structure encountered an infilled room that was presumably once vaulted. The room had been partially filled and the exterior landing in front of it elevated approximately 1 m in a major remodeling

episode, which saw the vaulted roof dismantled and a perishable structure constructed on top of the remaining low masonry walls. Based on ceramics removed from Structure A-23, the bulk of the construction of Courtyard A-3 occurred during the Late Classic period, but this area was also occupied into the Terminal Classic.

The final form of Structure A-25 was also a terraced platform supporting a building with low, masonry walls on its summit. The function of Structure A-25 during this final phase is still unknown, as no diagnostic artifacts or architecture were found. The form of the penultimate construction episode is unclear without further excavation.

Processional Architecture (Operation CC-14)

Chan Chich has two 40-m wide *sacbeob* that enter the Main Plaza in front of Structure A-1 from the east and west. These *sacbeob* and associated structures are the focus of a two-season investigation of the processional architecture at the site (Booher and Nettleton 2014). Following Keller's (2006) dissertation work on the causeways at Xunantunich, excavations of the processional architecture at Chan Chich were aimed at determining the construction history and form of the causeways, as well as identifying artifacts that may have been discarded along the causeways during processions. Additionally, the project aims to identify the function of two shrine structures located at the termini of each causeway. An associated courtyard group was also investigated in 2014.

Excavations of the two causeways revealed that each consisted of a single construction episode. The eastern causeway was made from crudely constructed walls of uncut stones that retained the construction fill of the elevated causeway. The western causeway was also elevated; however, it differed from the eastern causeway in that it had parapets fashioned from cut limestone blocks. Although the ceramics collected from these excavations have yet to be analyzed, the construction of the two *sacbeob* likely took place during the Late Classic (Booher and Nettleton 2014).

Preliminary excavations targeted Structure D-48, one of the two suspected termini shrines, in 2014. It is a small structure with a south-

facing patio at the terminus of the eastern causeway. Excavations revealed the final form as a series of steps and terraces leading to the summit of the structure. A dense array of artifacts was recovered from the limited excavation of Structure D-48, including hundreds of ceramic sherds, a possible ceramic game piece, dozens of lithic tools, obsidian fragments, and metate fragments (Booher and Nettleton 2014). Once ceramic analysis has been completed we will be able to place Structure D-48 within the context of the construction history of Chan Chich as well as evaluate its possible function in processions.

Courtyard D-1 was not part of the original excavation plan, however its proximity to the causeway indicated that it might be associated with the processional architecture of Chan Chich. Excavations of Structure D-1 and the surface of the courtyard revealed at least two construction episodes. The earlier form of Structure D-1 was a raised room with a patio extending to the east. Preliminary analysis suggests this room was later filled in and a platform constructed over the top. A burial (Burial CC-B12) was found close to the ground surface and inside the filled room. The interred individual was oriented with his or her head to the west and feet to the north; a small overturned bowl was found on top of the body's midsection. Based on preliminary analysis the vessel is an Achote Black bowl and dates to Tepeu 2 (Lauren Sullivan, personal communication, 2014). The proximity of the burial to the ground surface and its location within the construction fill suggests it was likely interred after the room had been filled, possibly by the individuals occupying the summit of the final phase platform.

Belize Estates Archaeological Survey Team (BEAST)

The CCAP/BEAST permit area includes 145,000 acres of land encompassing Gallon Jug Ranch, Laguna Seca, and a buffer around Chan Chich that extends onto Yalbac Ranch. The primary objective of BEAST in 2013 and 2014 was to update the inventory of sites in the permit area, a task originally undertaken by the Rio Bravo Archaeology Project (RBAP) directed by Thomas Guderjan (Guderjan et al. 1991). BEAST surveyed along seismic lines, revisited

previously recorded sites, and conducted targeted survey (Figure 5). In 2013, BEAST

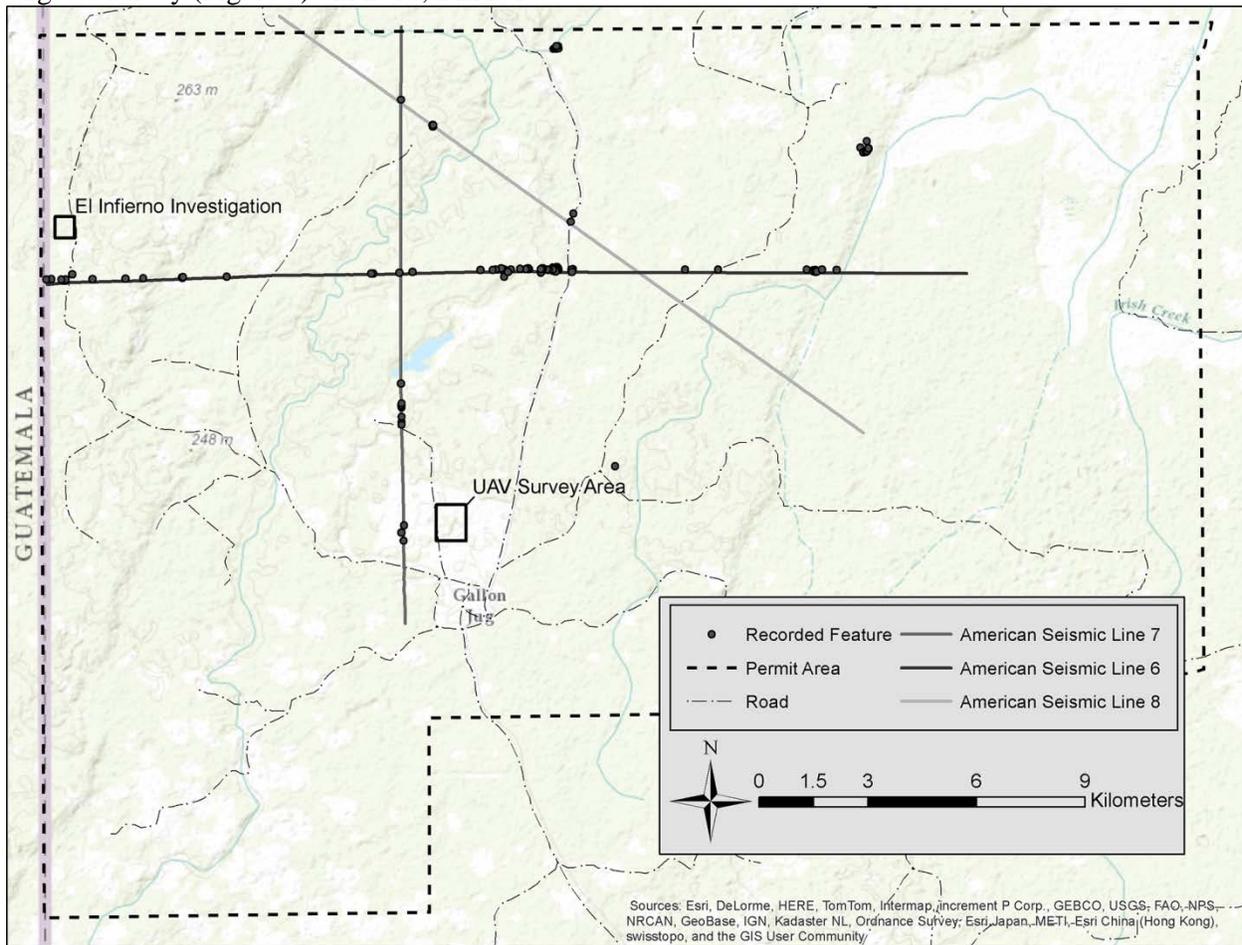


Figure 5. Map of CCAP/BEAST permit area with locations of surveys conducted in 2014 (after Sandrock and Willis 2014: Figure 6.1).

identified four new sites and surveyed over 40 km of transects cut by American Seismic, LLC. This year BEAST surveyed 36.2 km of transects, revisited several previously recorded sites to assess their condition and update their locations, attempted to locate the site of El Infierno, and conducted unmanned autonomous vehicle (UAV) survey of Gallon Jug Ranch.

The ancient Maya sites of Punta de Cacao and Gongora Ruin and the nineteenth-century logging camp of Qualm Hill were successfully re-located. A large wall-like feature, winding some 500 m, was also mapped. Despite a focused search, the site of El Infierno was not found.

In addition to pedestrian survey, which mapped 117 previously unrecorded structures, BEAST used a custom modified DJI Phantom

UAV to map a portion of the pastures on Gallon Jug Ranch resulting in the identification of several hilltop structures (see Sandrock and Willis 2014). BEAST surveyors later ground-truthed and mapped the location of the structures.

Conclusions

The 2014 season of the CCAP successfully achieved its research goals and identified many queries for future research. The inaugural season of the CCDAP successfully determined the final form of Structures A-1, A-18, A-20, and A-22. Additionally, excavations revealed glimpses into the long and complex construction history of the structures surrounding the Upper Plaza. SfM mapping of Structure A-15 successfully recorded the

exterior of the mound as well as the interior looters' trenches/tunnels. The SfM models will be analyzed for architectural sequences, and future investigations will continue to explore early architecture via excavation of the monumental architecture surrounding the Upper Plaza.

The final form and function of some of the architectural elements in Courtyard A-3 were also determined. Excavations revealed that the plaza was a single construction episode surrounded by buildings consisting of at least two construction episodes. Excavation of Structure A-23 revealed a large amount of broken utilitarian vessels, animal bone, and cutting implements suggesting that this area was most likely used as a food preparation area.

Excavations of the processional architecture determined the final form and construction history of the east and west *sacbeob* and revealed they were both constructed in a single event, but take different forms. Excavations in Courtyard D-1 revealed the form of the final two construction episodes of Structure D-1, as well as an intrusive burial. All three areas of Chan Chich that were investigated this season revealed evidence of Late Classic occupation. Courtyard A-3 also provided evidence for a Terminal Classic occupation, while the Upper Plaza has yet to present any evidence of a Terminal Classic occupation. This may suggest activity was refocused away from the Upper Plaza during this period.

Finally, survey conducted by BEAST identified 117 previously unrecorded structures and revisited four archaeological sites. The efforts of BEAST provided many avenues for future investigations within the permit area, including the proposed 2015 investigations of Qualm Hill camp. Additionally, BEAST demonstrated the effectiveness of drone survey over cleared landscapes.

In sum, the results of the 2014 season of the Chan Chich Archaeological Project combine to inform on the complex and dynamically changing urban landscape surrounding the ancient city of Chan Chich. Excavations in and around the urban epicenter continue to expose its complex and long-lived construction history, while survey work in the region is helping to define the cultural landscape that constitutes

Chan Chich's urban hinterland. Future work will build on these results with a continued focus on delineating chronology, particularly among early architectural features, and tracing dynastic architectural change and kingship at the site from the Terminal Preclassic through its abandonment in the Terminal Classic period.

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33 **ARCHAEOLOGY IN NORTHWESTERN BELIZE: RECENT EXCAVATIONS OF THE PROGRAMME FOR BELIZE ARCHAEOLOGICAL PROJECT**

Lauren A. Sullivan and Fred Valdez, Jr.

Excavations by the Programme for Belize Archaeological (PfBAP) project in northwestern Belize have been broad and extensive continuing a regional approach to examining Maya urban centers and their supporting sites. This regional viewpoint is only possible by integrating the work of different research programs that each has their own theoretical perspective. Recent investigations have ranged from examining how the elite of La Milpa used monumental architecture to better understanding household archaeology and commoner rituals at small sites.

Introduction

Excavations by the Programme for Belize Archaeological Project in the Three Rivers Region of northwestern Belize have been broad and extensive continuing a regional approach to examining Maya urban centers and their supporting sites (Figure 1). This regional viewpoint is only possible by integrating the work of different research programs that each has their own theoretical perspective. Recent investigations have ranged from examining how the elite of La Milpa used monumental architecture to better understanding household archaeology and commoner rituals at small sites. Excavations at the sites of La Milpa, Maax Na and the smaller sites of La Milpa North, Chawak But'o'ob, and others have all contributed to our understanding of regional interaction.

Occupation on the property ranges from well before Maya settlements and into the historic period. There is growing evidence, primarily in the form of chipped stone tools, for Paleoindian era and Archaic period remains. Unfortunately, these early remains are from surface finds rather than stratigraphic contexts. Beyond the prehistoric Maya remains are sites and artifacts of the historic period. Historic sites in-and-around Hill Bank as well as Quam Hill remind us of the long utilization of the region (Valdez and Cortes-Rincon 2012).

In terms of Maya habitation, ceramic data indicate the area was occupied by the Middle Preclassic and is represented with Swasey/Swasey-related and/or Mamom ceramics recovered from excavations at a number of different sites. The area's population grows quickly during the Late Preclassic with

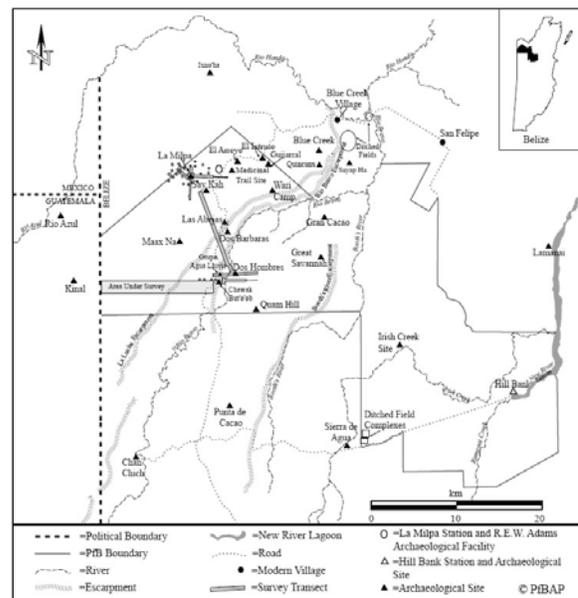


Figure 1. Map of sites in the PfBAP and neighboring areas (map by Rissa Trachman).

much of the occupation located around natural and stable water sources such as the Rio Bravo, Rio Azul, and Boothe's River. Occupation continues into the Early Classic although there are limited data for major construction or occupation at most site centers unlike what is seen at the nearby sites of Tikal and Rio Azul. Population levels rose to their highest during the second half of the Late Classic (Tepeu 2). During this time there was an increase in the number of large sites, the amount of monumental construction, the number of small rural communities, and the extent of agricultural modifications. The majority of ceramics recovered date to this period (Sullivan 2002; Sullivan et. al. 2007). At the largest center in the region – La Milpa – there is clearly a Late

Classic florescence based on the erection of monumental architecture, inscriptions, pottery, as well as the growth of elite residential and administrative complexes (Figure 2) (Hammond and Tourtellot 2004). A survey of house mounds in the area near La Milpa also yielded primarily Late to Terminal Classic dates (Everson 2003). There is limited evidence for Postclassic occupation and visitation in the upland area on the escarpment. The only actual occupation is seen at La Milpa while evidence for visitation is more widespread in the form of monument veneration, censer fragments, and Postclassic arrow points found at various locations (Houk et al. 2008).

La Milpa

Much of the research at La Milpa by the PfBAP is focused on Plaza A or the Great Plaza. Aylesworth (Aylesworth and Suttie 2009) conducted a soil resistivity survey that revealed a pit filled in antiquity, a backfilled excavation unit from earlier researchers, and a structure. The building was built atop an early plaster floor and was comprised of large limestone blocks that were plastered along the exterior surface. The ceramics recovered date to the Late Preclassic. Continued excavations here will help to better define the nature of the Late Preclassic community at La Milpa.

Structure 3 (Figure 3) is located on the southeast side of Plaza A is one of the larger pyramids in the region. It is also associated with at least seven stelae and altars. Debora Trein has been investigating the various ways that this structure and the surrounding area may have been used. Monumental architecture is most often associated with ritual performance and the politics of the elite. Trein (2012; 2013) hypothesizes that this area may have also functioned as a working space for groups other than the elite. This possibility is supported by the recovery of high quantity of lithic debitage to the northeast of the structure. The some 35,000 lithic artifact recovered suggest late stage biface production and re-sharpening occurred here – perhaps in conjunction with the “construction and maintenance” of Structure 3, exchange of lithic material, or production (Trein 2012:22). It is interesting to note that this area is flat compared to the southeast area of the site and

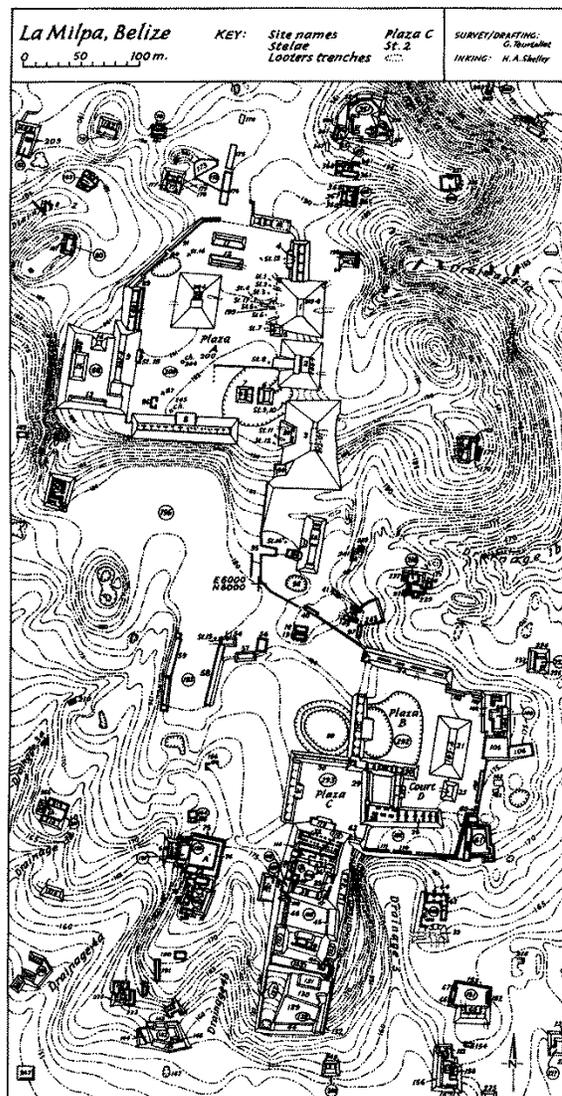


Figure 2. Map of La Milpa (courtesy of Hammond and Tourtellot, BU La Milpa Archaeology Project).

the ceramic and lithic artifacts recovered had worn edges and were minute in size which suggest trampling and indicate that this part of the site may have been a “high-traffic” area (Trein 2012).

The project is working with UT Austin physicist Roy Schwitters (2013) to use cosmic-ray muon tomography in order to investigate Structure 3. Muon tomography can be used to detect the different angles and directions of the muons, which allows for a 3D image to be compiled over a period of several months. The detector sees fewer particles coming from the structure than from other angles. This basically allows the pyramid to be X-rayed. In order to

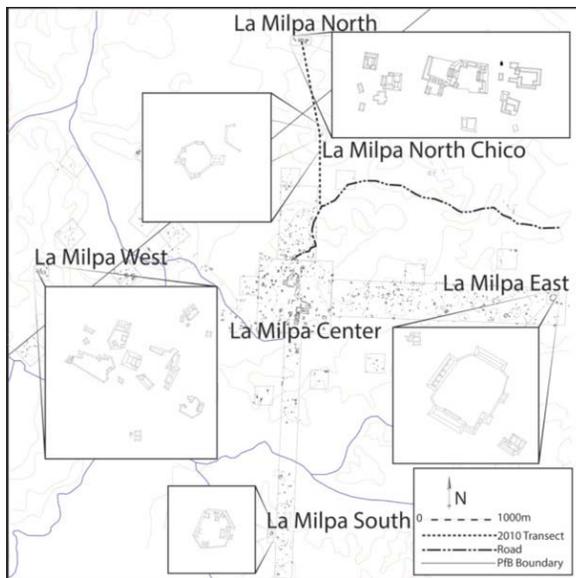


Figure 4. Map showing La Milpa North in cosmogram (Heller 2012).

La Milpa North

La Milpa North was originally mapped by Hammond and Tourtellot and they suggested it was part of a cosmogram that represented an elite residence (Figure 4) (Tourtellot et al. 2003). The layout of the cosmogram has La Milpa at the center with the four equidistant groups oriented to the cardinal directions (La Milpa East (LME), La Milpa South (LMS), La Milpa West (LMW), La Milpa North (LMN) each about 3.5 km from La Milpa creating a quincunx formation that took its final form in the Late/Terminal Classic (Sagebiel 2005). This layout, in essence, puts La Milpa at the center of the Maya cosmos or universe. Tourtellot et al. (2003:106) suggest that these minor sites may have served as “supplemental secondary (or middle –level) administrative centers” that would have been necessary to manage the “densely dispersed population” of the La Milpa community (some 50,000 people). Each of the centers may have served a different purpose. For example, La Milpa’s East position under the rising sun along with an altar and plain stela (Stela 19) suggest it may have been part of a “politico-religious circuit” used by the elite at La Milpa (Tourtellot et. al 2003).

The arrangement of La Milpa North is somewhat different from the other three-outlier sites (LME, LMW, LMS) and is in the form of a palatial compound surrounded by several

smaller domestic groups. This variation may be due to the fact that the Maya associated the north with deceased ancestors. The core of the site consists of six limestone masonry structures located on a hilltop which allowed for surveillance of lower lying areas such as the Dumbbell Bajo (Heller and Burns 2014). While there is evidence for Early Classic activity at the site these structures seem to have been constructed in a single phase during the Late Classic and represent a “significant investment of labor and materials in a single construction episode” (Heller 2012: 131). Recent excavations indicate that the different activities that were carried out at the site include lithic production and textile production (Heller and Burns 2014).

Chert nodules are seen scattered across the site and chert veins are seen in exposed bedrock outcrops on just to the south of LMN. Evidence for lithic production was also recovered from the fill of Structures 1 and 4 where chert nodules, broken bifacially flakes stones, lithic debitage, and fire cracked stone were found. Three areas of lithic debitage scatters, broken bifaces, cores, and flake scarred chert nodules were located on the surface of the La Milpa North core area. A platform to the north of the core yielded the remains of a lot of debitage, the distal ends of broken bifaces, and several unfinished tools. A 1x1 meter unit revealed a “dense layer of lithic materials directly on the surface of the structure” (Heller 2012: 133).

Beyond lithic production this area (Structure 6/Subop 1D) may have also served as an area for the production of sumptuary goods. Marine shell, obsidian blade fragments, hematite, pebbles of red and yellow ocher that might be associated with the production of pigments or dyes were found. Spindle whorls (ceramic and alabaster) were also recovered from these excavations and may suggest textile production (Burns 2014; Heller and Burns 2014). Textiles are thought to have been utilized by Maya women as a method for solidifying status distinction (McAnany 2013), which give us some insight into possible gender roles in the economy of LMN (Heller and Burns 2014).

As Heller has noted the lithic and possible textile production suggests that this was a

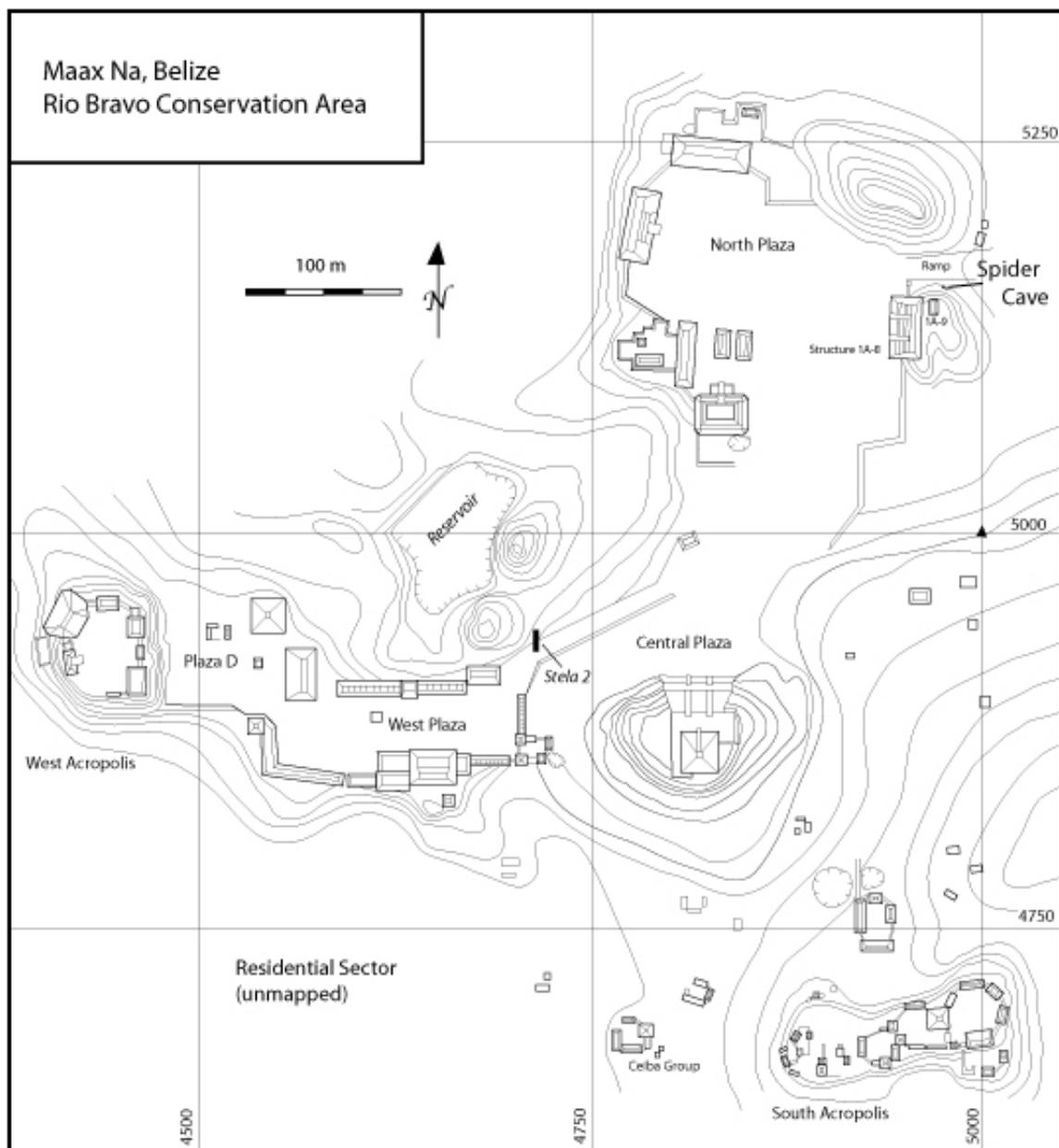


Figure 5. Map of Maax Na (map by Leslie Shaw).

resource specialized community. While analyses here are still ongoing, if their productive activities reached beyond the demands of the household they would have contributed toward the political and economic success and/or sustainability of the community as well as to the maintenance of social inequality (Heller and Burns 2014:5). These specialized communities become quite common in the Three Rivers Region during the Late Classic.

Maax Na

The site of Maax Na is (Figure 5) one of the larger sites in the area located within seven kilometers of La Milpa and equidistant between La Milpa and Dos Hombres (both large ceremonial centers). Maax Na differs from other sites in the area (such as Dos Hombres and La Milpa) in that it grows rapidly in the Early to Late Classic, but not on the scale seen at other sites. It also may have been abandoned earlier as there isn't much indication of Terminal

Classic use (King et al. 2012). One of the things that makes Maax Na special is the fact that it is associated with several caves - which are scarce in the Three Rivers Region and much smaller than those in the Belize River Valley (King and Shaw 2003; King et al. 2012). This association also distinguished Maax Na from other sites in the area and suggests that it may have had a different function (King and Shaw 2003; Valdez 2008). It may also have played a critical role in Maya cosmology in the region. Spider Cave, while small (8 m long x 7.5 m wide), may be one of the largest in the area and it is located along the south side of the main entrance ramp or walkway to the ceremonial plaza (King et al. 2012). King and Shaw (2003) suggest that this may be what originally attracted settlers and visitors to the area. Excavations at the cave entrance revealed a dense concentration of unslipped and monochrome pottery (primarily jars). Many of these sherds had blackening on the interior and may have been used for burning copal (King et al. 2012). Inside the cave about 1,000 sherds were recovered – including slipped and unslipped jars, bowls, plates, and censers – some of which were burned. Excavations in a small shrine associated with Structure 1A-9, the large building that dominates the group the cave is under, revealed a second entrance to the cave, which would have provided access from the group. It appears that this second entrance was intentionally sealed with large blocks and stones in antiquity, thereby effectively “closing” the cave or “killing” its power – most likely when the site was abandoned (King et al. 2012; Sullivan 2012b).

The vast majority of ceramics recovered from Maax Na date to the Late Classic. This number is comparable with overall trends in the Three Rivers Region and may be inflated to some extent, as for practical and research related reasons much of the research in the area has focused on the Late Classic. An increase in activity is also observed in more construction in residential and ceremonial architecture as well as more significant agricultural intensification and land modification. Common ceramic types include Achote Black, Cayo Unslipped, Meditation Black, Chilar Fluted, Subin Red, and Tinaja Red. The large unslipped wide mouthed jars with rounded everted rims and interior



Figure 6. Maax Na vessel (courtesy of the Maax Na Project and PfBAP).

bolstered bowls are common forms (Sullivan 2012b).

Some of the nicer vessels recovered include two cached pots with appliquéd faces were found in an elite residential group (the Ceiba Group) southwest of the main pyramid at Maax Na (Figure 6). One of these vessels contained different items including bivalves and shark vertebrae. The other one contained only soil. Similar vessels have been found at other nearby sites such as Bolsa Verde (vessel more elaborate than Maax Na vessels), Dos Barbaras, La Milpa (Sagebiel 2005), and Blue Creek (Sagebiel 2006) as well as at Caracol (Chase 1994), Tikal (Rice 1999) and Seibal (Sabloff 1975) and are thought to represent different deity images. The most common image depicted in the Late Classic is the Jaguar Sun god of the Underworld. The depiction of this image occurs quite frequently in the funerary imagery at Tikal and may be the site’s “royal patron” (Rice 1999: 36). While typically referred to as “incensarios” many of these vessels show no evidence of smoke blackening and were probably not used to burn incense. Ferree (1972) has suggested that in many cases these vessels took on the identity of the deity they portrayed and were, in fact, the idols to which the incense was offered.

A lip-to-lip cache recovered on the west stairs in the easternmost building of the South Acropolis at Maax Na include two vessels - one decorated with the mat or pop motif. In this case, the mat motif form is an interwoven incised-multiple twist design that appears as a panel across the top of the lid vessel and as the



Figure 7. Chawak But'o'ob Ballcourt (photo by Megan Schuster).

only ornamental design on the vessel. Robicsek (1975) has suggested in this form the motif may indicate that the owner of the bowl was a person of authority. Several vessels with a similar motif were found in a cache in Plaza B at La Milpa and have been observed at Rio Azul (Sullivan et al. 2014, Sullivan 2012b).

The initial ceramic analysis, based on macroscopic pasted and temper identification, suggested an increase in locally made utilitarian types and a decrease in the percentage of luxury vessels present as compared to the Early Classic. These data were supported by a petrographic study of Cayo Unslipped by Brennan that indicates local production. He found heterogeneous paste recipes that varied greatly and are consistent with a “non-standardized mode of production” (Brennan 2011). This pattern may be the result of a change in ceramic production from central to non-centralized production organized on a more local level (Sullivan 2002, Sullivan and Sagebiel 2003). This pattern is also observed at Santa Rita (Chase and Chase 1989), Tikal (Fry and Cox 1974), Xunantunich (LeCount 1999), and at a range of others site in the Belize River Valley (Ball 1993).

The lithic data also indicate localized production. Lithic workshops identified in the Toknal sector of Maax Na (4.5 kilometers away from the site center) suggest a fair amount of localized tool production that primarily occurs during the Late Classic. The lithic artifacts recovered (chert and obsidian) support “the idea of specialization” (King and Shaw 2013:147).

Interestingly there are several small sites surrounding Maax Na (eg. Bolsa Verde) that were only established in the Late Classic and may have been the result of a population

increase that forced people into all environmental zones - optimal or not (Sullivan 2002). “Several of these, including Bolsa Verde, were resource-specialized communities. That suggests that something in the networks binding the Three Rivers Region changed during that time period, either allowing for or calling for greater specialization” (King and Shaw: 2003:76).

Chawak But'o'ob

Chawak But'o'ob is a good example of one of these resource specialized communities that become common in the region during the Late Classic. The site is a farming community that consists of residential terraces, commoner houses, and complex water management systems. The site has seven residential groups – the houses are characterized by modest proportions and construction techniques (Walling 2005). No administrative or pyramidal platforms have been located at the site to date. The majority of pottery dates to the Late to Terminal Classic and suggests that the construction here took place in a relatively short period of time. Water management features associated with the site include dry-slope and cross-channel terraces. Many of the residential patios also functioned as water collection surfaces with interconnected water basins. A large central reservoir was used to direct water over the escarpment to the residences below (Walling 2005).

Recent excavations by Walling have focused on a ballcourt complex (in Group H) to the south and how this might tie in to ritual and perhaps water management in the area (Figure 7). Ballcourts are most often associated with large site centers with very few found in commoner contexts. This Late Classic ballcourt appears to have been built in one construction phase. At this point five basins - interpreted as water storage features - associated with the ballcourt have been found (Walling 2011). A more comprehensive understanding of these basins will be possible once the soil, pollen, and phytolith analyses are completed (Walling et al. 2014). Small rectangular structures associated with the features have also been located – these structures cover a small area (12m²) and are comprised of more numerous and larger blocks

that typically are seen in residential structures in this area (Walling 2011). Two small cave openings are located near the ballcourt and may have been why the ballcourt was placed in this location. As mentioned earlier, caves are rare in the Three Rivers Region and tend to be much smaller than those seen in other areas of the Maya lowlands. Excavations placed near these openings recovered few ceramic and lithic artifacts and they were weathered and mixed with limestone fragments near the surface. Further down (70 cm) a ceramic figurine in the form of an alligator or snake – possibly part of a ladle censer – was recovered (Walling 2011). A carved profile figure made of conch was also found (Walling et al. 2014).

Excavations at Chawak But'o'ob suggest that the life of Maya commoners was much more multifaceted than previously believed. At this site we see complex ceremonialism, resourceful water management, and a sophisticated use of the landscape (Walling 2011; Walling et al. 2014).

Conclusion

The information presented here is just a small glimpse into the regionally focused work being done in the Three Rivers Region. The data support significant changes during the Late Classic with more local autonomy and organization observed. Increasing populations during this time may have encouraged the Maya developed different resource-specialized communities (Scarborough, Valdez, & Dunning 2003) that tried to “diversify production as much as possible” (Dunning et al. 2003: 24) which resulted in high levels of specialization and exchange and an increase in diverse resource specialized communities. Continued excavations will allow for a more detailed interpretation of the ritual, political, and economic significance of La Milpa and the surrounding sites in the Rio Bravo Region.

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34 NEVER ENDING, STILL BEGINNING: A NEW EXAMINATION OF THE CERAMICS OF KA’KABISH, BELIZE

Kerry L. Sagebiel and Helen R. Haines

A thorough analysis of the ceramics from all seasons of work (2005–2013) at Ka’Kabish has led to a reconfiguration and renaming of the ceramic complexes. The formulation of this new ceramic framework for Ka’Kabish involved a reconsideration of Ka’Kabish’s place in the landscape of North-central Belize as well as a reconsideration of its occupation history. Ka’Kabish was probably occupied by the middle Middle Formative (ca. 800–600 b.c.) and was likely an independent polity by the late Middle Formative (ca. 600–400 b.c.) continuing through the Early Classic. The possible abandonment of the Ka’Kabish regality center by the end of the Early Classic puts it at odds with much of Northern Belize, where most sites grew during the Late Classic (a.d. 600–900). There is evidence that Ka’Kabish was then reoccupied, or at least used for specialized activities like rituals and burials, in the Terminal Classic and Postclassic. This paper will shine light on Ka’Kabish’s ceramic history from its precocious start to its as-yet-to-be explained ending(s).

Introduction

The site of Ka’Kabish has been under investigation by the Ka’Kabish Archaeological Research Project (KARP) since 2005, with intensive excavations beginning in 2010 and continuing through 2014. As of summer 2014, the ceramics from all seasons of work have been analyzed by the lead author. This includes a thorough reanalysis of sherds previously analyzed (Aimers 2007, 2011, 2012). This new analysis has led to a reconfiguration and renaming of the ceramic complexes of Ka’Kabish. The previous ceramic complex names have been discarded because a number of them replicate complex names used elsewhere (Haines 2012:17–18). In order to both avoid replication of names and to highlight the environmental importance of Ka’Kabish—as it faces continuing threats from development—we have chosen to use the genus names of the bats found at Ka’Kabish for the ceramic complexes.

Dr. Brock Fenton of the University of Western Ontario has been studying the bats at Ka’Kabish since 2012 and has so far recognized 12 species, including one species of bat—the Big-eared Woolly Bat or Woolly False Vampire Bat—that took three years to identify because individuals hang out in other species’ colonies. The Ka’Kabish looters’ trenches have become prime habitat for a wide variety of environmentally and economically important bat species, which we hope to preserve along with the archaeological remains and other wildlife of Ka’Kabish.

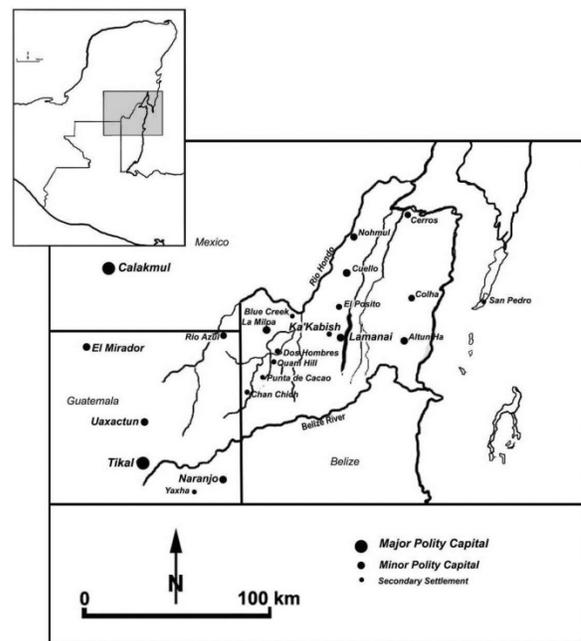


Figure 1. Map of Northern Belize and Northeastern Guatemala showing location of Ka’Kabish.

Ka’Kabish is located on one of the roughly northeast/southwest-trending limestone ridges of North-central Belize (Hammond 1973; Romney et al. 1959) (Figure 1). To the west are the drainages of the Rio Bravo and Booth’s River, which run along the Rio Bravo escarpment—where the Peten region truly begins. Up on the escarpment are the sites of Blue Creek, La Milpa, and Chan Chich, along with several other substantial sites. Only 10 km southeast of Ka’Kabish is the larger and longer-lived site of Lamanai, which is situated along the

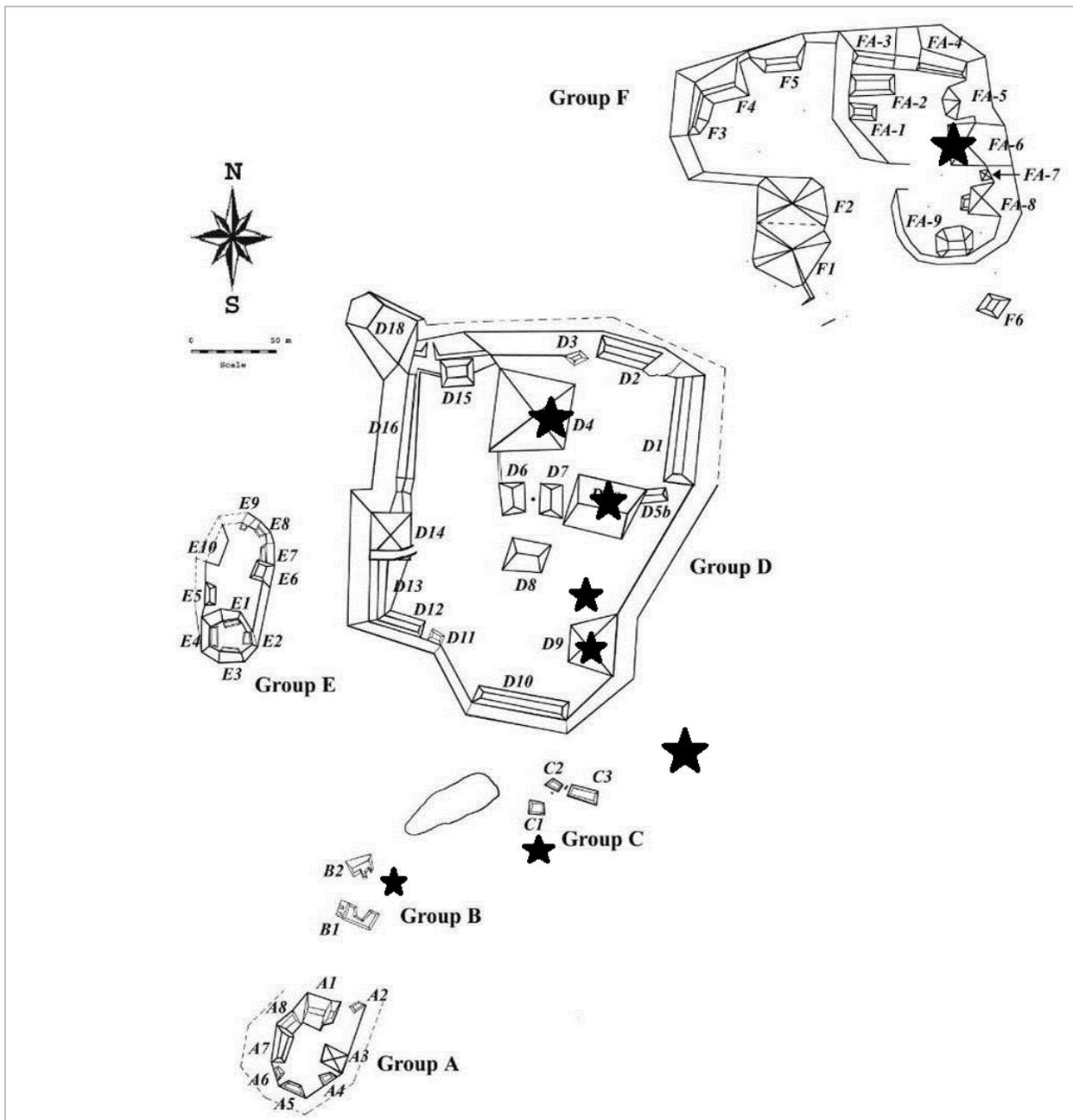


Figure 2. Map of Ka'Kabish site core with areas investigated marked.

New River Lagoon. Still farther east is Altun Ha and the Caribbean coast.

Work at Ka'Kabish has included the clearing and recording of looters' trenches in two main temples (D-4 and D-9) (Figure 2) and the excavation of a large area of the northeast plaza in order to get a preliminary idea of the construction sequences of these buildings (Tremain 2011). Additional work has included

the examination of two looted tombs: a Peten-style painted tomb found within Structure FA-6 and radiocarbon dated to the fifth century and the Structure D-5 cocoon tomb, which also dates to the Early Classic (Haines 2008, 2010). Other clearing operations have been conducted along the fronts of the D-4 and FA-6 pyramids. Operation 8 in the Group D South Plaza has so far provided the longest ceramic sequence at the



Figure 3. Ramgoat Red and Consejo Red bowls.

site, along with other interesting finds (Lockett-Harris 2013, 2014). Three chultuns (Chultuns B-2, C-1, and C-2) in site center have also been excavated and all three have contained Terminal Classic and Postclassic burials and other remains (Gonzalez 2013, 2014). Finally, an ongoing survey transect between Ka’Kabish and Lamanai has been mapped, along with testing and surface collections (McClellan 2011, 2012, 2013).

The Mormoops Complex

The Mormoops Complex is the earliest complex, dating to the middle Middle Formative ca. 800–600 BC. The ceramics tentatively belong to the Swasey/Bladen Sphere of Northern Belize (Kosakowsky 1987; Kosakowsky and Pring 1998). Primary contexts include a secondary burial, three pits (ca. 40 x 40 cm), and 23 smaller declivities excavated into bedrock in the Group D South Plaza. From these contexts a total of 47 pieces of greenstone and jade and over 2,500 marine shell beads have been recovered.

In 2013, the secondary burial was discovered within a depression excavated into bedrock (Haines et al. 2014). Three nearby pits contained 17 greenstone and jade artifacts—including a jade spoon pendant—and over 500 marine shell beads. Inverted above the burial was a Consejo Red bowl with an unusual striated

exterior. Charcoal from within this vessel was dated in the 2-sigma range to 799–511 BC cal.

In 2014, 23 smaller declivities were discovered near the burial, also excavated into bedrock. Eighteen of the declivities contained artifacts, including 30 pieces of jade and greenstone, 1,800 marine shell beads, and Consejo Group sherds. One of the declivities discovered in 2014 was capped with a small, inverted Consejo Red bowl with squash-like grooves/modeling on the exterior. Several of the declivities contained later Joventud Red sherds in an area that appeared to have been re-opened, re-entered, and re-capped.

The most common group in the Mormoops Complex is the Consejo Group. The Consejo Group has a bright red slip on a white surface preparation or underslip. Paste colors are buff, tan, or gray with thick gray cores. Calcite inclusions predominate, but sherd inclusions (grog) occasionally occur. Bowls are the most prevalent form; most have flared to slightly outcurved walls and flat bases. Some bowls with round to incurved sides also occur. Rims are direct or slightly everted with round or, occasionally, square lips. The forms—flared to outcurved walls, everted rims, and round lips—all suggest an affiliation with the Bladen Complex of Cuello (Kosakowsky 1987). Several Consejo Red vessels that appeared to

have a much finer paste were sampled for petrographic analysis by Alice Gomer and were found to have volcanic ash inclusions (Gomer 2013a).

The Consejo Group also includes Barquedier Grooved-incised, Fireburn Red-and-cream, Cudjoe Composite (including incised, modeled, punctate, and chamfered varieties), and Ramgoat Red. At Ka’Kabish, Consejo Red with its white underslip is generally on tan to gray paste, whereas, Ramgoat Red, without the white surface treatment, is usually on a pink to orange paste, perhaps making the white underslip unnecessary in order to achieve the desired bright red slip color (Figure 3). Other Mormoops Groups include: Copetilla, Machaca (including Chalcalte Incised), Quamina (including Tower Hill Red-on-cream), and Chicago.

The Noctilio Complex

The Noctilio Complex encompasses the late Middle Formative ca. 600–400 BC. It is similar to the Mamom Sphere Lopez Complex at Cuello (Gomer 2013a, 2013b; Kosakowsky 1987). So far, the best contexts come from the Group D South Plaza, especially a small “smash and trash” deposit located just above the bedrock deposits previously discussed. This “smash and trash” may represent a feasting event as it includes many serving vessels. Four radiocarbon dates from the deposit have a 2-sigma range between 762–388 BC cal.

The most common group in the Noctilio Complex is the Joventud Group. The Joventud Group has a thick, waxy, dark red to dark purple slip over a cream underslip that is often left visible on vessel exteriors. Pastes are somewhat darker than the Consejo Group with sherd inclusions quite common. A few sherds have volcanic ash inclusions as well (Gomer 2013a). Rims are folded or thickened with round lips. Bowls and dishes are common forms with flared to outcurved walls and flat bases. New forms include bottles and chocolate pots with ovate spouts. Incised designs on bowls and dishes include the double-line break motif.

The Noctilio Complex groups include: Richardson Peak, Joventud (including Guitara Incised and Desvario Chamfered), Chunchinta (including Deprecio Incised), Pital, Muxanal,



Figure 4. Muxanal Red-on-cream bowl.

and Chicago. Muxanal Red-on-cream typically has a red interior and cream exterior, but many have what may be intentionally painted or resisted designs in red (Figure 4).

Rhogeesa Complex

The Late Formative ceramics of the Rhogeesa Complex at Ka’Kabish are similar to the Cocos Complex of Cuello (Kosakowsky 1987) and belong to the Chicanel Sphere dating roughly 400 BC–AD 300. Good stratigraphic evidence again comes from the Group D South Plaza from a very large possible feasting event. This deposit consisted of over 3,000 sherds, over 30 reconstructible vessels, many small bowls and large jars, chocolate pots, an incensario, figurine fragments, one or two drums, a large sherd lid, and a large strap handle from a basket- or bucket- style vessel. Many vessels were decorated with modeling (Figure 5), impressed fillets, and possible resist decoration. There was also a lot of *Pomacea* shell, faunal bone, and ash.

The Rhogeesa Complex includes the following groups: Richardson Peak, Sapote, Sierra (including Laguna Verde Incised, Puletan Red-and-unslipped, Society Hall Red, and Rio Bravo Red), Polvero (including Lechugal Incised), Flor, and Chicago. It is also possible that the Matamore Group is represented, but this has yet to be confirmed.

Several types may increase over time, possibly representing a Terminal Formative facet. This includes Society Hall Red, which is



Figure 5. Sierra Red modeled sherds.



Figure 6. Early to Middle Postclassic red-orange tripod vessel.

a streaky orange-red on a white underslip or surface preparation. Similarly, Puletan Red-and-unslipped jars also have a white wash or surface treatment over fine striations on the lower body that is then covered by a red to pink wash. This is not noted at Cuello and appears to be a local variation. Puletan Red-and-unslipped likely continues into the Early Classic. Similarly, Rio Bravo Red is defined by the use of Sierra Red slips on Early Classic forms and pastes and likely continues into the Early Classic (Kosakowsky and Lohse 2003:7; Sagebiel 2005:247–253, 2014; Sullivan and Sagebiel 2003; Sullivan and Valdez 2006; Valdez and Houk 2000:130–135).

Desmodus Complex

The Early Classic Desmodus Complex dates about AD 300–600 and most of the penultimate, if not ultimate, construction phases of the buildings so far investigated in Ka'Kabish's site center date to this time period. This includes the latest major plaza filling events in the Group D South Plaza. The Early Classic ceramics fit well within the Tzakol Sphere of the Peten (Smith 1955; Smith and Gifford 1966), including the groups Quintal, Triunfo, Aguila (including Pita Incised), Sierra, Dos Arroyos (including Yaloche Cream Polychrome and Caldero Buff Polychrome), Balanza (including Lucha Incised), and Pucte, along with unidentified red and cream types. There is also an unslipped expedient ware (poorly formed and fired with highly variable rim forms) made up almost exclusively of small bowls. There are many in the fill of the Group D South Plaza, but whether they are the remains of yet another feast (as disposable bowls or ration bowls?) or have some other use (salt or other production?) remains to be investigated.

Trachops Working Complex

The Trachops Complex, ca. AD 600–750/900, is more a place holder than a complex at the moment. Identifiable Late Classic types have been exceedingly rare at Ka'Kabish so far and all have been mixed into deposits with later sherds. Few, if any, contexts have been encountered that contain only Late Classic (Tepeu 1 and 2) sherds.

Vampyressa Complex

The Vampyressa Complex is Terminal Classic ca. AD 750/900–1000/1100 and is possibly part of the Tepeu Sphere. The best evidence comes from surface collections in the settlement zone and Chultun B-2 in site center, which contained a burial and a number of Terminal Classic reconstructible vessels (Tinaja and Achote Groups) along with Dumbcane Striated and Lamanai Polychrome (Graham 2004). However, the radiocarbon dates from Chultun B-2 are Middle to Late Postclassic (2-sigma 1263–1394 and 1296–1418 AD cal.). A likely explanation for the Postclassic radiocarbon dates is that they are associated with unidentified Postclassic sherds in fill that was deposited sometime after the burial.

Tentative Terminal Classic groups and types include: Cambio Group, Dumbcane Striated, Tinaja Red (including Chinja Impressed), Roaring Creek Red, Garbutt Creek Group, Achote Black (including Cubeta Incised), Lemon Cream (Sagebiel 2005:541–553; Sagebiel 2014), Lamanai Polychrome, and unidentified fine-paste orange.

Artibeus and Centurio Working Complexes

The Artibeus and Centurio working complexes are tentative Early and Middle Postclassic complexes with very tentative dates of AD 1000/1100–1350. Sherds and several whole vessels from this complex were found in the settlement zone, in two chultuns in site center—C-1 and C-2—and in domestic surface occupation in the Group D South Plaza. Chultun C-1 contained copper bells and rings (post-a.d. 950), and returned a 2-sigma radiocarbon date of 1221–1386 AD cal. This radiocarbon date overlaps with radiocarbon dates likely associated with Postclassic sherds from Chultun B-2.

Tentative groups and types include unidentified unslipped and striated jars, comals, and basins; unidentified red-orange chalices on pedestal bases and grater bowls; unidentified red slipped vessels; unslipped jars with red slipped rims and necks; and unidentified black, brown, cream, and red-on-orange trickle.

Three whole and reconstructible vessels were found in Chultun C-2, including an unusual Protoclassic-looking red-on-orange trickle

collared jar, a red-orange slipped tripod vessel (Figure 6), and an unslipped collared jar.

Molossus Working Complex

This is the very tentative Late Postclassic to early Colonial working complex likely dating to post-a.d. 1350. A few possible early Colonial jars have been found in the settlement zone along with a number of Cehac-Hunacti Composite censer fragments from the surface of Structure D-4 in the Ka’Kabish site center.

Conclusions

The ceramics of Ka’Kabish require further analysis in order to definitively provide a dated ceramic sequence. However, the ceramics indicate occupation in or near Ka’Kabish beginning in the middle Middle Formative (ca. 800–600 b.c.). By the late Middle Formative, occupation of the site center is likely and continued at least through the Early Classic. The scarcity of Late Classic ceramics suggests some kind of occupation hiatus at Ka’Kabish. The burial in Chultun B-2 suggests at least use of the Ka’Kabish site center in the Terminal Classic. Surface and near-surface finds both in the site center and the settlement zone, as well as the ceramics in Chultuns C-1 and C-2, suggest that occupation in and around Ka’Kabish may have rebounded somewhat by the Early to Middle Postclassic, possibly continuing through the early Colonial period.

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35 **REFINING THE DATABASE: ONGOING INVESTIGATIONS OF THE DYNAMICS OF CLASSIC MAYA POLITICAL INTEGRATION IN NORTHWESTERN BELIZE**

Thomas Guderjan and Colleen Hanratty

In this paper we discuss one of our ongoing research questions regarding the spatial organization of Maya cities. We also discuss recent relevant fieldwork in northwestern Belize along the eastern margin of the Alacranes Bajo. The results of this fieldwork reveal a temporally dynamic political landscape, especially in the Early Classic period.

Introduction

The Blue Creek Archaeological Project continues to investigate the prehistory of northwestern Belize. In this paper, I briefly discuss one of our ongoing research domains and then discuss related data from recent field seasons. During the past several years, our attention has been focused on the sites on the eastern edge of the Alacranes Bajo which covers more than 5000 sq. kms of Belize, Mexico and Guatemala.

World Systems Theory: Modeling Maya cities and their Political Economies

World Systems Theory is a framework for understanding human interaction and how that interaction leads to the creation and maintenance of power, legitimacy and authority. In this case, I view interaction among multi-generational lineages as the central cause for those lineages to have become and then to continue to hold power. In essence, this was the glue that integrated Maya cities. Further, I believe that this is an avenue to building a model of ancient Maya cities that is uniquely Maya and not one that has been developed for other societies. We must move beyond semantic barriers such as whether Maya polities were “cities” or “states” or whether “commoners” or “hinterlands” were heterogeneous. Instead, it is more insightful to examine the Maya experience and construct models of how their society operated.

Much of the Blue Creek project’s efforts over the past decade has been organized around the concept of understanding the spatial arrangement of the city and how its components were integrated (Barrett and Guderjan 2006; Giacometti 2002; Guderjan 2004, 2007; Guderjan, Baker and Lichtenstein 2003;

Guderjan, Lichtenstein and Hanratty 2003; Guderjan and Hanratty 2006; Hanratty 2002; Lichtenstein 2000; Preston 2007). Blue Creek consists of numerous residential components each with its own distinct nature, several of which we have intensively investigated. These residential components exhibit vastly more diversity and complexity than would be expected of an undifferentiated mass of commoners. Most importantly, the internal stratification and differential access to exotic goods, etc. within each component indicate that each had its own internal mode of local leadership and that those modes were not identical in each component. In some cases, such as Kín Tan, local leadership consisted of the authority of multi-generational lineages that appear to have controlled large holdings of agricultural lands (Guderjan 2007; Guderjan, Lichtenstein and Hanratty 2003; Guderjan and Hanratty 2006). Similar power structures probably existed in other components such as Nukuch Muul, Rosita, and others. However, such multigenerational power structures do not seem to have existed at Chan Cahal and Sayap Ha, where local central places indicate that these were integrated communities with their own public places and leadership. Instead of multigenerational lineages leading these communities, leadership and authority seems to have been achieved by individuals in their lifetimes rather than ascribed to a lineage from its ancestors (Guderjan 2007; Guderjan and Hanratty 2006).

So, there were multiple modes of local leadership among the residential components of Blue Creek. Further, there was a group of elites who controlled the large, grand, public places of the core area and who also most likely controlled the large agricultural resources available below

the Bravo Escarpment. How can the existence of both of these apparently conflicting structures of power, legitimacy and authority be reconciled?

The sociologist Immanuel Wallerstein pointed us in the right direction (Chase-Dunn and Hall 1991; Pauketat 2000; Peregrine 1991; Peregrine and Feinman 1997; Wallerstein 1974). His initial evaluation of core-periphery relations was an argument that there would be a permanency in the nature of the relationship between the core and the periphery due to their economic interaction. In our world this has proven to be somewhat less than true as the variables involved, such as markets for energy, have dramatically shifted. In the Maya world, relationships between groups of people were also dynamic; for example, the relationship between Kín Tan and the core area. But Wallerstein and World Systems Theory in general direct us to examine the relationships and interaction among people and institutions. Institutionalized structures of power, legitimacy and authority, such as the core area and Kín Tan, simply could not co-exist unless they were mutually supportive of each other.

Theoretical frameworks as diverse as Durkheimian Structuralism, General Systems Theory, and evolutionary biology all tell us the same thing about the co-existence of multiple structures of authority at Blue Creek. If these structures did exist, then the larger system must have somehow worked. Wallerstein's General Systems Theory leads us to understand that the larger system worked because of the interactions among these multiple structures of authority. It was not simply the authority of the rulers over the commoners that explain the integrity of Blue Creek or the power, legitimacy and authority of the ruling elite of the core area. Instead power and authority derived from the interaction among local leadership within each residential component and the ruling elites of the core area. The archaeological markers of these structures are easily seen. We find complex residences and public sacred spaces within residential components. Further, we see connectivity between residential components and the core area. Causeways, or sacbeob, are incorporated into many Maya sites. At Blue Creek, two small sacbeob are located at the base of the escarpment

immediately below the core area. They cross a lowlying area that is seasonally inundated to Sayap Ha. Causeways are relatively uncommon in the region. The only others of which I am aware of are at Chan Chich where a major causeway connects settlement on the upper Rio Bravo (also known as Chan Chich Creek) to the core area, approximately 3 kilometers away, another connects an outlying elite residential group to the core, and a third connects Ekenha to Chan Chich (Guderjan 1991). In the case of the first causeway at Chan Chich, there is no known evidence of the causeway continuing beyond the Rio Bravo. However, this broad sacbe is running directly towards Chan Chich's nearest large neighbor, Punta de Cacao.

In the northern Yucatan, causeways are much more common and connect important areas within polities and in some cases they connect sites that are clearly politically aligned but not part of the same polity. The most apparent example of this is the 100 kilometer long causeway between Chichen Itza and Yaxunah. Others include a recently discovered intersite causeway near the northeast coast of the peninsula (Mathews 1998).

Like contemporary roads, Maya causeways connected and facilitated interaction between groups of people who already had close interaction. They also symbolically reinforce existing political relationships. While the Chan Chich causeway may not have extended all of the way to Punta de Cacao, however, whenever someone from Punta de Cacao came to Chan Chich, they certainly walked that causeway and understood clearly that it had been built to publicly acknowledge the importance of their relationship and to reinforce continued interaction between the two polities.

If these complex residences, public sacred spaces and evidence, such as causeways, of connectivity are archaeological signatures of integration at Blue Creek, then they should be present at other sites as well. Unfortunately, field research at most other Maya sites has not been organized in a manner to easily test these propositions. Nevertheless, there are some locations where data exist that reinforce my arguments. I argue that residential communities at Blue Creek were tethered to the ruling lineages of the core area through complexities of

political economy and interaction among leaders (Guderjan 2007). If this is true, then they should also exhibit archaeological signatures of this sort of interaction. Despite the general lack of relevant data, several sites do in fact demonstrate these similar patterns. For example, outlying central places that are probably surrounded by unrecorded residential components are architecturally linked to the core area. At the Belize Valley site of Baking Pot, causeways extend approximately a kilometer east and west of the core area then terminate at ritual buildings (Audet and Awe 2004). Similarly, at other sites in the Belize valley such as Cahal Pech, causeways sometimes, but not always, connect such termini groups to the site core (Cheetham 2004). It is not clear whether these ritual buildings are central places for residential components as seen at Blue Creek, but they probably are.

Further, similar patterns exist at sites north of Blue Creek. The core area of the large Classic site of Dzibanche in southern Quintana Roo, Mexico is situated on an erosional remnant “island” surrounded by a very large bajo and its high quality soils (Nalda 2005). A causeway leads north from Dzibanche approximately 2 kilometers to a small site, Kinich Na, which consists of a single very large temple complex surrounded by a group of relatively small elite residences. It is clear that Kinich Na was the home of an important lineage that was part of the Dzibanche polity. Kinich Na probably functioned to consolidate Dzibanche’s authority over the northern sector of the bajo. A related pattern is seen at the Becan-Xpuhuil-Chicanna complex, another Classic period site in southern Quintana Roo, less than 100 kilometers north of Blue Creek. The core area of Becan is surrounded by a large moat with five crossings. Only a kilometer to the south is Chicanna, a small center with elite residential compounds and its own temples and ritual space, none of which is as large as those of Becan. Even more clearly connected to Becan is Xpuhuil, approximately 4 kilometers east. Xpuhuil also has compounds of elite residences and on its west side, a three-towered pyramid. Two towers face east, the direction of the Xpuhuil elite residences, defining the ritual space for Xpuhuil. However, the third tower faces west and has an

ornate façade designed to mark the large terminus of the causeway from Becan. While incorporated into larger polities, Kinich Na, Chicanna, and Xpuhuil all have the political authority and economic bases to build large complex, masonry residences and large public, monumental architecture. These, like the causeway termini buildings at Baking Pot, represent central places for components of larger polities and the homes for the lineages that control them. Further, the ruling lineages of the core area are connected to the people of the outlying residential components through social and political ties to the local elite lineages.

Similar relationships appear to have existed in the Puuc region as well. A recent report on the site of Xuch in Campeche focuses on the series of outlying nodes of public architecture located 1-4 kilometers from the central precinct (Isendahl 2006). Similarly, the small site of Cehtzuc is located 4 kilometers from the major center of Uxmal (Sprajc 1990) and appears to have functioned as another home of a multigenerational lineage that was integrated into the large Uxmal community. At Blue Creek, the same structural and functional inter-relationships are seen. With the exception of U Xulil Beh, each residential component has its own central place and often also includes a complex residence of a lineage that was more prestigious than all others (Guderjan 2007; Guderjan, Baker and Lichtenstein 2003; Lichtenstein 2000). In the cases of Kín Tan, Nukuch Mul, Rosita, Chan Cahal, and Sayap Ha, lineages in each component, or community, formed relationships through political economies with the ruling lineages of the core area. In the case of U Xulil Beh, it appears that the community was settled late in Blue Creek’s history, possibly to exploit additional agricultural resources. Further, it appears that the community even developed internal stratification or a central place or a lineage that regularly articulated with the lineages of the core area.

The Dynamics of Landscape and the Alacranes Bajo

The Alacranes Bajo was formed between two of the uplifted limestone shelves that molded the natural landscape of the eastern side

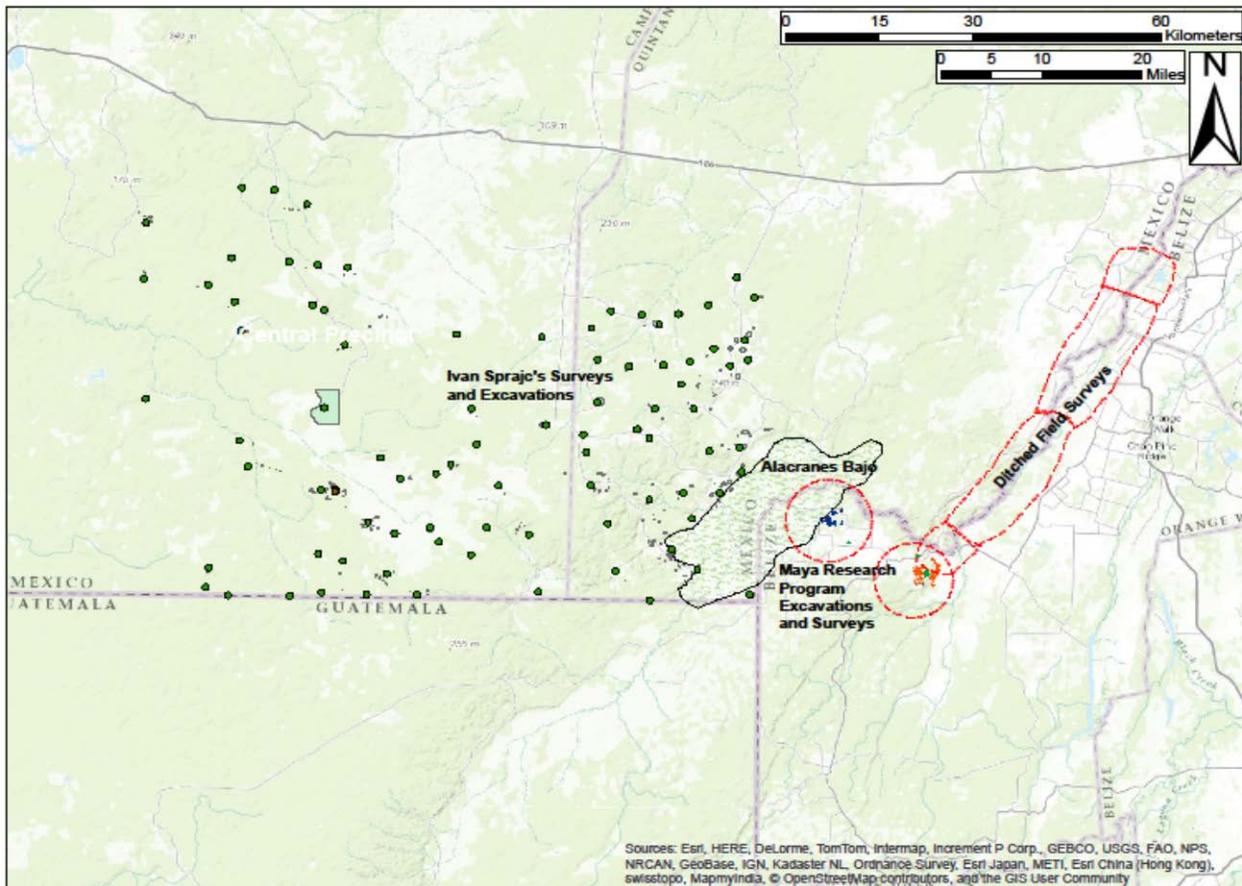


Figure 1. Map of Alacranes Bajo and selected sites (by Samantha Krause).

of the Yucatan Peninsula and can be especially well seen as separating the Belize Coastal Plain from the La Lucha Uplands. The bajo covers between 500-600 square kilometers and runs generally southwest to northeast (Figure 1). The east side is elevated about 100 meters above the bajo and much of that area, the large portion located in Campeche, Mexico, has been surveyed by Ivan Sprajc (2008). On the southwest end of the bajo, the Rio Azul empties into the bajo, where a large alluvial fan disperses water, creating a tremendous agricultural resource for the nearby Maya city of Rio Azul which is located above the river near its mouth (Adams 1999). Contrary to most maps and popular opinion (i.e., Adams 1999: 113), the Rio Azul does not flow through the Alacranes Bajo into the Rio Hondo. Instead, the headwaters of the Rio Hondo are only approximately 4 kilometers from its confluence with the Rio Bravo near La Union, Mexico. The northeastern

section of the bajo is in Quintana Roo, Mexico, and unlike the Campeche case, this has not been adequately surveyed.

The middle-eastern section of the bajo is in northwestern Belize where we have located three important sites on the edge of the bajo: Grey Fox, Nojol Nah and Tulix Mul. A fourth site and the largest, Xnoha, is located nearby. Several sites are also known to exist south of these, but they have not yet been visited. The bajo is low and flat with poorly drained soils in which there were likely yet-to-be discovered agricultural systems such as ditched fields and bajo edge terracing. The edge of the bajo is also marked by large scale deposits of cherts ranging upwards to boulder-sized rocks. These are readily accessible and numerous Maya household stone workshops have been identified and excavated (Barrett 2004).

Fieldwork on the eastern side of the Alacranes Bajo

Nojol Nah

Nojol Nah is a small center consisting of elite residential groups and two small plazas with pyramidal shrines (Figure 2). Excavations at Nojol Nah were first led by Jason Barrett, then Bill Brown (Barrett and Brown 2008; Barrett, Dickson and Brown 2009; Brown, Quiroz and Plumer 2014). We are currently in the process of compiling these data for a monograph and I will not discuss them in detail here. There are, however, two important points to be made about Nojol Nah.

During our first exploratory visits, the two plazas appeared to have an unfinished feel about them and this was borne out by excavation data. The main buildings on both plazas were constructed in the Early Classic period. Importantly, a large deposit of Early Classic ceramics on the north side of Str. 3F marked its termination. Additionally all of the elite residences we have excavated were built and abandoned in the Early Classic. The most notable of these was Group 4C. Prior to construction of the masonry building (Str. 4C11), a chultun was ritually filled with Tzakol ceramics and numerous elite goods. Strikingly, the materials from the chultun were not of the usual domestic nature. They included elite polychromes and Teotihuacan (or Tikal's Manik phase) ceramics, a mace scepter head ceramics, smashed, complete bowls, bone needles and shell ornaments, spindle whorls, obsidian blades, chert bifaces, and a ceramic roller seal (Brown, Quiroz and Plumer 2014). The building was constructed on top of the chultun and ceramics from the end of the building's occupation are fundamentally not separable from those in the chultun. However, the residence was used long enough for the burial of 12 individuals under the floor.

Second, while burials, particularly of male lineage founders, beneath floors of residential buildings is common, there were typically 5-10 under each of the residences excavated at Nojol Nah for a total population of 73. As Brown reports, these people were very healthy and have favorable diets (Brown, Plumer and Vance 2013), I suspect, from being so closely

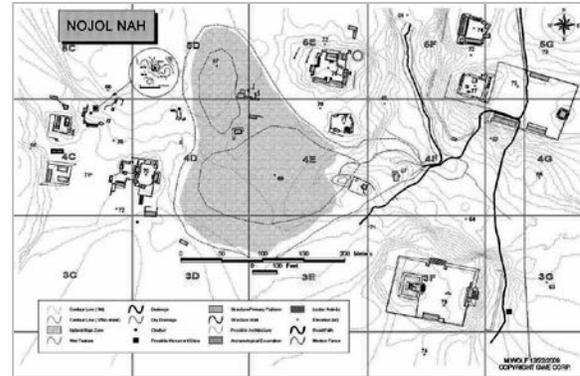


Figure 2. Nojol Nah Site Map (by Marc Wolf).

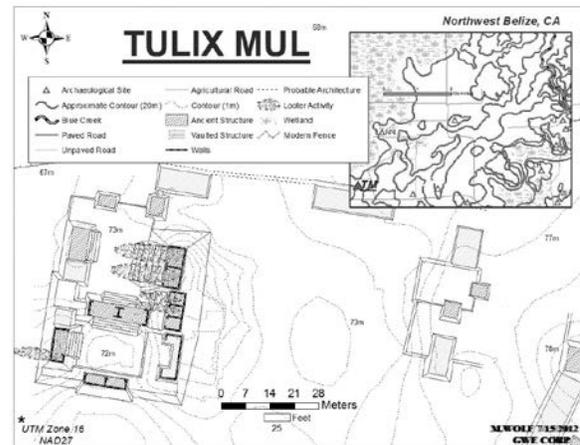


Figure 3. Tulix Muul site map (by Marc Wolf).

associated with the food production resources of the Alacranes Bajo. Additionally, a sample of the females were subjected to strontium isotope tests and it appears they all experienced childhood in the area of Nojol Nah and did not in migrant from distant locations (das Neves 2011).

Tulix Muul

Tulix Muul is a small shrine group located a kilometer south of Nojol Nah also on the edge of the Alacranes Bajo (Figure 3). Our investigations of Tulix Muul began as part of a data gathering effort precipitated by the discovery that several thousand acres of forest had been recently cleared when we arrived in the summer of 2010. In 2012, investigations of Tulix Muul were begun by Gail Hammond and she found a very similar pattern as that of Nojol Nah.

Tulix Muul consists of a small plazuela with three multi-storied buildings and two

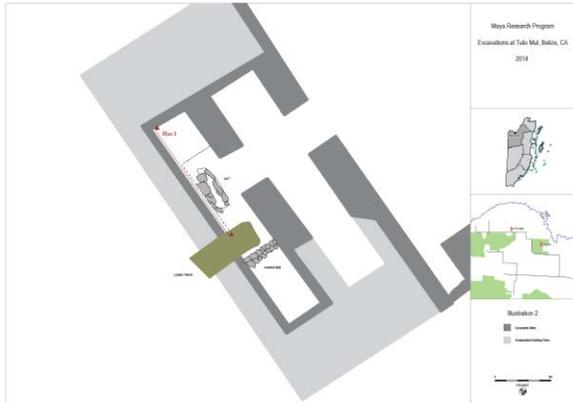


Figure 4. Tulix Muul, Structure 2 Planview (by Pieta Greaves).



Figure 5. Photo of Structure 2 (by Thomas Guderjan).

groups of adjacent residential rooms. The residential rooms were built and apparently abandoned in the Early Classic (Hammond, Vance and Williford 2014). During the 2012 field season, an exploratory trench was begun into the southern building on the plazuela. Immediately we realized the trench had been located to go through the doorway of an infilled room. At the base of the back wall, we discovered fragments of painted plaster. Not being prepared to handle the conservation effort of a mural at the time, we ceased the excavation at that time. Returning in 2013, we found no mural at that location but we continued clearing into the next room, where we did find a painted plastered wall (Figures 4, 5). In 2014, with support from the Archaeological Institute of America, we attempted to remove the unpainted over-plaster from the painted wall. This proved to be unsuccessful but we were able to conserve the plaster and seal the room for a future effort (Graeves 2015).

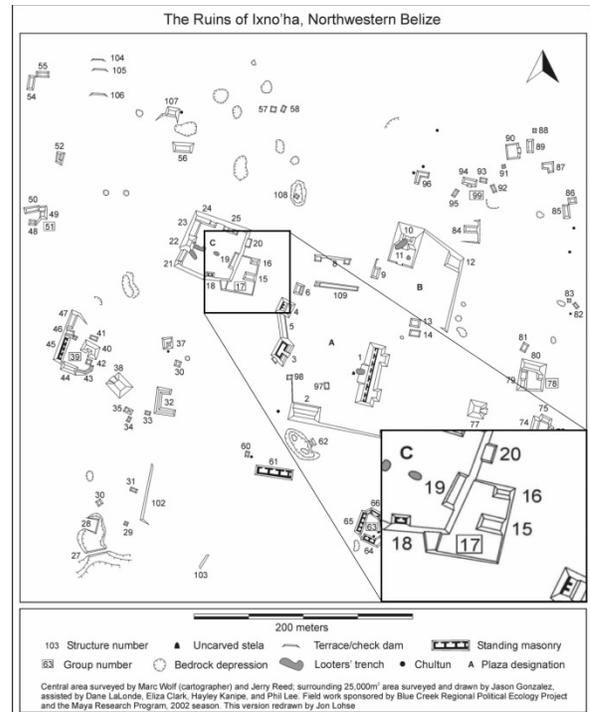


Figure 6. Xnoha Site Map (by Marc Wolf).

Xnoha

Xnoha (Figure 6) was first recorded in 1990 (Guderjan 1991) and mapping and test excavations were undertaken in 2000-2003 under Jon Lohse's direction, culminating with Jason Gonzalez's doctoral dissertation comparing Xnoha with La Milpa (2013). In 2012, Tim Preston, leading one of our teams, began investigations of Structure 1, a long range building on the east side of the main plaza (Preston and Guderjan 2013). In 2013 we expanded to investigate two buildings, Structures 15 and 16, we thought may have been a ballcourt but was later demonstrated not to be and in 2014, we deployed our entire team at Xnoha for the first of several planned field seasons.

Marc Wolf has reminded me that it was likely my passing comment that raised the possibility that Strs. 15 and 16 were a ballcourt. These buildings are at the base of the acropolis group on the west side of the main plaza, opposite Structure 1 (Figure 6). Despite several attempts, we were unable to obtain data from the 200-2003 excavations and did not know excavations had been undertaken at the buildings. So, at the end of the 2012 season



Figure 7. Photo of Structure 15, Xnoha (by Kent Mead).

when some time became available, Preston began a trench between the two buildings to ascertain their form and to confirm the ballcourt function. Within hours, it became obvious that a previous excavation has been undertaken there and shortly afterwards, an unexcavated cache was discovered. Review of the 2002 excavation report (LaLonde 2003) proved unhelpful. Consequently we decided a full excavation of Structure 15 would be needed to understand the nature of the buildings. As our 2013 season was underway, a volume was published incorporating the 2000-2003 excavation data and we found the buildings had been determined to be a ballcourt, apparently based upon the LaLonde report and the Gonzalez dissertation (Lohse 2013). Further, the volume incorporated an extensive comparison with the Xnoha ballcourt and other courts in the region (Lohse, Sagabiel and Baron 2013). By the time these documents reached us, we had already come to the clear conclusion that the two buildings were not a ballcourt.

Instead, we now recognize Strs. 15 and 16 as a residential complex located at the base of

the western acropolis (Mead 2015). While the location in the plaza is unexpected, it is clear that the buildings were built in the Late Preclassic and Early Classic periods with a total of 8 interments in Str. 15 and Terminal Classic domestic refuse on and near them (Figure 7).

Now understood to be lacking a ballcourt, we also undertook non-penetrating excavations at Str. 3, a monumental building on the plaza, near Strs. 15 and 16. Str. 3 had a similar Late Preclassic and Early Classic construction sequence with Late and Terminal Classic surfaces deposits. Interestingly, one of the Late Preclassic caches contained large quantities of sponge spicules in the pattern seen at Blue Creek (Bozarth and Guderjan 2006, Parmington 2015). In addition, at an elite residence east of the plaza, had a similar construction and Classic period sequence but was constructed on top of a hilltop with deeply stratified middle and Late Preclassic caches (Parmington 2015). Finally at least one non-elite residential complex was added in the Late Classic period (Plumer 2015).

Summary- A Tale of Three Cities, the RRBA Cliff Notes version

We continue to focus our broad efforts in northwestern Belize along the lines of several research domains (Guderjan 2008). One of these, the organization of Maya cities integrated into a general view of landscape archaeology was discussed. We are now able to present a speculative outline of the temporal dynamics of these dynamics of the eastern side of the Alacranes Bajo.

The earliest dates yet found are the Middle Preclassic deposits from Xnoha. Further, above these caches are massive Late Preclassic caches indicating a residential continuity. By the latter part of the Late Preclassic and into the Early Classic period, Xnoha saw significant growth including the construction of a large plaza (but no ballcourt). Also during the Early Classic, residential and monumental construction occurred at both Nojol Nah and Tulix Muul, including at least one building at Tulix Muul having a formal *audencia* decorated with a polychrome mural. However, both sites were likely abandoned in about two hundred years. In the café of the abandonment of Tulix Muul and Nojol Nah, Xnoha continued to grow and thrive, very likely seizing control of the eastern side of the Bajo Alacranes in areas once controlled by the former neighbors.

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36 ***THE CERAMICS FROM A TERMINAL PRECLASSIC CHULTUN STYLE BURIAL AT THE SITE OF BLUE CREEK, BELIZE***

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In 1998 a Maya Lowland style chultun burial (T5) dating to the Terminal Preclassic (AD 100/150- 200) was uncovered on a karstic erosional remnant in the flood plain of the Rio Bravo, visible from the site core of Blue Creek in northern Belize. The contents of the burial included at least three partial skeletons, and the mortuary assemblage included twenty-eight whole vessels. The immediate threat of looting required a rapid salvage excavation and very preliminary examination of the ceramics. In last year's publication of the Research Reports in Belizean Archaeology, Volume 11, Papers of the 2013 Belize Archaeology Symposium, published by the Institute of Archaeology, Guderjan et al. 2014 (347-59) describe the pottery based on those preliminary identifications made more than a decade ago. Since that time the vessels from T5 have been extensively reevaluated and in this paper we report the corrected typological designations of the pots, and provide illustrations of all vessels.

Introduction

As reported in last year's Research Reports in Belizean Archaeology, Volume 11, by Guderjan et al. (2014:347-59), in December of 1998 in the aftermath of Hurricane Mitch, a bulldozer operator mining marl for road repairs inadvertently opened the top of the main chamber of an intact chultun burial (T5) dating to the Linda Vista Ceramic Complex (AD 100/150-250), of the Terminal Late Preclassic at Blue Creek (Table 1). The burial site is located in the settlement zone of Blue Creek approximately 4.25 kilometers northeast of the site core, and is situated on a karstic erosional remnant in the flood plain of the Rio Bravo that would have been visible from Blue Creek (Guderjan et al. 2014: 348). Known to the locals in the area as "Dead Man's Hill," this area has been the scene of intermittent quarrying activity for the last two to three decades, as well as a site for both historic and more modern construction, by the local Mennonite community.

The initial surveys of the hilltop by the Maya Research Program revealed a historic occupation in the form of a concrete foundation as well as extensive areas that had been stripped to bedrock by bulldozer action. Upon closer inspection it was noted that this historic foundation had been cut directly into badly damaged ancient masonry architecture (Guderjan 2000). Ceramics from these poorly preserved architectural floors date to the Early Classic Rio Hondo Complex. In 1996 a midden that had been found sealed below the Early Classic floors was uncovered (Haines and Suther 1997) dating it to the Late Preclassic Tres

Leguas Complex, and with a typical assemblage of Late Preclassic ceramic types. While there had been rumors of burial chambers on this hill, reported to the Maya Research Program archaeologists in preceding years, it was the accidental discovery of chultun burial T5 that led to further work at this location. Initial recovery, description and excavation of the grave goods were of necessity done in haste in order to secure the material before it was further looted; hence, some valuable data were no doubt lost. Subsequent excavations were carried out to map and determine the extent of the chultun chamber and shaft, and to recover any grave goods missed in the initial recovery, as reported in greater detail by Guderjan et al. (2014).

However, in that same publication (Guderjan et al. 2014: 352-53) the authors incorrectly identify the twenty-eight whole vessels uncovered within the chultun burial, based on rudimentary preliminary examinations done in the Institute of Archaeology vault in Belmopan by the senior author of this paper in the year 2000. Since that time, the authors of this paper have reexamined the vessels and reclassified them using standard type: variety mode designations (Gifford 1976). Guderjan et al. (2014) published the incorrect types, based on the preliminary analyses, therefore we take this opportunity to provide the corrected ceramic types and contextual information, along with illustrations. These illustrations were done by Candida Lonsdale (not by Jo Mincher as acknowledged incorrectly by Guderjan et al. 2014: 357), and the ceramic research was graciously funded by a grant to the senior author

(Kosakowsky & Lohse 2003) by the Ahau Foundation, through the auspices of the late Peter D. Harrison.

Description of Chultun Burial T5

The contents of T5 were placed within the chamber of a chultun of classic southern Maya Lowland style with an entrance shaft and chamber with a slight sill at the edge, and a large main chamber below (see Figure 2 in Guderjan et al. 2014: 349), that is roughly circular in plan, and approximately 2m in diameter and 1.6m in height. Four large limestone slabs, mortared together at the edge of the entrance chamber sealed the opening of the main chamber. Access in antiquity was gained through an entrance shaft and chamber located on the east side of the main chamber. Presumably at one time the shaft entrance was also sealed, as there was little soil in the fill of the shaft, although no capstone was located (Pastraña et al. 1998).

Materials recovered from the main chamber of the chultun burial include at least three partial individuals (or possibly four), twenty-eight whole ceramic vessels, and 104 pieces of jade, obsidian, hematite, and cloth fragments, as well as a wide assortment of both faunal and floral remains (see Guderjan et al 2014 for a description of the non-ceramic mortuary offerings). The primary interment, Burial 34, is that of an adult male placed in an extended supine position with his head to the east and with arms outstretched and legs crossed at the ankles, right over left (Glassman 2001). As reported by Guderjan et al. (2014: 350-1), this individual was wearing a necklace of 28 jade beads, with an additional 27 beads found scattered around the neck area, as well as a bracelet of 12 jade beads on the right wrist. The skeleton was covered with a sprinkling of powdered hematite, an obsidian blade was underneath the pelvis, and the entire skeleton was lying on a bed of what appeared to be fish bones. However, not reported by Guderjan et al (2014) is the correct placement (Pastraña et al. 1998) or correct types of the ceramic vessels in the chultun burial.

According to original field notes on file with the Maya Research Program (Pastraña et al. 1998), a large bowl (See Figure 1: BC5703) may have been inverted originally over the cranial

area of Burial 34, the main individual (the cranium was missing), and surrounding this individual, at the ends of each arm, and at the feet, were three groups of grave offerings, comprised of nine vessels in each group. To the northeast of the head, at the end of the right arm was a collection of nine vessels (See Figure 1: BC #'s 5702 & 5704-5711). At the end of the left arm, to the southeast of the head, was a group of nine vessels (See Figure 2: BC #'s 5701, 5712-19). Two of the bowls (BC5713 & BC5717) from this group contained the remains of the partial secondary Burial 36. To the west, at the feet of the primary individual, was a collection of nine vessels (See Figure 3: BC #'s 5720-28) as well as a flexed and possibly bundled partial Burial 35. Vessel BC5723 also contained human remains and two of these vessels (BC5725 & BC5726) were placed lip-to-lip and contained 56 jade beads (48 complete, 8 fragmentary) and one bead of carved shell. The Terminal Preclassic date of this chultun burial corresponds with a period of architectural growth in the Blue Creek site core (Driver and Kosakowsky 2013).

The Ceramics

As mentioned previously, the twenty-eight whole vessels (Table 2) from the chultun burial date to the Terminal Late Preclassic Linda Vista Ceramic Complex (AD 100/150- 250) (Kosakowsky and Lohse 2003). The vessels placed in the burial showed a high degree of use-wear indicating they had been utilized prior to their inclusion as mortuary items and based on Steven Bozarth's (2001) phytolith analyses may have held foodstuff (for complete details see Guderjan et al. 2014: 351).

Fifteen of the vessels from the burial are identified as pertaining to the Cabro Red Group, first established by Robertson (1980:158) from the Tulix Complex at the site of Cerro Maya (Cerros) in Northern Belize and found also at Nohmul (Pring 2000), Lamanai (Powis 2002), Colha (Valdez 1987), and Santa Rita Corozal (Robertson personal observation 2014). The type has also been found at Cuello (Kosakowsky 1987; Kosakowsky & Pring 1998) where it was originally called the Big Pond Variety of Sierra Red. The principal identifying attributes of Cabro Red are a hard, thin monochrome red

double slip with a high luster that cannot be easily scratched, and that normally clinks when tapped on a hard surface. These vessels were fired at a high temperature sufficient to produce vitrification of the fabric in most instances. BC5706 is a Cabro Red short-necked globular jar with post-firing incised decoration in the form of four turtle-like figures around the exterior of the vessel (see Figure 1). BC5714 is a Cabro Red bowl with a medial flange with impressions (see Figure 2). BC5718 is also a short-necked globular jar (see Figure 2). Twelve of the vessels are of the type Tuk Red-on-Red Trickle (BC#'s 5702, 5704, 5707-08, 5710-13, 5720-21, 5724, & 5728) also in the Cabro Red Group, and identified by the presence of secondary red-on-red trickle decoration on both the interior and exterior surfaces of vessels (Robertson 1980:198). The trickle decoration is often quite faint and consists of lines running down from the rim of the vessel that may or may not merge together. Five of these (BC5702, 5707, 5710-11, 5721) are additionally decorated by pre-slip groove incising, also identified on examples of this type at Cerro Maya by Robertson (1980:200). (See Table 2 for vessel forms.)

Two of the vessels are from the more common Sierra Red Group, established as a type at Uaxactun (Smith 1955; Smith and Gifford 1966). The first (BC5725) is a small flaring sided dish with convex base. The second is an example of Puletan Red and Unslipped: Chilculte Variety, a striated short-necked globular jar (see Figure 2: BC5717). Originally described as a type identified by Robertson (1980:40) at Cerro Maya, it is now recognized as a variety of Puletan Red and Unslipped described at the site of Cuello (Kosakowsky 1987; Kosakowsky & Pring 1998; Pring 1977). It is characterized by a Sierra Red slip on the interior of the rim and exteriorly on the neck, thin walls, and an unslipped exterior with brush striations from the neck down. The Sierra Red Group, with all its types and varieties is the most common slipped ceramic group in the Late Preclassic Tres Leguas at Blue Creek, though less common during the Terminal Preclassic Linda Vista Complex (see Table 3) where it appears to be replaced by Rio Bravo Red, a type

described by Sagebiel (2005:247-53) at nearby La Milpa.

Three of the vessels (See Figure 1: BC5709; Figure 2: BC5715 & Figure 3: BC5723) are Matamore Dichrome short-necked globular jars, established as a type by Pring (1977). The principal identifying attributes of Matamore Dichrome are vessel areas slipped in two contrasting colors, with one color always red and the other black, buff or brown. BC5715 appears to have faint trickle lines as secondary decoration.

Three of the vessels are of the Hukup Dull type originally named as a variety of Hole Dull by Robertson (1980: 250), and is characterized by a thin dull red slip and commonly fireclouded. BC5719 (see Figure 2) is a short-necked globular jar, BC5726 (see Figure 3) is a straight sided, flat-bottomed short walled vase, and BC5727 (see Figure 3) is a miniature, restricted orifice globular jar with two loop handles. Hukup Dull can be mistaken for eroded examples of Cabro Red where preservation is not good.

The last five vessels in the burial include one example of a Sacluc Black-on-Orange flaring sided tetrapod bowl (see Figure 1: BC5701) and one example of a Caramba Red-on-Red-orange spouted jar with nubbin feet (see Figure 1: BC5705). Caramba Red-on-Red-orange and Sacluc Black-on-Orange were established as types by Adams (1971) in the Plancha Phase at Altar de Sacrificios, and are found also at Tikal (Culbert 1993; Laporte 1995), at El Mirador (Forsyth 1989), at Cerro Maya (Robertson 1980), and at Nohmul in the Anderson & Cook Collection (Pring 2000). Both types consist of multiple parallel lines created by the more common "wipe-off" technique in which a slip was applied and then partially wiped off in some areas to produce lighter stripes in the case of Caramba. The second technique is one of positive painting with a second coat of the original slip or one of a different color as in the Sacluc type. A third vessel (See Figure 2: BC5716) is a Cayetano Trichrome tetrapod bowl, a type described by Culbert (1993) at Tikal and found at Cerro Maya as well (Robertson 1980), in which a pattern of decoration similar to Caramba Red-on-Red-orange is then decorated with a thin black slip on

sections of the vessel which are wiped off creating multiple parallel lines. The fourth vessel (see Figure 1: BC5703), found inverted over the cranial area of Burial 34, is a Yaxnik through-the-slip Incised medial flanged bowl, which was identified as a type by Robertson (1980:129) at Cerro Maya. It is a composite type with a darker orange or red-orange slip over a lighter orange slip on the interior and a red over orange slip on the exterior. There is a band of specular hematite, “purple paint,” applied exteriorly on the medial scalloped ridge and above to the rim. Vertical lines are incised through the slip on the upper wall on the interior, while the interior base is incised with undulating multiple fine lines. The fifth vessel (see Figure 3: BC5722) is a Correlo Incised Dichrome medial flanged bowl, established as a type at Uaxactun (Smith and Gifford 1966) in the Sierra Group, though we include its description with this final set of vessels as it consists of a similar wipe-off technique to Caramba Red-on-Red-orange, created by parallel incising through the red slip removing alternate bands of red and revealing the underlying buff color. These five vessels all employ similar decorative techniques. While the decoration mimics the Usulután style (Demarest 1986; Forsyth 1989) these examples represent different production techniques from true Usulután (Pring 2000), and require greater definition (Robertson in prep.)

Concluding Remarks

The ceramic types represented in this burial appear to be of restricted use at Blue Creek, as they are not found in any great frequency from other excavated contexts in the Blue Creek site core, as analyzed by the senior author (see Table 3). The ceramics from this burial are most similar in form and decoration to the Tulix Complex from Cerro Maya (Robertson 1980; 1983; in prep.), and the Anderson & Cook collection from Nohmul (Pring 2000; Kosakowsky 2005), and some examples from Lamanai (Powis 2002) and Colha (Valdez 1987) in nearby northern Belize. In southern Belize there is also a chultun burial at Caracol with a Sacluc Black-on-Orange vessel (Chase and Chase 1995:95-7). There are examples of some of these types present at Guatemalan sites such as Tikal (Culbert 1993), at Altar de Sacrificios

(Adams 1971), at Seibal (Sabloff 1975), at El Mirador (Forsyth 1989), and in the central karstic uplands at Naachtun (Walker 2013) and Yaxnohcah (Walker in press). These types also appear at sites in southeastern Quintana Roo, such as Ichkabal and elsewhere in the Dzibanche region (Walker personal observation 2013), and additionally at the site of Becan in Campeche, Mexico (Ball 1977).

Terminal Preclassic ceramics such as these from the chultun burial T5 at Blue Creek remain somewhat problematical due to their uneven geographical distribution and equally uneven identification and reporting (Kosakowsky 2005; Robertson in prep.). As early as Smith’s (1955:22) work at the site of Uaxactun, he noted a transition from the waxy slips of the Late Preclassic to the glossier slips of the Early Classic, as evidenced in many of these Blue Creek examples. Graham (1986: 45-6) has described the ceramic technology of the Terminal Preclassic as a period in which “temperature control in firing, kiln construction, drafting controls, source clay choice, and slip formulae were changing much more rapidly than had been true in the Late Preclassic” and as Pring (2000: 39) has pointed out, “it is this very diversity and ceramic experimentation that make the pottery so hard to categorize and define.” While the T5 vessels from Blue Creek are not unique, they highlight the need for more exacting descriptions of ceramics from the Terminal Preclassic throughout the Maya Lowlands.

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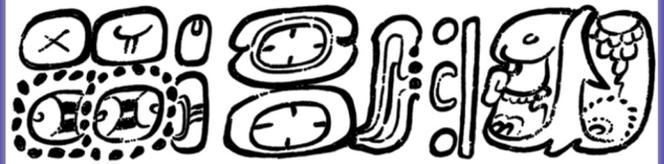
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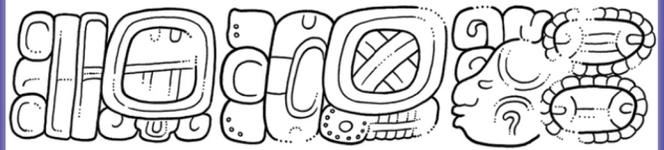
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