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Tracing the Ritual 'Event' at the Classic Maya City of Palenque, Mexico

By

Lisa M. Johnson

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Anthropology

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Rosemary A. Joyce, Chair

Professor Lisa Maher

Professor Lisa Trever

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Abstract

Tracing the Ritual ‘Event’ at the Classic Maya City of Palenque, Mexico

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Professor Rosemary A. Joyce, Chair

In this dissertation, I consider a theoretically driven methodological approach to the study of ritual in archaeology. Inspired by a renewed materialist perspective, the project employs a comprehensive series of methodologies in a study of ancient Maya ritual. Through excavations of two funerary shrines of an elite residence in the city of Palenque, it considers each discrete context not as a “ritual deposit” but as an ‘event.’ Each ‘event’ was comprehensively sampled in order to recover the residues and traces of past actions, and of the various materials brought together in a moment of heightened relationality. The inclusion of multiple macroscale and microscale archaeological methods together not only identifies residues of materials previously undetected, but also employs a microhistorical approach. Micromorphology of ‘events’ shrinks the time frame of analyses and presents archaeological stratigraphy as lived, generational, time. Paleoethnobotanical, zooarchaeological and micromorphological analyses combined with a single context excavation strategy resulted in the recovery and identification of periodic ritual events carried out in honor of the dead.

The ancient residence under consideration, known as “Group IV,” was materially rich and politically well connected. The leading members of the house were recorded in texts in the residential group as well as in the main palace, thus providing additional lines of evidence to pull from in order to explore the ritual life of the generations of Maya that lived, died, and were buried in what is suspected to be a founding residence. This work not only provides a general framework for archaeological approaches to the study of ritual in the past, but also provides important information for Maya studies in particular. Few studies in the Maya area have been fortunate enough to have a residence with the names of its occupants, as well as accompanying well-dated, fine-grained stratigraphic resolution that coincides with occupation of the residence within the span of a human lifetime.

To the women that have taught me strength and persistence when faced with life's challenges:
my grandmother, Hazel D. Farr (1922 – 2013) and my mother, Mary L. Harding

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Chapter 1: Introduction

In this dissertation, I present the archaeological analyses of a Classic Period (250 – 900 AD) elite residence of the Maya city of Palenque in modern day Chiapas, called by archaeologists, Group IV. In particular, my excavations were concentrated in two small structures hypothesized to be funerary structures for the residence. These areas were targeted for excavation in order to investigate the materialization of the ritual ‘event.’ This work pays particular attention to discrete archaeological contexts not as “ritual deposits” to be read for symbolic meaning, or analyzed for the source and pattern of materials, but as the material traces of a moment; a moment that brought together Maya peoples, in a sacred space with their dead, with food, incense, and other offerings. Their actions, including trampling, constructing, burning along with those materials produced distinct material signatures, that when reconstructed, illuminate a sensorially rich and powerful moment in history. The questions driving this research are questions that have proliferated anthropological research since the inception of the field, but the approach and understanding of those questions have changed. Primarily, those questions concern the nature of human actions and what constitutes ritual. What do we mean when we say ritual? And how is that different from other kinds of human actions? Archaeologists seem to know it when they see it, as it stands apart as unusual or special; not of the everyday. These cases can vary from culture to culture. For the ancient Maya, ritual often appears to be easily identifiable through distinct architecture and ceremonial objects (Ashmore 1991; Becker et al. 1992; Joyce 1992; Lomitola 2012). But when encountered with contexts and materials outside of these more typical “ritual deposits,” the determination is less clear. Revisiting earlier theories of ritual becomes necessary if we are to understand the variability in the materiality of ritual.

Chapter two discusses the theoretical context in which this study emerged. It follows an abbreviated review of theoretical approaches to the topic of ritual and how those have developed and expanded over the years. In particular, this chapter discusses a growing interest in a ‘new materialism’ and its relevancy for ritual studies. Archaeologists have always recognized the performative and material qualities of ritual but have often looked behind it for the immaterial, symbolic and abstract features of religion. This study, inspired by the revitalization of materialist discourse, seeks to contribute to those discussions by focusing on ritual in particular.

Manuel De Landa (2000, 2006) has provided a clear and realist approach to investigating just *how* matter assembles, and how assemblies of matter can be temporarily bounded, enabling contemplation. Karen Barad (2007), similarly discussing the coming together of matter, expands this idea to specifically consider “intra-action.” Further, she explores material discursive practices as a way to consider meaning outside of a strictly linguistic approach. This is directly related to De Landa’s discussion of the expressive qualities of assemblages. In addition, Howe’s (1991) consideration of the senses is a reminder to consider the sensorial experience of humans and nonhuman matter coming together. Much of ritual activates the senses and thereby fixes the ‘event’ into social memory. A memory is recalled when confronted with those materials again.

Traditional theoretical approaches to ritual often privileged belief, symbolism and meaning while downplaying the material practice of ritual (for a review, see Fogelin 2007; Joyce 2015b). Ritual

is not only material but is meaningful. It is through Barad's concept of "intra-action," that meaning is understood to emerge as material discourse. As De Landa (2012, 39) has argued, "any materialist philosophy must take at its point of departure the existence of a material world that is independent of our minds." That is not to say that cognition, experience, sensation, memory, that these things are not also real and worthy of consideration. But it is also worth noting that these things are grounded in the material world in which we live.

A materialist perspective as considered here is interested in an ecology of materials and the very real and physical qualities of materials, as well as the history of possibilities afforded by them (Ingold 2012). These perspectives are particularly exciting for ritual studies as ritual rarely centers on the human alone. Rather, ritual is a markedly distinct way of engaging with the world that constitutes and reconstitutes the place of the human in the world. A consideration of human and nonhuman organisms and materials through a relational approach brings us closer to a non-western, Maya perception of the world, as evident through ethnographies, colonial era documents and ancient text and images. To engage in a post-humanist dialogue is not to disregard human action and intentionality (Barad 2003). It is to acknowledge the human as one component in a larger grouping of materials. The project then becomes investigating the various ways humans *intra-act*. It shifts our objective as archaeologists from the "study of humans in the past" to the study of *being* human in relation to both other humans and non-humans in the past.

This dissertation pays particular attention to the ritualization of materials within a growing theoretical movement characterized by a post-humanist position, a sensitivity to the power of matter and a consideration of the historical processes behind the emergent nature of things. Ritual is deeply entrenched in the material, or 'matter' (including plants and animals), where meaning can be shaped and reshaped, and is developed and maintained and negotiated through practice. This understanding of ritual is easily well-suited to a 're-newed' materialist study of ritualized events. *Ritualization*, as a concept, has been increasingly used over 'ritual' as it describes action, a *doing*, rather than a noun, seemingly stable and unchanging (Bell 1992; Bradley 2003; Brown 2004; Hendon 2010; Joyce 2011a). Much like the 'new materialism' the emphasis is on the action.

Ritualization allows for the consideration of events that are not always religious in nature, or highly formal, but are still a stylized way of acting that sets them apart from the ongoing tempo of daily life. As an outcome of these actions, we can expect to find distinct material traces. While the materials engaged in ritualized events may, in other circumstances, be utilized in more day-to-day activities (for example, axe heads, pottery, or food), when they participate in a ritualized assemblage alongside humans, and in marked spaces, they *become* ritualized.

Within this theoretical orientation, chapter three outlines a methodological approach to ritual in archaeology. Understanding material relations this way can change the ways we conduct archaeological research, including a concern for the very traces of assemblages in the past, right down to the microscopic level. Approaching an "archaeological deposit" as an "assemblage" will not privilege the durable and visible. Rather, the material traces, including chemical signatures, layering of sediments, plant and animal remains, in addition to objects traditionally identified as archaeological 'artifacts,' are all considered the result of a temporary assembling of

material components, including the humans that may no longer be visible. The incorporation of additional, more fine-grained techniques, such as micromorphology (the study of in-situ blocks of soil in thin-section), soil chemistry, and paleoethnobotanical analysis can detect a layering of material residues from multiple ritualized events, in which additional materials were brought in, like food, pine, or flowers.

Iconography, text and colonial accounts confirm the common use of perishable materials in Maya ritual, yet few investigations explicitly test for it (but see Bozarth and Guderjan 2004; Matheson et al. 2008; Morehart and Butler 2010). In archaeology, the material evidence left by past events is already incomplete, with the exception of burials, the people are gone, yet we would understand those assemblages in which people were a part even better if we could detect the other components that were *brought in* (Ingold 2007). Chapter three considers these points in discussing a comprehensive methodological approach to the study of ritual in the past, while also reviewing previous studies in Maya ritual practice.

Multiple analytical techniques are proposed to recover the diversity of material remains in discrete archaeological contexts. Methods such as micromorphology, in which blocks of soil are impregnated with an epoxy resin and sliced into thin sections to be viewed under a petrographic microscope, have become increasingly common-place in archaeological studies as this kind of analysis reveals the in-situ formation of soils as well as fine layering and spatial relationships of material components that comprises those discrete contexts (Nicosia and Stoops 2017). By analyzing both the geological matrix and the anthropogenic alterations of that matrix, past intra-actions and the material signatures that emerge through the coming together of humans and non-human components and landscape are identifiable. In this work, both theory and methodology are grounded in a concern with relationality. Interpretation in micromorphology is derived from the recorded and measured spatial relationships and orientation of material components.

Traditional studies of ancient Maya ritual rely heavily on the rich artistic tradition of stonework, mural and pottery painting to understand the possible perishable goods incorporated in ritual. Plants, including foods, hallucinogens, and ornamental species, orchids and other flowers are commonly depicted in ceremonial scenes (Carod-Artal 2015; Taube 2004; Zidar and Elisens 2009). In the last few decades, paleoethnobotanical studies have provided direct evidence of ancient plant use in the Maya region (Ford and Nigh 2016; Lentz 1999; Trabanino 2012). Together, the archaeologically recovered botanical remains and the select depictions of plants in ancient artworks can provide a more complete understanding of plant use in ritual events. In the few studies that have explicitly tested suspected ritual contexts for plant remains, foods and plants that are depicted in art are recovered, most often, maize (Bozarth and Guderjan 2004; Morehart et al. 2012) and cacao (McNeil 2006) but also plants that are not typically depicted such as cattails, palms, flowers, squash, beans (Bozarth and Guderjan 2004; McNeil 2006).

In addition to these microscopic methods, chapter three also considers the macro artifacts that are more typical of Maya ritual studies. Pottery, figurines, obsidian, jade, shell, and faunal remains are common artifact types found in Maya ritual contexts. These materials were also found in the Group IV excavations and were subject to typical typological and technological analyses.

Chapter two and three provide a framework for ritual studies, a way to think about ritual and a means to recover the material evidence of ritual. This approach is considered through a case-study in the Maya region. Chapter four provides a brief historical overview of the city of Palenque. Palenque, occupied during what archaeologists call the Classic Period (250 – 900 A.D.), was the center of a polity headed by a dynasty that left a written record that is one source of evidence drawn on in this chapter. Classic Maya city-states that extended from Mexico to Honduras employed the same writing system, were linked by ties of marriage and warfare, and created markets for imported materials consumed by the nobility and ruling families (Figure 1). The bulk of the population in any polity were farmers for whom places like Palenque may have been sites of ritual and market exchange, and possibly of demands for tribute. Among the network of Maya centers, Palenque was not particularly large, but was densely populated and had a long history.

For over a century, explorers, art historians, epigraphers and archaeologists have worked at Palenque (see Stuart and Stuart 2008). Those investigations were most often concentrated in the palace and large temples immediately surrounding it. The extensive text and images throughout the central ceremonial core of the city has largely been deciphered, revealing a lengthy political history. This dissertation only briefly mentions the political history and the lives of Palenque's kings and queens. Those events and people most certainly impacted the emerging city and its material form, but in following De Landa and other materialist arguments, the city takes shape through material and energy flows. Human labor, rock, water, food, are all considered as energy flows in chapter 4.

The subtitles for the chapter are influenced by Manuel De Landa's materialist approach to the growth of European cities (De Landa 2000). His work has clearly articulated the material processes from which cities emerge, not as a predetermined outcome of a linear history of development, but rather, a series of nonlinear meshworks, a complex set of circumstances both intended and unintended. A city does not suddenly materialize, it is a historical construction. This chapter discusses the history of Palenque's becoming with a particular focus on the ritual events and their repeated practices throughout the city. Rituals carried out in Palenque were a historical practice, leading to patterns in the ways those events emerged. The content and placement of offerings in temple floors, the construction of funerary monuments, sarcophagi and crypts, were a distinct Palenque practice. Some of those patterns can be seen in the households as well, as evidenced by the recovered contexts in Group IV.

The data for this dissertation comes from new archaeological work in a residence of a lower-level noble family, for which some written texts are available and is presented in chapter five. Previous work in this residential compound recovered an unusually high number of burials, a finding that the project reported here confirms. Using the most up to date chronological sequence of pottery, the series of deposits analyzed for this study would be assigned to the period between 450/500 – 800 A.D. As part of this project, chronometric dating was carried out, which along with fine-grained excavation methods, leads to a more nuanced understanding of the history of development here. Chapter five then explores the ritual events carried out in Group IV, an elite residence, within the city. These were events informed by the history of practice

throughout the city yet materializing in distinct ways. The chapter is written in a more narrative fashion rather than as an excavation report (that report exists in the form of the *informes* submitted to the Mexican authorities; Johnson 2016). I tack back and forth from the macro to the micro history, considering all the recovered archaeological data as traces of an event. The individual analyses of materials are brought together as an assemblage rather than listed separately.

The ritual events carried out in this residence were centered around the dead. They include the initial funerary events as well as the repeated commemoration events over multiple lived generations. This chapter reports the results of micromorphological, paleoethnobotanical analyses as well as the contextual analyses of macroartifacts and features.

Finally, the dissertation closes with a brief chapter reiterating the theoretical and methodological approach as advocated throughout the text and considers future directions for such an approach both in ritual studies in general, and Maya ritual studies in particular. The theories of ritual considered here all arise from one agreement, that ritual is a distinct kind of action, that often leaves distinct archaeological remains (Pollard 2001; Swenson 2015). To test that assumption, block soil samples were taken from the vicinity of hypothesized ritual contexts within a funerary shrine as well as outside of those areas in the plaza of the residence for micromorphological analysis. This dissertation found that there were similarities across the samples, a result of the geological parent material and the tropical climate, but there were also distinct differences in the patterns and quantities of anthropogenic materials across contexts. These results support the proposal that ritualized actions *do* produce distinct material traces when compared to other, more day-to-day, non-ritual events, and further, that the inclusion of micromorphology in Maya ritual studies can be a fruitful endeavor. In addition, the flotation of discrete contexts and analyses of the macrobotanical remains carried out for this dissertation were also successful in recovering plant remains included in ritual events at Palenque. Those results reveal a preference for plants that produce distinct smells when burned as well as symbolic plants during ritual events. Microscopic materials such as those recovered by paleoethnobotanical, micromorphological, and chemical residue studies can arguably makeup a large percentage of the archaeological record (Weiner 2010). Ignoring those materials can leave our understanding of past ritual practices incomplete. The results of this study reveal the scope of materials that were included in ritual events in a Palenque house, bolstering the utility of the comprehensive theoretical and methodological approach to ritual studies outlined in this dissertation.



Figure 1: Map of Maya region with locations of some major cities mentioned in text (Johnson 2018).

Chapter 2: Theorizing the Ritualized “Event”

Ritual: All-purpose explanation used where nothing else comes to mind. Bahn 1989

Interest in ritual has gone through waves often paralleling larger discourses in social theory. Over the course of the history of the discipline, archaeology has often treated ritual as the communicative counterpart to religion. Religion, as beliefs held in the mind, directed the symbolic actions carried out in ritual (Renfrew 1994). Recently, representationalism, in which objects, subjects, events, are meant to represent an independent concept, separate from the material, has been increasingly challenged, as the social sciences have taken a “material turn.” Ritual – a topic that has had structuralists and practice theorists playing tug of war over meaning and material, belief and action, is a distinct performance of meaning making.

To study ancient Maya ritual practice, we must first examine what we understand ritual to be. How is it different from any other kind of practice? What is it we see as archaeologists that drives us to attribute some materials and contexts to ritual and not others? Is it a legacy of a functionalist understanding of utilitarian/non-utilitarian or practical/impractical (Walker 2002)? A history of theorizing ritual and religion has created divisions, dichotomizing and categorizing in increasingly problematic ways, and even the relationship between ritual and religion for that matter can be questioned. Often taking for granted ritual as “proxy of other sociopolitical realities” (Swenson 2015, 329), ritual has been approached as the expression of religious beliefs (Renfrew 1994), as arena for the exercise of agency and power (Lucero and Fash 2006), as reflective of identity and personhood (Blackmore 2011). Yet, these theories of ritual are not always appropriate cross-culturally, or even from ritual to ritual within the same culture. At times, rituals may include the supernatural, as has been defined as religion (Wallace 1966), but religion as concept is problematic for many non-Western cultures. Some rituals may perform or enact power relations, but as Swenson argues, “the varied material contexts, meanings, effects, and frequencies of ritually marked practice reveal that it *defies reduction to any one interpretive framework*” (Swenson 2015, 331). With that being said, the question becomes, how do we study ritual as a cross-cultural human experience? It has become clear that placing ritual in opposition to the mundane is problematic, and in the case where rituals are not highly formalized or structured, the two can run together (Bradley 2003; 2005).

Early studies rooted in anthropology, and sociology have stressed a number of defining characteristics, often borrowed by archaeologists to identify ritual. Those include actions that are repetitive, formalized and often symbolic (Drennan 1983). And yet, there are many non-religious, quite mundane acts that feature some of those same characteristics, often prompting the continual upgrade and corrections to a definition of ritual that will work for a given context.

Brück (1999, 316) notes that while archaeologists have put forth a number of methodologically rigorous approaches to the study of ritual in the archaeological record, like Walker’s (2002) “behavioral” approach, or “structured deposition” as proposed by Richards and Thomas (1984) and further explored by Pollard (2001), they still rely on previously established criteria that frequently overlap between ritual and non-ritual behaviors (i.e. repetition, formality). As

Swenson (2015) has explained, these approaches are helpful in identifying distinct actions, as long as cultural and historical context are considered. What does a “stylized way of acting” look like for a given culture, during a given time period? To consider that question, Swenson (2015) argues, one must know what non-stylized action looks like. If ritualization is a “process by which certain parts of life are selected and provided with added emphasis” (Bradley 2005, 34), what do the un-emphasized, everyday actions look like?

For those that study the Maya, it can be easy to identify the residues of ritual as those actions were often carried out in demarcated spaces, such as temples, altars and tombs and included materials reserved for those events, materials depicted in art and described in text. However, when residues do not follow those patterns, when they include materials not typically considered ritually or symbolically significant, or the materials display a variety of treatment (such as burning or fragmentation), they can be challenging under an overly symbolic approach to ritual. At this point, we will have reached our limits of understanding. But this is ritual as *noun*. Ritual as *verb*, allows us to move forward. *Ritualization*, as a quality of action provides an alternative to ritual as noun. Further, those actions are materially and temporally grounded.

This chapter will discuss a theoretical approach to the study of ritualization in the past, an approach that attends to the many features of ritualization, as material, as action, as sensory, as memorable, and as temporal. To do that, ritual is approached through the theoretical concept of the “event” (Connolly 2013; Gilmore and Donoughue 2015; Sahlins 1985; Sewell 2005). The ‘event’, provides a useful way to consider ritualization and materialization as a bounded phenomenon. While the event as employed here shares many features with previous elaborations of the concept, it departs from those earlier perspectives to include a consideration of an active materialism. This study seeks to theorize the ‘event’ that is as much material as it is action, and the ritual event in particular as a distinct material experience, actualized through a heightened relationality between people, non-human plants and animals, the supernatural, and the space in which the event arises (Swenson 2015; Walker 2008).

Beliefs in Action

Anthropologists have always been interested in the origins of religion, although the lack of both written records and archaeological evidence has made the subject speculative (Moro et al. 2008, 1)

Until recently, anthropologists have overwhelmingly taken for granted the inseparableness of religion and ritual. Predicated on a Cartesian dualism between mind and body, religion was to ritual what belief was to action. Anthropologists were in a preferable position as ethnographers, with the opportunity to interview informants directly and ask them what they believe, then witness their rituals. Archaeologists have often found themselves trying to convince fellow anthropologists that it *was* possible to explore the religious life of people long dead. Religious beliefs, while in the mind, and unavailable for archaeological inquiry, drive the ritual actions that leave material traces. This assumption has often led archaeologists to privilege ritual over

religion. Through ritual, religious beliefs can be inferred. A review of archaeological approaches to the topic of ritual and religion describes two, often opposing camps, those that focus on religion as the motivating factor, and, those that focus on ritual as practice often downplaying religion and the symbolic meaning of rituals (Fogelin 2007). Both positions are grounded in an understanding that ritual and religion are related (even if that relationship is often debated) and that belief and action can be independently considered. Among archaeologists that have attempted to analyze religious beliefs as “a system of symbols” through archaeological remains, Renfrew’s (1994) cognitive approach posited that the key to understanding religious beliefs among ancient peoples, was in a comprehensive analysis of iconography as a system of signs. As far as rituals were concerned, they were the “result of actions which we can plausibly interpret as arising *from* religious belief” (Renfrew 1985, 12). While Renfrew and others (Drennan 1983) recognized that some non-religious actions can share qualities with religious rituals, particularly in their repetitive nature, in formality and symbolic overtones, the concern was with *religious* rituals.

“Unfortunately, with much of the archaeology of religions we will never get at its essence no matter how long we boil the pot, because it is in the mind, it defies rationality, and, it will remain elusive” (Insoll 2004, 150). This citation of *rationality*, is revealing and has increasingly frustrated archaeologists. Long have archaeologists relegated any context or set of objects that defy “rational” explanation to the realm of ritual or religion. But as anthropology, and social theorists in general, have come to recognize the existence of multiple ontologies, it has become clear that terms such as rational, practical or even functional can be problematic and should be critically considered. As argued by Brück (1999, 317), this equation of ritual and irrationality stems from a post-enlightenment era rationalism, a western philosophical movement that countered dominant theological views of the nature of the world. Similarly, Walker (2002) critiqued the functionalist assumptions of practical and impractical actions in archaeological discourse.

Further, the structuralism of religious rituals as put forth by those scholars, often presented religion as timeless, unchanging, and deterministic of human behavior. To counter that approach, others put primary emphasis on ritual as *practice*. Through practice, individuals can negotiate, re-invent or re-create traditional beliefs and practices. In this way, the agency of actors in rituals are considered, as well as change in ritual practices over time. The repositioning of ritual studies within a practice-oriented approach stressed the diversity and contextual specificity to ritual practices.

But the shift towards a practice-oriented approach to ritual, has prompted some to lament the “neglect of religion by archaeologists” (Insoll 2004, 2). It seems a number of archaeologists are hesitant to divorce the study of ritual from religion, convinced it is still a productive category (Aldenderfer 2011). Yet there seems to go along with the religion first approach an assumption that it is more difficult to disentangle religion and secular among “simpler societies” or “primitive societies” (Aldenderfer 2011; Drennan 1983). Where did we get this idea that religious belief governs the lives of “simpler” peoples any more than “complex societies”?

One issue with the religion first approach, is an over-emphasis on symbolism. Religion as a “system of symbols” (Renfrew 1994) assumes a set of independent representations, divorced from the material it is meant to represent. But if mind and matter are intertwined, so too is belief and practice. Further, belief is an understanding of the world and the position of self within it. As such, it is difficult, if not impossible, to distinguish “belief” in a ritualized context from “belief” outside of those contexts. An understanding of the nature of the world, or more correctly, an ontology, does not change outside of those special circumstances.

This point resonates in contemporary debates surrounding the place of “religion” in ritual studies. Recently, archaeologists have begun to question the division between religious and non-religious rituals, as these categories are often constructed by the scholar and may not reflect reality. Walker (2008,144) noted:

A focus on religious practice undermines modern notions of religion, ritual, nature and society. History and ethnographic informants, in their own fashion, have been demonstrating this to anthropologists for more than a century. The term “religion” rarely translates well. Counterintuitively, archaeologists interested in the study of religion and ritual should be happy to be rid of both concepts in preference for an expanded understanding of practice that focuses on the material relations between people and nonhuman agents in society.

So, it stands to reason, for a culture such as the Amerindian Maya, where the supernatural are *always* present, it is not the presence of the supernatural that makes a ritualized event distinct, it is the participation of the supernatural. It is the elaborated or stylized way in which humans engage with the supernatural, other non-human plants and animals and things that can be considered *ritualization*.

This is an explicit move away from ritual as a form of communication, such as the traditional concept of ritual as enacted religious beliefs, often conveyed through symbolic meaning. Because, as has been argued by Bell (1992) and Humphrey and Laidlaw (1994), when one asks ritual participants what certain actions *mean*, their answers can vary, suggesting that ritualization involves more than just symbolic meaning alone. Searching for evidence of religious acts, following a strict set of criteria, continually overlooked or did not recognize those contexts that did not fit. Primarily, ritual events that included elements of the everyday, such as domestic ritual contexts. Ritual as a separate sphere of activity has been increasingly debated. Leading, for many to the reconsideration of the concept of “ritualization,” primarily put forth by Catherine Bell (1992).

Ritual as Practice, or *Ritualization*

Reacting to the increasingly apparent problems of strict categorization in studies of ritual – categories and criteria that would need to be continually expanded, as new examples did not neatly fit-- Catherine Bell (1992) proposed an alternative approach. Bell’s approach to ritual is rooted in practice theory, which at this time had become an emerging theoretical approach in

anthropology. A focus on practice would offer a means to overcome the problems of dichotomizing between ritual and the “mundane.” Dichotomies rarely reflect the reality of the lived experience. The practice of ritual, or ritualization, she argued, is a distinct way of acting, “that specifically establishes a privileged contrast, differentiating itself as more important or powerful” (Bell 1992, 90).

In archaeology, Richard Bradley (2003) also argued against distinguishing between those activities deemed practical and those considered ritual as reflected in archaeological deposits, particularly as the material assemblages often encountered do not always conform to solely one or the other given the defined criteria. As Bradley (2003, 6) noted, “Ritual is one of those words which have survived from an older archaeology and continue to haunt the discipline to this day.” One of the reasons ritual, as a word and as a category continues to muddle our understanding of just how particular actions and practices are distinct from others, is the association between ritual and religious beliefs, and further, the assumption that ritual, as a communication of ideas, lies in a completely separate sphere of social life. In archaeology in particular, these assumptions brought expectations as to what kinds of materials are the product of ritual, and what kinds of spaces were reserved for ritual actions (Binford 1972; Drennan 1983; Flannery 1976). And yet, increasingly, archaeologists were presented with contexts deemed “problematic” or difficult to interpret (Clayton et al. 2005; Stanton et al. 2008). Particularly contexts that include “everyday” objects such as pottery used for cooking or food storage, or crafted tools or debitage from crafting deposited in patterned ways that suggest intentional actions that are not related to the pragmatic work these things are understood to be used to carry out. In other cases, materials found in varying states of completeness, intentionally broken or burnt have also presented challenges in an interpretation as evidence of ritual.

In a book-length argument, Bradley (2005) provides numerous examples of problematic contexts in Prehistoric Europe, in which archaeologists often struggle to assign them to the categories of sacred/profane as they often include elements considered to be diagnostic of both. The question, he argues, should not be whether the material contexts are domestic or ritual, sacred or profane, but rather, what are the components of social life that are being selected and given special treatment, and how? Asking that question is to analyze the process of ritualization, which is often an intentional and strategic process. Because it is strategic, it can leave structured deposition of materials that archaeologists can recognize, document, and interpret.

Others working in Europe have argued that the notion of ritual as a distinct practice is problematic across cultures, particularly cultures outside of contemporary Western society. Opting instead, for an approach that seeks to explore how “prehistoric conceptions of effective action may have differed from those enshrined in modern rationalist thought” (Brück 1999, 314). Similarly, Walker (2008, 140) has argued for a reconsideration of the overly functional assumptions surrounding ritual and the mundane, to focus, rather on “those behaviors arising from extrasocietal relationships” of which could include relationships with things, houses, animals, plants and the supernatural.

Following other anthropologists such as Bell (1992) and Humphrey and Laidlaw (1994), Bradley (2003; 2012) argued for a consideration of *ritualization* over ritual in archaeology. Broadening

the definition of ritualization from Bell's a bit, Bradley (2003, 12) defined ritualization as both "a way of acting which reveals some of the dominant concerns of society, and a process by which certain parts of life are selected and provided with an added emphasis." In this way, everyday acts, such as eating, for example, can be ritualized, thereby materializing in elaborated ways that are identifiable archaeologically. Ritualization is a *quality* of action that emphasizes the ongoing everyday materiality of the lived world. And so, as Swenson (2015) has argued, ritualization is historical and culturally specific.

Humphrey and Laidlaw (1994:90) pay particular attention to the human *intention* in their "theory of ritual," arguing that ritualization "transforms the relation between intention and the meaning of action." While ritualized acts can vary in practice, they are rarely formally prescribed from the outside and repetition, it is argued, is necessary for amplification (Bloch 1974).

The elaborate and patterned ways in which materials may be deposited has been described by archaeologists as "structured deposition" (Joyce 2008; Pollard 2001; Richards and Thomas 1984). Ritualization, as a stylized way of acting that is most often intentional, structures the way materials are associated, spatially and temporally. The kinds of materials, the pattern in their association, and their treatment can be culturally and contextually specific. In some archaeological examples, objects are found intentionally broken or burnt, and in others, only partial objects are deposited, indicating a relationship with things that goes beyond the Western notion of practicality or functionalism. In a consideration of intentionally fragmented things, Chapman and Gaydarska (2007) explain that things are *enchained* in relationships with people, places, and other things. These relationships are exchangeable, so that a fragment of an object once whole brings with it memories, of a place, perhaps, or can project the extended personhood of a previous owner (Weiner 1992). If a fragment of an object that participated in a ritualized event is carried away to be kept somewhere else, it carries with it that event and all the memories it evokes.

Further elaborating this idea of enchainment, others have proposed a somewhat different understanding through a consideration of an objects "itinerary" as a way to understand how things are entangled, or "enmeshed with the lives of the humans who make, use, exchange, modify, destroy, and deposit them" (Joyce and Gillespie 2015, 7). Whether enchainment or itinerary, these discussions signal a move toward a more relational approach grounded in the materiality of ritual, and not limited to the immaterial, internal, representations, of an external material world (Renfrew 1994). These discussions are further elaborated to include not only the material dimensions of ritual and the relationships they produce, but the performative nature of ritual (*sensu* Barad 2007). As Barad (2007, 49) has argued, "performative approaches call into question representationalism's claim that there are representations, on the one hand, and ontologically separate entities awaiting representation on the other – and focus on the practice or *performances* of representing."

Earlier discussions of ritualization still carried with them the notion of entities awaiting representation through ritual practice. "Boundary-marking acts, are an institutionalized externalization of the psychological processes involved in this. Thus, while they are not constitutive of ritualization itself, they do mark off a particular sequence of ritualized action as 'a

ritual' and are thus part of the social processes whereby these institutionalized events are produced and reproduced" (Humphrey and Laidlaw 1994, 105). As I will discuss below, the 'event' provides a different way of "boundary marking," one that takes into consideration a relationality of matter and meaning. This includes a consideration of both human and nonhuman participants in the ritualized act.

Barrett (1994, 72-80) has described ritual as a distinct "field of discourse, bracketed-off in time and space from other areas of human practice." That "bracket" is considered here, as 'the event.' The 'event' as concept, has a lengthy history in anthropological theory but has recently been reconsidered from a more relational perspective.

Bounded by the 'event'

When a U.S. government engineer was sent to survey irrigation among Pima Indians of Southern Arizona during the early 1900s, his reports to the government included, along with his maps and extensive field notes, translations of "calendar sticks" given by the oldest surviving Indians on the reservation (Southworth 1931). The long, wooden sticks, are incised with a series of lines, etched dots and v-shaped cuts at differing intervals down the shaft. Each incision recalls an event, experienced and remembered by the community. The events incised into the stick mostly include episodes of violence with neighboring tribes, seasons of sickness, races and games, the deaths of elders, the persecution of medicine men and interactions with white settlers and soldiers. Those events were brought into the present by the long carved and incised wood. The stick is not a mediator (Latour 2005); it would not exist without those events. The bounded moment that was an inter-tribal raid, the passing of an influential tribal member, stood apart from the continual tempo of everyday life. Through those events, material traces emerged in the form of an incised wooden stick.

The event arises simultaneously through a historical perspective as well as a material one. It involves an explicit concern for temporality and its materialization. Archaeologists, historians and sociologists have often explained historical change through 'events.' Yet, the way the event is understood has varied. As Sewell (1996) explains, earlier social theorists did not consider historical events as context-specific, or even accidental, but rather, often treated them as the inevitable outcome of an inherent logic of social development. The 'event' was a manifestation of that logic. The event was not attributed to anything concrete but rather, to abstract "transhistorical processes leading to some future historical state" (Sewell 1996, 3).

In a different vein, others would later contemplate the 'event' as the arena through which structure and agent came together, were negotiated or completely transformed. This view of the 'event' is often inspired by the work of Sahlins (1985; 2005). While Sewell and others (Beck et al. 2007) have considered the 'event' as a moment of structural change, directly implicating the human as agent rearticulating social structures, others understand the event as a different kind of moment. Kapferer (2015,1) argues for an approach "that takes the event as central to anthropological analysis rather than the concept of society, in relation to which the event or the

event-as-case is commonly engaged, either to substantialize the abstract (society) or to provide a means to grasp the foundational or general organizational principles of society.” So rather than the event as a moment of contradiction, or re-negotiating established structures, echoing Turner’s (1969) “ritual process,” the event and the material relations within it becomes the primary focus of study.

The event does not always need to be considered as a “rupture”, which implies a change to the ongoing routine actions, this is not always the case. It may be better to consider eventful episodes as heightened moments, whose outcomes or effects may differ: they can prompt change to those moments that follow or not. The interest in this study is the articulations of components within the ‘event,’ not any arbitrary definition of some moments as events based on their outcomes.

This dissertation is concerned with what separates an ‘event’ from any other moment of material intra-action. Events are often described as large-scale, dramatic, and upending of order (Connolly 2013; Nichols 2007; Sahlins 1985). What should we do then, with the small-scale, intimate, temporary moments, which make up more of people’s actual experiences? Gilmore and O’Donoghue (2015,6) argue that at the very least, “an important criterion for a happening to be considered eventful is its achievement of an impact that extends beyond the moment and place of its occurrence.” What makes an occurrence “eventful” can vary in scale and reach, but what constitutes the ‘event’ is its memorable, effecting qualities. It is set apart from other repetitive moments that blur together in memory. The ‘event’, understood this way, parallels the features of ritual or more specifically, ritualization as described above.

Ritual has often been considered a kind of ‘event’. That pairing is not new. However, the ways we understand the ‘event’ have recently been revised with vibrant materiality released from an anthropocentric, representationalist hold. When we discuss an “event” we are contemplating a moment, in a series of moments that stands apart. It stands apart because it *punctures* stretches of stability. The ritualized event interrupts ongoing day-to-day actions. Events are often described as contingent, situational and specific (Connolly 2013; Kapferer 2015; Sahlins 1985; Sewell 1996). The ‘event’ described in this way may on the surface appear to be too particular, a singular occurrence, difficult for those interested in long term changes (Beck et al. 2007). While the event is situational, it is also loosely structured by historical processes. A history of practice informs the event, yet through the event, something new emerges. And so, an analysis of a sequence of events over time can reveal changes in material practice as generation after generation of humans intra-acted with an array of materials in elaborated ways. Attention to the events that emerge over time may find repeated occurrences of particular elements, or it may find the material traces of innovative moments. These are moments of improvisation, that then change the moments that follow. Temporality, as a key feature of the event, places archaeology in a unique position to investigate such a concept. The event is temporal, it has a beginning and end. And here we are also talking about the *perception* of time as distinct in ritualization. The temporality of the ritualized event is often experienced differently. As Maurice Bloch has described (1989), through ritual, the past and the present conflate in the present, or “the past and the present in the present.” This is also a key feature of the event, as it is informed by the past

yet materializes in the present. But what Bloch is discussing specifically is the *perception* or human experience of the past and present simultaneously through rituals. This is another feature of ritualization and ritual that sets it apart from the everyday. Bradley (1991, 209) has described “substantial time” as marked by human experience, and “abstract” time as measured and divided precisely. Rappaport (1992) describes ritual’s “time out of time” in that it is outside of mundane time. Similar to “substantial time,” Gell (1992) defined A-series/B-series events. A-series, are considered time-immanent in passage of events, B-series, are isolated happenings. The ritualized event, as assemblage is an isolated happening.

This is not to say that the conflation of past and present *only* occurs in ritual, but rather in events in general, a feature of intra-acting with materials, that ground us, in the senses. Through the materiality of the event, memories invade, smells, touch, texture, recall previous events into the present and we are left with a sense of *déjà vu*. It is the material that grounds the event in the present. “To recall an event like a snapshot differs from the experience of being suspended in a moment in which the sensory richness of the event resonates back and forth with the world you now inhabit: it is the divergence between a stereotyped recollection versus layered memory in which disparate sensory elements fold into each other in a new way” (Connolly 2011,4). It is a *folding* of past and present, leaving the body and the sense of time and matter that is heightened, and thus, memorable.

And like the event itself, the sensorium is contextually, historically, and culturally specific. There is no single way of engaging the material world, but rather innumerable ways of experiencing the world. There are multiple temporalities. The ‘event’ can be considered from within as social or experiential time. As archaeologists, we have the opportunity to consider past events, in linear time, or within the *longue durée* (Braudel 1958), as we can see those moments that preceded and followed the event, the effects of the event, leading to future events. The approach advocated here is a simultaneous consideration of these multiple temporalities, following Bergson’s explanation of “multi-temporality” (1991). The event as temporal is often a given, but what many of the previous discussions concerning the ‘event’ were lacking, was the concern for an active materialism.

Contemplating the Ritualized ‘Event’ Within a ‘New Materialist’ Ontology

An event is neither substance or accident, nor quality nor process; events are not corporeal. And yet, an event is certainly not immaterial; it takes effect, becomes effect, always on the level of materiality (Foucault 1972, 231).

Scholars with renewed interest in materialist perspectives have aligned themselves under what has often been called a “new materialism” (Dolphijn and van der Tuin 2012). Calling it “new” is not to say that they are *entirely* novel ideas, but rather, it is a reconsideration of classic materialist thought as a jumping off point to consider a new ontology (Dolphijn and Van der Tuin 2012,13). At the heart of this collectivity is a recognition of a vitality underlying all matter that is not restricted to humans alone. In contrast to a Marxist inspired materialism, rooted in

economically driven relations of power, this approach to materialism is more closely in line with biological sciences, physics, and ecology, considering the place of humans as *part* of a world of materials. Under this ‘renewed’ materialism, humans are not set apart from a material world that lies outside, but rather, humans form an integral part of a complex, pulsing, “web of life” (Barad 2007; Bennett 2010; Ingold 2012). We are matter. Yet, we are a distinct type of matter, a self-reflecting, conscious, walking, talking, matter-form. It is because of this that we are in a position to contemplate the potency of the materials, animals, plants, and landscapes, that surround, permeate and ensnare us. Object agency, “materiality”, and “materialism” are all contemplations of this potency, and the material relationships that form as a result. Yet they vary in their understanding of these relationships, and the source of this energy which we perceive, but can’t quite pin down. For some, this power was akin to a human-like intentionality, leading to a profusion of anthropomorphized things, and a renewed interest in animist ontologies (Alberti and Bray 2009; Haber 2009; Harrison-Buck 2012; Zedeño 2009). For others, it was caught up in a network, or ‘entanglement’ of *social* relations (Hodder 2012; Latour 2005). This emphasis on social relations has led some to criticize proponents of materiality for ignoring the very physicality of matter, and instead opt for a relational approach more closely to an ecology (Ingold 2007).

Through material relations a liveliness is enacted in the coming together of matter in various collectives, or *assemblages* (De Landa 2006; Deleuze and Guattari 1987). In this manner, no one component acts alone, and intentionality is not always at play. It is not intentionality alone that causes affects. It is something else, a stirring of energy pulsing through this world of materials. Karen Barad has described this coming together, not as an *inter* action of components, but rather, an *intra* acting, as it is not separate and distinct components with an inherent agency, instead, agency is a doing, or “acting” that occurs in the various reconfigurations of matter (Barad 2007,178). This impermanent collective of matter forms an *assemblage* of organic and nonorganic matter that is stimulated to act.

And this is where the approach taken here diverges from other, more, object centered perspectives often employed in archaeology. For advocates of object agency, “To understand how collective-societies-work, we have to relearn to ascribe action, goals and power- or to use that old mantra, *agency*- to many more agents than the human subject, as well as to ballast epistemology – and ontology – with a new and unknown actor; the silent thing” (Olsen 2003,89). The new materialism engaged with here resists this notion of agency as an inherent trait, or as something to be *ascribed* from the outside. As Barad argued (2012,54) “Agency is not held, it is not a property of persons or things; rather, agency is an enactment, a matter of possibilities for reconfiguring entanglements.” It is a *doing*.

Ingold (2007, 1) too, has said, “Things are not active because they are imbued with agency but because of the ways in which they are caught up in these currents of the lifeworld.” By resituating a focus on *matter*, humans, animals, plants, weather, stone, all things with a presence, are “brought back in” (Ingold 2012). Ingold resists the overuse of “agency” as the means to acknowledge active things. Turning away from agency, instead, he focuses on liveliness, or energy flows. Vitality, is a “current of energy”, a liveliness, that resides right down to the atomic

level. It keeps the world of materials moving. The exertion otherwise called agency is made possible through the presence of vitality, or energy. Jane Bennett (2010) put forth an idea of “vibrant matter” to discuss the ways in which matter is active. Bennett explains at length a brand of ‘vital materialism’ in which matter is perceived as *lively*. While she draws inspiration from early twentieth century vitalists in attributing a liveliness to things, she departs from the idea that this force is a not-quite-material essence or force. Similarly, Ingold has cautioned against essences, in his critique of ‘materiality’ (2007,9).

The moment, or ‘event’ occurs when components are brought together. Across assembled components, humans and non-humans alike, agency is unevenly expressed (Bennett 2010; De Landa 2000; Deleuze and Guattari 1987). Assemblages are emergent, unfixed and unrepeatable, in the sense that no two assemblages are *exactly* alike. This is true even for ritualized events following a rigid religious structure. Within a ritualized event, or assemblage, relations are hierarchical, and power asymmetries exist between participants in ritual and those who might have been able to witness actions but did not undertake them. Human observers of a given ritual act would not have had the power that the ritual practitioner had, or that the materials engaged, utilized, and carried. In the case of the ritualized event, the division is not between humans and non-humans, but between the beings engaged in ‘intra-action’ and those outside (Barad 2003). The ritual event, produces a *ritualized* assemblage.

Through this view, it is recognized that there are differential periods of stability and relative equilibrium and there are periods of *disequilibrium* and becoming (Connolly 2013,400). These moments are similar to Deleuze and Guattari’s (1987) “plateaus.” Plateaus are regions of intensity, or “a piece of immanence” (Deleuze and Guattari 1987, 158).

A person acting as part of those assemblages is immersed in the materiality of the grouping bringing forth a sensual aspect of the event. Ritualized events can be emotional, can heighten the senses through engagement with matter, this includes the material effects of sound through song or instrumental music, the aromatic smells of burning incense. Often, there is an interplay among the senses during ritualized events. As Hamilikas explained (2007,6-7): “The *work* of memory relies on the senses, and the senses rely on the materiality and the physicality of the world.”

Ritual, like any other kind of happening, is a multi-sensorial phenomenon. Often, archaeologists are guilty of over-emphasizing the visual aspects of the past, particularly in the move to treat remains as a textual metaphor, waiting to be read. The materiality of the event, reminds us that the other senses were undoubtedly engaged. The burning of incense, for example, while surely producing a vivid visual display, does more. In the case of Maya copal (a resinous substance burnt as incense), it has a distinct smell, and when it is burned too close to the body, it can have a physical bodily effect, getting into the eyes, making them burn or water. As in many other Amerindian cultures, incense smoke is often intentionally wafted onto the body in Maya rituals today as a means to “cleanse,” another tactile effect.

Under the ‘new materialism’, the distinctions between mundane and ritual as stable categories become problematic. Yet, there *are* distinctions between ritualized events and other, more day to

day actions. The ritual event, no matter how dramatic, how large or small, long or short is a disruption of the daily tempo of social life. Along with the humans who, while absent from the archaeological deposits, formed part of the assemblages at the moment they created events, objects in these assemblages did things that they did nowhere else in these sites. This is both literally true (as power objects from ritual assemblages carried out unique actions) and ontologically true (as these objects were as much the authors of the effects rituals had as the humans with whom they acted). Understanding the distinction between ritual and the mundane is not as contradistinction but rather temporal states of being in an already active object.

To consider the heightened relationship between humans and non-humans in ritual is to consider the *event-as-assemblage*. Coined by Deleuze and Guattari (1987) and expanded by De Landa (2000; 2006), assemblages are wholes made up of heterogeneous parts. While the whole is not reducible to its parts, they are indivisible wholes, the individual parts can disassemble and reassemble in different assemblages. Through the interaction of those parts, a whole emerges, that is the assemblage. The components within an assemblage are heterogeneous and relations between them are hierarchical (De Landa 2006). Assemblages occur at various micro and macro scales, and some assemblages, when brought together lead to other, larger assemblages. In this way, assemblages can be embedded within larger assemblages, much like the ‘event’ as assemblage, which is, by nature, embedded in larger assemblages of communities, cities, culture etc. Assemblages are real and can be considered, they are not mysterious, and they are not powered by “essences,” a critique shared by Eagleton (2016). In contrast to a recent critique by archaeologists, asserting that a vital materialism should be “light and airy” (Hamilakis and Jones 2017), assemblages are historical, each component within the event is historical, if we follow them out, we will find ourselves in the stars, tracing “star stuff.” Their properties, or “qualities” as Ingold (2012) prefers, emerge through the interactions between parts (De Landa 2006,32).

As events are material, they are sensorial. How the senses are experienced, is cultural. People relate to their landscape and all the organic and nonorganic materials within it in historically specific, contextually contingent ways (Ashmore 2002). For example, the contemporary Maya consider a break between cultivated, domestic space, and uncultivated wild space (Hanks 1990, Taube 2003). This environmental perception most likely had Pre-columbian roots. Yet those boundaries blur and take constant effort to maintain. Planting crops, clearing “wild growth,” killing or shooing dangerous snakes, fending off dangerous witches and wild spirits all require continuous work.

In many ways, Maya ontology is perfectly suited to examine human and nonhuman relations. Religion as a counterpart to ritual, and ritual as separate from the everyday may have no real distinction in Maya ontology. Ethnographic work among contemporary Maya communities has indicated, the human relationship to the vital materiality that surrounds us is particularly important in the Maya perception of the cosmos. As Molesky-Poz (2006:41) explains, “In Maya thought, the human is understood not as an individual, but as a relational being, that is, one who cannot be conceived of without multiple relations.”

The relationality that occurs within an event is much like an “assemblage” in the Deleuzian sense, a coming together or “ad-hoc grouping of diverse elements” as Jane Bennett has defined

them (Bennett 2010,23). Within those “groupings” or ‘events’, subjectivity can shift, power can be unevenly shared. This is a common feature of a ritualized assemblage in particular as objects of power, or the power of the supernatural can supersede or override the power of the human actors or observers of the event. As explained by scholars such as Bennett, Barad, and other ‘new materialists,’ the assemblages as a whole has agency, the ‘event’ as assemblage generates effects. This differs from other considerations of the event that takes for granted the exclusivity of agency to the human actor (Beck et al. 2007).

The ‘new materialist’ ontology shifts the human from the center of all things, to a relational being in a larger world of materials, thus recognizing other matter as *agential*, or with the potential to cause effect (Barad 2007). This is not the same as granting human-like agency to nonhuman things (Knappett and Malafouris 2008; Olsen 2003). In my concern for the ritualized events, humans are always present, but where they are situated, subjectively and the level of power they exercise shifts from event to event.

The heterogenous collective that is the assemblage forms an indivisible whole (Deleuze and Guattari 1987). Prior to coming together, the various components were something else, but in coming together into the assemblage, something new emerges. Within the ‘new materialist’ framework, the ‘event’ can be considered similar to *plateaus*, as heightened moments. They are intensities as Bateson describes them (2000) but also, multiplicities “connected to other multiplicities” (Deleuze and Guattari 1987, 21). It is a multiplicity of components that is context specific, it is a “becoming” (Connolly 2011) that is internally unique, but connected, like a rhizome to other events, past, present and future.

In contrast to people and things being caught up in relational networks, the concern is rather, for humans and other organisms bound up in “webs of life” (Ingold 2012,428), different from a “flattened” network in which all components are equal, components are brought together in heterarchical and hierarchical meshworks. Some components are more agential in certain combinations, or “meshworks” than in others. Considering the meshwork from an ecological point of view is similar to the heterogeneous assemblage.

This view is not just held by academics but is echoed by contemporary peoples: “This culture that originated some fifteen or twenty thousand years ago, believes and understands that humans and all that exist are part of an indivisible whole.” [Daniel Motul Morales in Molesky-Poz 2006: ix]. This may lead one to suggest that maybe philosophers should have been paying attention to nonwestern ways of thinking all along (De Castro 1998).

This ontological re-orientation shifts the human from central subject, acting on the world, to the human as another component in a meshwork of matter-energy. While this seems to leave a concern for human entanglements wide open, it becomes graspable when we “problematize” our concern for human involved meshworks (Connolly 2013,401). This research treats the event as a meshwork, that implicates humans in various ways.

An approach to Maya ritual that takes the event as central to study, aligned within a new materialist tradition, expects variability. The new materialist would say no two events are exactly the same, they can’t be. Each assemblage, or event is a novel materialization, a coming

together of elements that have never come together in that exact place or time, in that exact combination. That is not to say, however, that because events are context specific, they are therefore useless in understanding the general human condition. And so, it becomes more productive to explore the ways in which relationality is heightened during those events, the ways in which those material traces are distinct from other actions. To explore the material process of *ritualization*.

Meaning in Ritual

In ritual, the world as lived and the world as imagined....turn out to be the same world (Geertz 1973, 112).

A new materialist position need not dispense with meaning, and the ways in which things mean (Dolphijn and Van der Tuin 2012). Instead, it changes things from representational media to signifying beings. By resituating our considerations away from ritual solely as a symbolic act, composing presentations of materials to represent an idea or belief, we are given the opportunity to explore the ways in which ritualized material and human participants together emerge during those events. Yet, what is important to note, is that through those material relations, meaning emerges. Meaning, of course, cannot be tossed aside as the ways matter intra-acts can be quite meaningful. This includes the symbolism that emerges in ritualized actions, as is often emphasized, but we know that matter means in a variety of ways. The ways in which matter means, lend to the ways in which matter assembles. Within the assemblage-as-event, meanings can shift. And often, material brought together within the event have multiple meaningful qualities. Many objects have *bundled* qualities (Keane 2005).

Keane emphasizes *qualities* of materials, much like ritualization is a *quality* of action (Humphrey and Laidlaw 1994) and just as Ingold (2012) argues for *qualities* of materials, not properties of materials. Discrete moments of experience with things can heighten some qualities over others (Keane 2010, 188). While Keane is explicitly discussing the ways materials mean, Ingold's discussion of the qualities of materials, stresses the physical, material qualities.

Material and meaning are simultaneous happenings. A 'new materialism' does not overlook meaning, but rather, argues that it is a more active process grounded in material intra-actions. Karen Barad (2007, 334) has described meaning making as *material discursive* practice. She considers this as a posthumanist approach to the consideration of meaning and representation. Rather than considering meaning as stemming from speech acts, overly emphasizing reality as a product of human concepts, she explains, "materiality and discursivity are mutually implicated in the dynamics of intra-activity. A performative understanding of discursive practices challenges the representationalist belief in the power of words to represent pre-existing things" (Barad 2013, 802).

The separation of representor, representation and the thing that is being represented as if they are ontologically separate entities is problematized under the performative approach of Barad

(2003). Rather, we can focus on the material-discursive practices by which the differential constitutions of humans and “non-humans” are marked (Barad 2003, 810). As ritualization is action, the action of matter coming together produces bounded events, so too, meaning is an act, it is ongoing practice of meaning-making.

Barad (2003, 814) defines material-discursive practice as a “causal relationship between specific exclusionary practices embodied as specific material configurations of the world (i.e., discursive practices/(con)figurations rather than “words”) and specific material phenomena (i.e. relations rather than “things”). It is through relating, that differentiation is expressed, through discursive practices, rather than pre-existing categories of distinct “things.” Barad calls this relating, “agential intra-action.” Intra-action instead of *inter*-action as it is in the coming together that something new emerges, not the mixing of already pre-defined and bounded entities (inter-action). They become “bounded’ through intra-action.

Material-discursive practices are the practices through which different distinctions get drawn (Barad 2003, 816). It is through specific agential intra-actions that things and phenomena become meaningful. And they are meaningful in different ways. In following this idea that distinctions emerge through intra-action, whereas one phenomenon is distinguished as different from another only when they intra-act, Kohn (2013) explains that this way of drawing distinctions happens among nonhuman entities as well. Semiosis, contrary to what is often taken for granted, begins with *indistinction* (Kohn 2013, 51). This is where we borrow from Peirce’s semiotics and the icon, index and symbol (see Preucel 2006 for discussion of semiotics in archaeology), but not as language or words, rather, as materially enacted meaning that is historically driven and can shift as components come together in varying ways and in different intra-actions. Eduardo Kohn (2013), operating within Peirce’s semiotics, argues that signs are not language or text, they are communication. Humans are not the only beings that communicate. Plants can communicate, animals communicate constantly.

In ritual specifically, Bloch (1974) has argued that communication is highly linguistic. “Ritual makes special use of language: characteristically stylized speech and singing” (1974, 56). But if communication is not reduced to *speech*, there are other ways in which communication is stylized, through bodily action, or as is often the case, dancing. Bloch asks, “What is the effect of singing something rather than saying it normally for the way meaning is carried” (1974, 56). Again, it is the stylization that sets it apart in ritualization, it is emphasizing speech. Through singing, speech is ritualized. Through dance, body movement is ritualized. Speaking, singing, dancing, are all actions, and so put simply, stylized actions are ritualization.

A Consideration of “Special Deposits” as an ‘Event’

With all this in mind, let’s consider one particular assemblage, an event of offering in the Temple of the Sun at Palenque, during the 8th century. Each component of that event-as-assemblage, including the human participants, the human observers that may have been down below in the plaza, the temple itself, two ceramic pots with a lid, shark’s teeth, fragments of shell, fragments

of jade, and bones are separable components, each with a history, or “itinerary” (Joyce and Gillespie 2015), but through their intra-action, an event of offering emerges. This assemblage is characterized by multiple dimensions including, as De Landa (2006) would explain, expressivity and the material. However, the expressive dimension of this event is not reduced to language, or abstract symbolism alone. While the combination of shark’s teeth, jade and shell may have referenced an immaterial concept such as the “underworld,” they also have very real material qualities, histories of previous assembling, which is made visually evident in their fragmented state. The shark’s tooth brings with it a history, beginning with its formation in the mouth of a shark, to the Maya that found or hunted the tooth and eventually traveled from the ocean over 150 kilometers away. The entire itinerary is not clear, it could have been kept by the Maya fisher or scavenger for some time initiating memories of a successful hunt or a personal gift. However, in the 1950’s archaeologists found it assembled alongside other materials inside a pot that was hidden away in a constructed niche inside the floor of a temple. The jade, formed in igneous rocks of the Motagua region of Guatemala was at some point in its itinerary, quarried, shaped, polished, transported and broken. The fragment placed in the offering was a material link to the previous wholes in which the material had interacted. This link has been called “enchainment,” by some (Chapman and Gaydarska 2007), but its history really began before people emerged in the world when the igneous rock was forming.

This event as assemblage is embedded in other assemblages, trade networks that brought the jade, shell and shark’s teeth to the offering, religious organization prompting the building of temples and organizing timed events of offering, a hierarchical political structure that defined who could directly participate in the event and who would observe down below. Each one of these assemblages, the trade network, the political structure, and the expressivity of the offering was born of historical processes. That is not to say that there are not multiple possibilities in the ways assemblages materialize, this was but one, which is why there is variability in the materialization of assemblages. This event, is a whole that was informed by “wholes” or assemblages that had assembled before it, and it will inform future events as assemblages. This is not to constrain possibilities, for certainly, through the event, there is innovation, unexpected outcomes or destabilization. The assemblage as a whole exercises agency (Bennett 2010; Barad 2007) or has capacities (De Landa 2006). The individual parts are not exercising agency it is when they are brought together in the event of offering, that its capacity is realized. The human components, in this event, are exercising varying levels of authority, and in this combination, the offering itself can be more powerful than the humans not directly participating in the event. This is where the materialist ontology comes into our consideration of Classic Maya events, as it recognizes that humans engage in events but does not grant them complete power *a priori*. Rather, it is a consideration of the ways material assembles and in particular combinations, humans exercise more agential capacities than other non-humans, but in other combinations, nonhuman materials are more powerful. But it is always through their intra-action that effects emerge. This specific event is similar in its materialization to ritualized offering events across the Maya region during the Late Classic period because it is loosely structured by a shared history of practice. Yet this exact combination of materials, including the human and supernatural participants had never come together before in this space and time.

To analyze events this way is to identify the material components assembled within that moment, where they came from (sourcing) when they were assembled and their relationships in time and space. For Palenque, and most likely other Maya cities, some of those material components were organic, and difficult to retrieve macroscopically. The inclusion of microscopic analytical techniques, sourcing studies and a relational mapping of excavated contexts is thus necessary to consider events as assemblages.

In following ritualization, as a stylized, or emphasized action, but also the assemblage as a set of material relations, the 'event' presents a concept through which we can consider ritual not as an abstract idea, but a bounded phenomenon that produces material traces that can be studied. While ritualized events share in these fundamental features, they also "bear distinctive cultural signatures" (Sahlins 1985, xiii). They are culturally and historically specific. It is for this reason that ritualization and the material signatures of those actions varies from culture to culture. To explore ritual as a distinctive kind of behavior, that materializes in distinct ways, it becomes necessary to recognize the material residues of non-ritualized actions (Swenson 2015). To recognize material traces as 'ritual,' particularly when the materials recovered are also understood as every day, quotidian materials, requires a close consideration of context. Spatial and temporal association, is something archaeologists are often comfortable undertaking. So, it becomes more important to consider, equally, all the material components, what they are, how they are spatially associated, the temporality, in conjunction with a wider understanding of particular cultural practices. As I will discuss in the following chapter, those events leave traces that are recoverable using a comprehensive methodological approach that is theoretically driven.

Chapter 3: Analyzing the Ritualized ‘Event’

To understand the past, we not only have to define the major processes of both environmental and cultural change, but we have to understand the interactions between each local environment and their inhabitants – individuals, families, and communities over spans as short as a human lifetime. This requires exacting research to define local environmental conditions and changes at individual Maya sites (Sharer and Traxler 2006, 54-55).

The analytical methods we choose to employ are directly derived from the theoretical position in which we align ourselves, which further outline the questions we think important to ask. This study follows the position that *ritualization* is marked by a stylistic way of acting that is materially constituted. The process of ritualization can be studied through the material traces the events produce. In the study of site formation processes, ‘ritual formation processes’ have been described as resulting in enriched floor assemblages and as one of the few site formation processes in which deposition was intentional and primary (LaMotta and Schiffer 1999, 23; Walker 2002). While an archaeology of ritual is carried out largely through a traditional methodological practice, including the careful excavation of isolated contexts and the screening and recovery of larger, visible materials, much of the evidence of ritual formation processes are in the form of residues and sediments. Consequently, many archaeologists are no longer taking sediments for granted. With the incorporation of additional geoarchaeological methods and paleoethnobotanical analyses, sediments are more than a medium that surrounds durable artifacts (Macphail et al. 1990).

As discussed in the previous chapter, a ‘new materialist’ ontology is concerned with the relationality between components. No one material, subject or object is privileged. To operate under this theoretical orientation means not privileging one material type in our analyses of ritual contexts. The series of methodologies proposed here is an attempt to recover as much material as possible within each distinct context. Some contexts in Maya archaeology can present challenges in sampling for microscopic residues. In those contexts, traditional macroscopic approaches were employed.

The aim of this work is to focus on the process of ritualization and the material signatures of that process. To understand just how practices, materials, people and places are ritualized, we need to first consider the dynamics of material relations and how they are unique from context to context as different actions, materials, and environments come together and produce different material signatures. Investigation of material relations in archaeology cannot be limited to the durable and the visible. The approach utilized in this research project includes the use of multiple analytical techniques in order to retrieve the diversity of matter assembled. This includes paleoethnobotanical analyses to recover macrobotanical remains, typically charred seeds and charcoal, and microremains such as phytoliths and starches; the retrieval of *in-situ* block soil samples for micromorphological (microscopic thin section) analysis; soil chemistry;

and residue analyses, as well as traditional macro-scale analyses of artifacts in conjunction with a consideration of iconography, ethnographies, and colonial and ancient texts.

This chapter discusses the range of materials that have been reported for Maya ritual practices from pre-Columbian contexts through colonial and contemporary periods, including plants, resins, pigments, animals and other durable materials and features. It discusses the different lines of evidence utilized in understanding those practices including more recent applications of microscale analyses in archaeological investigations. In each section a review of the different materials is discussed and the means by which we can recover and analyze those materials archaeologically. Provided what is known surrounding those practices and the materials reported for ritual contexts, I also discuss the research design for this particular study.

Scholars have often assumed that perishable and organic materials were likely included in ancient Maya ritual ceremonies but until recently, retrieval and analysis of these materials were unusual. Studies of texts and images, and analogies based on ethnography of contemporary Maya descendants, as well as most recently, paleoethnobotanical analyses support the assumption that organic materials such as food, flowers, seeds and pigments were used in ritual (Bozarth and Guderjan 2004; Brown 2004; Morehart and Butler 2010). Ethnographies, colonial documents, and epigraphic analyses, as well as ethnoarchaeological studies suggest that ritual events were often accompanied by actions including dancing, costumed performances, smoking of tobacco, drinking of beverages, and the burning of tree resins and incense (Brown 2004; Hanks 2013; Stone 2002; Stuart 1998; Tozzer 1941). Some of these actions could have produced detectable residues, such as burned material, plant remains, and pigment or feathers from preparing dance costumes (Hutson and Terry 2006). The methodology proposed here, using scientific techniques not typically employed in the study of Maya ritual, has the potential to recover material evidence for such actions, as has been shown in other geographical regions (Boivin 2000; Matthews 2012). Following previous knowledge of Maya ritual practice, matter such as plants, animals, pigments and other residues such as resins were hypothesized to be present in excavated ritual contexts.

Plants among the Maya

In most archaeological settings, plant remains are visibly absent. Yet, plants were a major component in past lives, most certainly for the ancient Maya dwellers in the tropical forest. Text, art, and crafted objects all allude to the critical importance of plants in Maya lifeways (Hull 2010; Howie et al. 2010). The landscape, with rocky outcrops, dense undergrowth, and steep slopes was carefully managed to produce food, including diverse planting strategies that were cyclical and compatible with a forest of important and often sacred trees (Ford and Nigh 2015). A range of plants were encouraged to grow in variable soil conditions. Ethnographic and historic sources primarily describe the Maya diet as based on maize, beans, squash and chilis (Fariss 1984; Tozzer 1941). These were important staples. But archaeological work carried out at Ceren, El Salvador, a Classic period site preserved by an ancient volcanic eruption, suggests

tubers, maguey and a variety of trees and other garden plants were also grown (Sheets 2000). Other studies have also revealed quite a complex diversity of plants were grown throughout the Maya region, beyond the typified “trinity” of maize, beans, and squash, species such as tobacco, grape and “hog plum” in the Northwestern lowlands of Chiapas (Trabanino 2011) and heliconia, magnolia, nance, cactus and amaranth in Honduras (Morell-Hart 2011)

Other plant species were utilized for their medicinal qualities. In a study of Colonial era Maya ethnobotany, Roys (1931, xix) remarked that in Yucatán, “we find a considerable body of medical literature written by Indians in their native language.” In addition, colonial accounts suggest that the Maya cultivated particular plants “for odor, and for their pleasure” (Tozzer 1941, 194). Plants such as tobacco were important for ritual purposes, particularly in ritual healing. Cacao, too, was a prized crop, transformed into drink for special events (Beliaev et al. 2010; Joyce and Henderson 2006; McNeil 2009). Recorded rituals in Mesoamerica often include common, everyday staple foods as well as specialty foods, symbolic and ornamental plants such as flowers (Vogt 1976).

Decades of investigation in the Maya area has confirmed that the landscape was extensively modified, and managed by the ancient Maya, including agricultural terraces, smaller milpa systems, kitchen gardens, water catchment and storage features such as *aguadas* (Fedick 1996; McAnany 1996; Scarborough 1994). Those areas that were not managed or modified by humans were considered the dark and wild forest often associated with the underworld (Brown and Emery 2008; Stone 1995; Taube 2003). These distinctions between a wild, dark forest contrasting a sun-filled socially constructed community were often represented by the plants that participated in ritualized events. Among contemporary Maya, elements from both tended and untended fields may be paired in the decoration of altars (Vogt 1976).

Ethnobiological work among communities in Yucatán found that particular plants were chosen for particular ritual events (Salvador Flores and Kantún Balam 1997). In particular, succulents, symbolic of rain, were chosen for rain rituals, or *Ch'a Chaak* rituals. These ritualized events are necessary to ensure Chak, the god of rain, provides enough rain to maintain the crops in the milpa. In fact, in one ritual, witnessed and recorded by biologists, over 25 species of plants were used (Salvador Flores and Kantún Balam 1997), from the construction of the altar itself, to the making and covering of tamales and ceremonial drinks to the burning of resinous copal for smoke and scent. Particular woods were chosen for cooking, and branches were needed to purify ritual participants. Some of the plants were identified as related to wind, and others as related to water, while others were needed to directly carry out the ritual, such as the altar construction or food.

Contemporary Maya peoples offer materials used in their everyday lives, particularly food and drink, in ritualized events. During house building ceremonies in the Maya highlands, the house is “fed” with chicken heads, feet, and broth, and also given liquor and corn (Vogt 1976). Other ceremonies in the Guatemalan Highlands, such as include the placing of seeds in a ring along with candles to represent earth, water, animals and the universe (Menchu 1984, 52). The growing of crops was often ritualized as it was simultaneously caught up in the sacred calendar, the relationship with the maize god, as well as ancestral land claims (Zaro and Lohse 2005). For

many contemporary communities, the homestead and the milpa (small plot of land for crops) are the most important domains in social life (Hanks 1990; McAnany 1995; Vogt 1976).

Household and community altars are ritually charged spaces in which plants are often utilized. Among numerous contemporary Maya communities, pine is one of the most repeatedly used plants associated with altars and ceremonial burning events (Fischer and Hendrickson 2003; Vogt 1976; Wisdom 1940). Pine is odorous, it is resinous and when burned, produces a distinct smoke. Pine boughs often decorate altars and community crosses. Among contemporary Highland Maya communities, loose pine needles are spread around the altar as a bedding, a protective barrier between kneeling worshippers and the underworld down below (Vogt 1976). In addition, pine needles are layered above burials. Pine paired with red geraniums are used to dress the community crosses. As Vogt explains, these pairings are prompted by their wild and domesticated origins. Flowers are important ornamental plants and are commonly used in contemporary Maya ceremonies. Ethnographers describe numerous kinds of flowers typically used to adorn sacred objects, such as crosses and altars (Vogt 1976; Wisdom 1940, 388).

Recovering Evidence of Ancient Maya Plant Use

Most of these are examples of contemporary practices. However, Classic period iconography, text and increasingly, paleoethnobotanical research, confirm that plants were extensively used in acts of ritualization among the Pre-Columbian Maya. Paleoethnobotany is defined as “the analysis and interpretation of archaeobotanical remains to provide information on the interactions of human populations and plants” (Hastorf and Popper 1988, 2).

Paleoethnobotanical (PEB) analyses include the study of macrobotanical remains such as carbonized seeds and charcoal, and microbotanical remains such as starches, and phytoliths (durable silica plant remains that persist after the death of the plant) to identify plants in archaeological contexts (Morell-Hart 2011; Piperno and Pearsall 1998; Rovner 1983). The integration of PEB studies has provided a means to recover material evidence of plants, including those described in text and depicted in elaborate scenes on pottery, murals, and monuments, but in most cases, the species recovered are not depicted, marking a need for these kinds of studies. In those few studies explicitly aimed at ritual contexts, PEB analyses have found evidence for ritualized plant use, many of which are similar to those observed among contemporary Maya communities (Dussol et al. 2016; Lentz et al. 2005; Morehart et al. 2005).

Paleoethnobotanical analyses in archaeological contexts include the study of macrobotanical remains, that are typically charred seeds or wood charcoal large enough to recover through flotation by running loose soils collected from excavations through a bucket of water, agitating the water and collecting the remains that float to the surface (Pearsall 2015). At the very least, standard size samples are recorded to enable a count of taxon present or absent for each context. Other more quantitative strategies of sampling may be systematic to enable statistical analyses of quantity in addition to presence or absence (Hastorf 1999, 59). During the flotation process, the materials that float are called “light fraction.” The sediment and other materials that do not float

is collected and dried to be sorted for any other artifacts or plant remains, this material is called “heavy fraction.”

The recovered macrobotanical remains are typically studied through morphology with a light microscope to compare the visual features to known specimens (Hastorf 1999; Wright 2010). In some cases, the charred or desiccated remains are differentially preserved and may not all be identified (Wright 2010). In other cases, it may be difficult to recover diagnostic attributes that are identifiable to particular families or species of plants. This was the case with some of the remains recovered from this dissertation project (Appendix 5: PEB Identification (Trabanino 2016)).

Macrobotanical studies employed in Maya ritual contexts typically recover the wood that was burned, either as offerings or as a source of light or heat. Burning, in particular is a common feature of Maya ritual, providing numerous opportunities for such an analysis. The kinds of plants that were burned in Pre-columbian Maya ritual practice appear to show a pattern across the region.

Pine, in particular has remained an important plant resource in ritualized events for the ancient Maya as well as contemporary Maya communities. Traces of pine remains have been found in ancient ritual contexts in caves throughout Belize (Morehart et al. 2005). Most likely used as pine torches in a cave centered ritualized event, Morehart and his colleagues propose the idea that burning pine could be considered similar to the ritual importance of burning candles among the Maya today. At Xunantunich, Belize, pine was a restricted resource among elites and often used in ritualized contexts (Lentz et al. 2005). Pine is geographically restricted in its natural distribution and so not locally available for most of these communities, suggesting it was extensively traded as prepared charcoal or as pinewood (Lentz et al. 2005; Morehart et al. 2005).

Morehart’s study of pine use in cave contexts throughout Belize and the studies carried out at Xunantunich were made possible by the retrieval and analysis of carbonized macrobotanicals, primarily charcoal remains. Projects carried out in other Maya sites have also recovered macrobotanical remains of pine in primarily ritualized contexts, confirming that pine was preferred for ritual events. At Rio Bec, a study of wood charcoal within the ash layers of funerary events revealed a preference for pine, a resource not locally available (Dussol et al. 2016). The wood charcoal study at Rio Bec is significant because it was carried out as a systematic comparative study across ritual and nonritual contexts in order to determine the difference, if any, between the types of wood used in domestic hearth contexts and ritual ones, such as the layer of charcoal and ash scattered on the body of the deceased in a funerary event and the burnt remains in censers buried within the floors of structures. What they found was that pine was reserved for the censer and funerary events and was not present in the domestic contexts. In addition, the funerary event had the highest diversity of plant types including pine and various species within the Fabaceae family (a local variety of trees). The censers were found to have only pine and species within the Sapotaceae family, which includes chico zapote (*Manilkara zapota*) and other resinous latex producing plants, suggesting a preference for resinous wood in association with the burning of copal. Because of its resin, pine is ideal for

torches and fire-starting splints, but also, in some cases, pine itself is burned like incense as it produces a distinctive smell and large quantity of smoke (Lentz et al. 2005).

Other macrobotanical remains recovered in Maya archaeological research on ritualized contexts include carbonized seeds. At the site of Copan, analysts recovered maize kernels in caches, removed from their cobs and burned (Lentz 1991, 272). In addition, at Copan, squash seeds were coated in cinnabar and buried beneath a large stone monument as an offering (Lentz 1991). These kinds of materials are integral in understanding the scope of matter assembled during ritual events. To recover plant remains archaeologically requires different strategies in the field, and later in the lab.

Paleoethnobotanical analysis is still relatively uncommon in the Maya region. Most archaeologists interested in plant remains among the ancient Maya are asking questions about environmental change, subsistence, and diet (Lentz 1991; Lentz et al. 1996; Wyatt 2008). Yet, as the previous chapter has discussed, these studies can be quite informative for ritual contexts as well (see Morell-Hart 2011 for a review). For those that have included PEB studies in ritual studies, the results are often quite successful. In addition to Morehart's (2011) above-mentioned macrobotanical analyses carried out in cave contexts, others, such as McNeil (2006) have retrieved pollen from various ritual contexts at Copán, Honduras and found, not surprisingly, evidence of cacao, maize, squash and flowers inside vessels placed in tombs and caches. Pollen, starch, and phytoliths are considered microbotanical remains. Phytoliths are small bodies of silica formed when plants take up water with dissolved silica and the silica is deposited on the wall of the plant cell wall, often in distinct shapes that can be identified (Piperno 1991). Most plants produce phytoliths. There are, however, some plants that do not, particularly cultivated species such as tomato, chili, cotton or cacao (Piperno 1991, 159-160).

A chemical process of extraction can often recover phytoliths. Often those shapes and sizes are diagnostic of particular kinds of plants. In some cases, phytolith analyses typically cannot provide information down to the genus or species level, however, often, for those plants that do produce phytoliths, one can determine whether they are wood or bark, a grass, flower or leaves (Weiner 2010). Although in some cases, phytolith shapes can be diagnostic of particular plant taxon (Bozarth and Guderjan 2004, 208; Shillito 2013). In macrobotanical analyses, the materials recovered are often, but not always, carbonized. In contrast, phytoliths can be destroyed by burning. However, phytolith analyses can recover plants from a wider variety of contexts as they are not restricted to burning contexts. Ideally, phytolith analysis would be carried out on materials recovered from a closed context to ensure they are not mixed. Phytolith analyses in conjunction with micromorphology is argued to be the ideal approach to ensure the samples are from a secure context and thus more informative (Shillito 2013). In the Maya area, phytolith analyses have often been applied to studies of plant domestication and foodways (Benz 2006; Morell-Hart 2011).

One study explicitly concerned with ritual practices did employ phytolith analysis and successfully recovered plant remains from a ritual context. Ceramic vessels placed lip-to-lip as ritualized offerings at the Classic Maya site of Blue Creek in Northern Belize contained both durable, visible materials such as jade and shell, but also sediment inside them, which is common

in archaeologically recovered cached offerings. While the sediment is often ignored in archaeological studies, in this case, paleoethnobotanical analyses, particularly the analyses of micro-remains such as phytoliths, sponge spicules and diatoms, revealed that the offerings included maize, squash, bromeliads, palm fruits, agave and sea sponges (Bozarth and Guderjan 2004). Such a diversity of perishable remains included in offerings would not have been identified through epigraphic considerations alone.

The offerings were found in both monumental architecture and in commoner residences. The offerings included edible plants but also ornamental plants. Bromeliads in particular have been used by contemporary communities in Honduras as an ornamental plant for altars (Joyce personal communication 2018).

A recently excavated Late Classic (A.D. 600 -900) altar context in the basin of Mexico outside of Teotihuacan, provides an ideal example for when typical artifact analysis coupled with more intensive ecofact recovery provides an understanding of past ritual practice. The excavation was found to have a series of human crania placed around the altar (Morehart et al. 2012). Offerings of food and flowers were included in addition to the human crania. Copal and pine were burned in incensarios, indicated by the recovery of pollen and macrobotanical remains. Charred maize cobs and fragments from the ritual burning of food, as well as pollen from flowers, were detected. Analyses of the crania and human skeletal remains, the artifacts, including figurines of Tlaloc, the rain god, and molded clay chiles, and analyses of botanical remains together led to the argument that this lone shrine feature was dedicated to agricultural rituals.

Animals in Maya Ritual

Animals also enact an important role in ritualized events among the Maya. Ethnographic and historical accounts describe a number of rituals including those related to hunting and fishing. Ethnoarchaeological research in the Maya highlands describes a series of hunting shrines throughout the mountains as sacred areas of exchange for contemporary hunters (Brown and Emery 2008). At these locations, hunters leave the remains of animals, primarily deer, to the animal guardian spirit to ensure continued reciprocity in the form of a successful hunt. For some Maya communities, the deer-god is the protector of wild animals, especially deer, and it is to the deer-god that offerings must be made and permission sought for hunting (Wisdom 1940, 400). Colonial era accounts also describe various rituals in which deer remains were incensed and painted with pigment to invoke the gods of hunting. Similarly, fishermen held ritual events to ensure a good catch. Those rituals included the censuring of fishing equipment, the offering of fish and invoking of gods (Tozzer 1941).

Depictions of animal sacrifices are found throughout the Postclassic era codices and are often accompanied by other materials, such as incense burning, and ritual feasting. These events were typically tied to calendrical ceremonies (Masson 1999; Tozzer 1941). In contemporary Maya practices, newly constructed houses are fed chicken heads and feet and chicken broth during house animating ceremonies (Vogt 1976). Among contemporary Kaqchikel Maya, holes are dug

into the ground to receive the blood of sacrificed chickens and goats. These events of offering are accompanied by feasting, and the rest of the animal remains is consumed by those present at the event (Fischer and Hendrickson 2003, 87).

Colonial accounts in Yucatan describe periodic offerings of food to crafted ancestral statues and the skeletal remains of deceased ancestors (Tozzer 1941). While the common Maya may not have eaten meat every day, feasts were important social and ritual events that included meat. The feeding of saints, milpas and ancestors continued during the colonial era, and these ritual feasting events included both plants such as maize in various forms, and animals such as chickens, drink, such as balche (an alcoholic honey-based drink) in addition to other meats and foods (Farriss 1984, 323). Food often accompanied the deceased and was given during festivals for the dead.

Archaeological recovery of Animals

Zooarchaeological analyses, as the study of human and animal interactions, is often concerned with environment, seasonality, subsistence or hunting practice (Peres 2010). These kinds of studies have grown exponentially in the last few decades and has become a fairly common component to archaeological research. Peoples in the past relied on animals for food, but also for clothing, shelter, tools, ornaments or simply as companions, making faunal remains one of the most common kinds of artifactual materials represented in an archaeological assemblage. For the most part, faunal remains, primarily the bones of animals, are fairly durable and preserve even in tropical soils. The challenge then becomes determining which animals were intentionally exploited or deposited as part of a primary assemblage, and which may have inadvertently entered the archaeological record either as scavengers or from natural death later on (Emery 2002). Often, faunal remains are large enough to be retrieved by typical excavation methods, however, smaller remains such as fish, snake or bird may only be recovered by fine screening (1/8") excavated materials, or flotation. The recovered remains are then compared to known animal specimens to determine species. Much like osteological analysis of human remains, diagnostic features of the animal can then be used to estimate the minimum number of individual (MNI) animals present in an assemblage (Peres 2010).

Zooarchaeological studies conducted at Maya sites have identified the species of animals within and across various contexts within the sites to identify the kinds of animals available or preferred in particular cases. For example, at a Postclassic island site of Northern Belize, investigators found patterns in the kinds of animals associated with ritual features and those from domestic features, particularly in the choice of large mammals such as tapir, peccary and deer as well as crocodiles for ritual events (Masson 1999). Staple meats for the islanders, such as turtle, fish and local, small mammals were consumed in both ritual and domestic contexts. Turtle and fish are common foods for communities residing around water sources. Ethnographic observations suggest that deer, and in some cases, peccary, may have been partially domesticated and raised

for food (Masson 1999, 113). Favored foods, particularly meat, were a common element in Maya ritual, as well as symbolic animals featured in creation stories (Emery 2002).

Anthropogenic Sediments – detecting the single event

Events are outcomes of historical processes. Geology, plants, animals, the material world itself is a culmination of historical happenings (De Landa 2000). Human actions, especially repeated actions, can leave microscopic traces in sediment structure (Goldberg et al. 2009; Shahack-Gross 2017). One of the ways these traces can be identified, is through micromorphology.

Micromorphology is the branch of earth science that describes, interprets, and measures the components, features, and fabrics of soils, regolith materials, and prehistoric/historic artifacts at the microscopic and submicroscopic levels (Goldberg 1983; Stoops, 2003). Of particular concern is anthropogenic deposits (Maher 2017). Micromorphology is particularly powerful in seeking to understand material relations, as the basis for this methodology rests on the relationships between material components as seen in thin section. Micromorphology is a means to analyze the layering of microscopic traces of activity overtime, directly addressing questions of materiality and temporality.

In micromorphological analysis, undisturbed blocks of sediments are recovered from an excavation (such as a vertical section or wall or horizontally across a floor surface), secured and transported to a lab for further processing. At the lab, the samples are oven-dried for several days at low heat (to remove soil moisture from the clay-rich deposits while avoiding excessive cracking). Once they are sufficiently dry, they are impregnated with a clear polymer resin within a vacuum-sealed fume hood for multiple weeks to harden the block and remove air bubbles. The hardened blocks are then re-heated and trimmed for thin sectioning. The standard thickness of a thin section for micromorphological analysis is 30 microns (Bullock et al. 1985; Goldberg 1980; Stoops 2003).

The study of soil thin sections is most often done with a petrographic microscope in reflected and transmitted light. In particular, analysis of slides in transmitted light permits the assessment and identification of minerals and other constituents by their optical properties in plane-polarized light (PPL) and cross-polarized light (XPL). Cross polarized light aids in the identification of minerals or rock components that are anisotropic and exhibit interference colors birefringence. The relational study of the individual components, as seen in thin section is often characterized as *fabric studies* (Stoops 2003, 33). The fabric is defined by the arrangement, size, shape and frequency of components. Archaeological applications of micromorphology in particular is concerned with anthropogenic alterations of past local environments (Nicosia and Stoops 2017). Identifying the composition of the fabric in thin section analysis allows for a consideration of how components were deposited, where components came from and how they were transformed after they were deposited, including the ability to identify anthropogenic activities. In some cases, the signatures of particular activities are diagnostic enough to characterize specific actions, their duration and whether or not they happened repeatedly (Goldberg et al. 2009, 97).

The micromorphological studies conducted were mostly concerned with compositional and fabric analysis. This includes the identification of the components, however, necessary mineralogical identifications were minimal and focus was placed on anthropogenic input, such as the deposition of artifacts, and the alterations of fabric resulting from actions such as trampling. In addition to identifying what components are present, the analyses carried out here are primarily concerned with the relationship and orientation of components as a part of the fabric studies.

To explore the event in thin section, this project adopts the concept of “microfacies.” A microfacies is the patterned distribution of a particular suite of components that represents particular, often distinctive, activities. They can also include observations in thin section of past sedimentary environments (Goldberg et al. 2009, 106). Adopted by Goldberg and others, descriptions of microfacies aid in discriminating the various complex sediments, particularly those subtle stratigraphic subdivisions. The description of microfacies takes into account past human activities, as well as post-depositional alterations.

Similar to microfacies, the concept of soil “fabric” has been defined by Kubiěna (1938) as: “the arrangements of constituents of the soil in relation to each other.” While it is very difficult to identify the total fabric, as it is complex, and some of the features may be just too microscopic, this study follows Stoops (2003, 34) to focus on “observed soil fabric” as the arrangement, size, shape, or magnification of components.

The type of materials observed in thin section and their orientation and quantity can reveal a layering of material traces produced as ancient peoples performed activities, for example, cleaned up areas, laid a mat, or placed offerings (Courty et al. 1989; Goldberg et al. 2009). Polarization enables the identification of discrete minerals and is a common technique in geological studies. Phytoliths can also be detected *in situ*, which has proven particularly helpful when identifying the remains of straw mats and layered hearth remains (Goldberg et al. 2009).

Developed by Walter Kubiěna (1938) in the 1930s as a means to study past environments, it was not until the 1950s that archaeologists considered the utility of micromorphology in understanding human impact on soil formation and sedimentation (Cornwall 1958). It was slow to take hold, but in the last few decades there has been a dramatic increase in micromorphological studies in archaeology (Macphail et al. 1990).

The “life history” approach (Walker 2002) and more recently, the concept of the itinerary as an alternative to biography (Joyce and Gillespie 2015) have been heralded in ritual studies as a means to understand how the meaning, value and use of things can shift from context to context. Following such approaches, micromorphology can recover the life history of soil development, pre-depositional, depositional and post depositional episodes that were responsible for the material makeup of the sediments as they are encountered archaeologically (Matthews et al. 1997). Ideally, to analyze the life-history of place (Ashmore 2002), a series of sequential block samples would be taken from each stratum of a profile (Macphail et al. 1990). Unfortunately, that can prove difficult in the Maya region, particularly when trenching a stone-built structure with few occupational layers, and a bulk of loose construction material. In this project, where

possible, block samples were taken at the intersection and within layers outside of the targeted context to be compared to the ‘event’ of interest to determine how they are materially distinct.

The technique of micromorphology is well suited to investigate the temporality of material practice. The key is to integrate the microscopic analysis of the microstratigraphy with macroscopic studies typically employed to determine the spatial and temporal relationships between assembled materials in a given context. This type of analysis has been applied to a wide range of studies. While the earliest archaeological studies employing micromorphology were mostly concerned with human impact on soil formation, recently, micromorphology has been utilized explicitly in archaeological studies grounded in social theory to consider the use of space and identifying discrete activity areas (Benerjea et al. 2015; Boivin 2000; Jusseret 2010; Matthews et al. 1997; Walsh 2004). An assemblage, as a collective of material components coming together from moment to moment is detectable in the traces that it produces.

In discussing the principles of soil micromorphology, Walter Kubiëna (1970, 9-10) states,

The soil is not just a mixture of constituents. Nor is it the sum of its constituents or the sum of its properties. What, then, is it? 1) The constituents must be in combination with each other in a characteristic way to make a soil. 2) Each constituent is not only a substance but, as a constituent, plays its role in the dynamics or biology of the soil as an entity. 3) No constituent plays its role independently; all influence the others, to a greater or lesser degree. Relations exist among the separate constituents, and between the constituents and the whole. 4) The composition of the microscopic plants and animals which are a part of the soil, and which play the main role in its function, is not something accidental. This, too, is typical for each soil. The organisms of a soil are not just a mixture; they have developed into a kind of *assemblage*, which we may speak of as an assemblage of species. 5) If we regard biological processes as processes and not as manifestations of life, then we have a kind of assemblage or a fabric of processes typical of the biology of a soil. 6) *No factor in the entity of a soil acts independently; all are influenced by other factors; it is the interaction of all factors in unity* (emphasis added).

Kubiëna’s principles of soil formation echoes concepts later developed in the ‘new materialist’ ontology and how ‘new materialist’ scholars describe the entanglement of matter, and the emergence of assembled wholes. If we were to substitute “constituents” with *phenomena* and “soil” with *universe*, then we would be citing Karen Barad’s (2007) principles of agential realism and her concept of intra-action. Similarly, Kubiëna’s “soil,” with its intra-acting of constituents shares many fundamental ideas with assemblage theory as put forth by Deleuze and Guattari (1987), and later expanded, by De Landa (2016).

For archaeology, these questions concern formation processes, structured deposition and temporality. While soil studies can often determine what components are present, micromorphology can establish the relative chronology of the features, spatial relationships and orientation between components, making it an ideal addition to a comprehensive approach concerned with historical processes and material relationships.

Outside of the Maya area, micromorphological studies have revealed distinctions in the material and patterned layering in ritual activity areas, such as presence of pigments and burning in altar areas, or repetition in colored plastering during timed ritual events (Boivin 2000; Matthews et al. 1997). In some cases, these activities can be narrowed down to single depositional episodes (Goldberg et al. 2009). These kinds of analyses have not previously been carried out in a consideration of Maya ritual contexts, until the research reported here. Ethnoarchaeological work in the Maya area has provided insightful information surrounding potential distinct material signatures of rituals among the Maya. In one study, an archaeologist observed ritualized events of offering and burning at mountain shrine locations (Brown 2004). Those contexts were described and compared to other non-ritual domestic hearth contexts. The material in the ceremonial hearth was distinct as it was more compact with resin, blood, food and sugar, rather than the loose burnt debris expected from cooking. Information such as this provides hypotheses to test for when sampling archaeological contexts suspected to be the result of ritual.

A problem in the archaeologist's consideration of time is the difficulty of recovering distinguishable traces of a single event. Micromorphology is a means to zero in on that granularity. Incorporating traditionally used radiocarbon dates may only get us down to a 30-year range, but in looking at the event, the exact year is secondary to the temporality of the material coming together. In places where ancient inscriptions are available, all of these lines of evidence can be brought together to consider the temporality of events, in lived, generational time (provided by tight carbon dating and stratigraphic control), calendrical days or spans of days (provided by inscriptions), and the shorter time span of the event itself.

Those periodic events were materially produced traces recorded in the very soil itself (Joyce 2015b). Ritual events vary in elaboration and temporality, the material traces of some events are more difficult to detect than others, depending on the amount of materials present, and the preservation of those materials. And what macroscopically appear to be the traces of a single momentary event, may, microscopically be the traces of a series of events.

In tracing the history of a house, such as Group IV, we are in fact analyzing site formation processes (chapter 5). We are seeking to identify pre-depositional, depositional and post-depositional processes. In thin-section, not only are microscopic remains, such as phytoliths, ash, and micro-artifacts detectable, but the actions of humans, animals and environmental events that potentially altered or arranged those components can be studied. Actions such as trampling, sweeping, or burning can be seen in the orientation, shape and cracking of components.

Occupation surfaces such as plazas and floors can often be recognized as they have complex fabric with components oriented in parallel and linear patterns. In contrast, deposits of discarded materials, or intentionally tossed and fragmented materials often reveal a microscopic fabric with randomly oriented components that are poorly sorted, with complex packing voids (Matthews et al. 1997, 289).

Increasingly, micromorphology has been utilized explicitly in archaeological studies concerned with use of space and identifying discrete activity areas (Banerjee et al. 2015; Karkanas 2006; Matthews et al. 1997; Shillito and Ryan 2013). Following a detailed micromorphological study

in which various rooms of a house, as well as patios and areas outside architecture were sampled, Matthews et al. (1997) argued that while the “precise sequences of daily activities may vary, and different cross-cultural meanings may be attributed to each context, there are general principles and processes which affect the nature of floors and accumulated occupation deposits in different context types which relate to fundamental physical and sociocultural needs.” They identified discrete patterns in microstratigraphic sequences, suggesting that different activities as well as environmental conditions do create distinct material signatures (Friesem 2016). These results are important for micromorphological studies in the Maya region, as it suggests that while the material components may vary, similar actions will produce similar patterned microstratigraphy.

Residues

Chemical analyses can retrieve traces left by ritual acts from sediments. Human actions, especially repeated actions, can leave microscopic traces in sediment structure. Analysis of soil chemistry has proven successful at reconstructing discrete activity areas through concentrated levels of residues (Terry et al. 2004; Wells et al. 2000). There is a relationship between relative concentrations of soil phosphorous, trace elements, and organic components and anthropogenic activities. To identify discrete activity areas through soil chemistry, systematic samples are necessary, with concentrations of phosphates and other residues measured. Samples are air dried and subjected to an acid extraction technique (Mehlich 1978). When mixed with other chemicals, the phosphate reacts and creates a blue color, the intensity of which is considered relative to the quantity of phosphates (Wells et al. 2000, 453). There are different kinds of phosphates to look for, including both organic and inorganic. High phosphorous concentrations in soils have often been attributed to areas of food processing, consumption and disposal, while use of mineral pigments and crafting activities leave a different chemical signature (Terry et al. 2004). Phosphate is a key component of biologically produced molecules (Weiner 2010, 223). As organic food debris decomposes, the phosphate is released. The phosphorous is mineralized and deposited in the soil as calcium, iron, and aluminum phosphate (Terry et al. 2004, 1238). Phosphates become relatively fixed in the soil and remain stable for a long period of time, which is why soil chemistry often focuses on these kinds of traces to consider anthropogenic alterations to past soils (Wells et al. 2000, 450). Trace metals are often adsorbed by calcareous soils and stucco floors (Terry et al. 20014, 1238).

This particular analytical technique has only become widely used in the Maya region over the last two decades, many years after it was first introduced to archaeology in the 1930s and 1940s (Arrhenius 1931; Lorch 1940). Like the use of paleoethnobotanical techniques or micromorphology, chemical residue analyses, particularly phosphate analysis, were initially employed in nonritual contexts to understand domestic activity areas (Barba et al. 1987), agricultural terracing (Coultas et al. 1993) and more recently, market areas (Dahlin et al. 2007). Metals found in soils adjacent to architectural features have been attributed to the use of metal-based pigments to paint ancient Maya houses (Wells et al. 2000) and pigments associated with crafting (Hutson and Terry 2006).

As part of the comprehensive methodology of this study, an altar feature provided the ideal ritual context for soil chemistry. The surface of the altar was systematically sampled every 10 cm, to be tested for chemical residues. The results of these analyses are still pending.

Durable Materials in Maya Ritual

The most common durable materials brought into ritualized events in the Maya region include pottery, particularly incensarios, serving ware, and vessels for offering (Chase 1988). Other materials include crafted and unaltered stones such as obsidian, chert, jade, or limestone (Hruby 2007; Johnson 2016; Moholy-Nagy 2008). Figurines, musical instruments and crafted ornaments also appear in ritual contexts (Halperin 2014; Ishihara 2009). A consideration of the origin of materials used in making the artifacts as well as the use and wear over time of objects has become important in considerations of ancient Maya ritual. As a number of archaeologists have demonstrated, through use and context, everyday objects can transform into powerful objects (Brown 2004; Joyce and Gillespie 2015; Walker 2002). Ethnographic sources also describe the ways in which an objects' itinerary can lend to its potency among Maya communities. In one account describing contemporary Maya practice, incensarios become more and more sacred over time through participation in ritualized events (Wisdom 1940, 382). New incensarios are said to not become sacred until they have been used for many months on an altar. Incensarios are one of the most common types of artifacts attributed to ancient Maya ritual and were an important feature of ritualized events at Palenque in particular (Cuevas García 2007b; Rands and Rands 1959; Rands et al. 1979).

Ceramics were encountered in the ritual contexts of this study and were analyzed and classified following the established ceramic classification of Robert Rands (1987, 2007). Following this chronology, the excavated ceramics within the site core do not date earlier than the Early Classic (200-350 A.D.). The complexes are defined by a combination of paste, ceramic form and decoration, with overall trends throughout time allowing definition of distinctions between complexes used at different points in time at Palenque. Figure 2: Ceramic chronology of Palenque developed by Robert Rands (Modified from Rands 2007, fig. 2.1).

PERIOD (A.D.)	PALENQUE CERAMIC COMPLEXES	
LATE/TERMINAL CLASSIC 1000	HUIPALE	
900		
800		
750	BALUNTE	
LATE CLASSIC 700	MURCIELAGOS	
650	OTOLUM	
600		
CLASSIC 500	LOCAL MOTIEPA	CASCADA
400		"EXOTIC MOTIEPA"
EARLY CLASSIC 350	PICOTA	
300		
200		
LATE PRECLASSIC	?	

Figure 2: Ceramic chronology of Palenque developed by Robert Rands (Modified from Rands 2007, fig. 2.1)

The earliest ceramics, Picota complex, are made up mostly of deep dishes, with large solid slab feet diagnostic, as well as vertical groove-incision, with most vessels made from a sandy textured paste (Rands 2007). Also developed during the Early Classic period (ca. A.D. 400 -450), the succeeding Motiepa complex ceramics include red and orange slipped vessels, flat bottomed bowls, deep dishes, interior beveled rims, with pastes that include both carbonate and sandy carbonate textures. During the Middle to Late Classic period (ca. A.D. 620 – 700), Otolum complex ceramics include polychrome vessels with orange, black and red paints, dichromes of red on orange, and tripod plates with wide everted rims. The Late Classic Murcielagos complex ceramics (ca. A.D. 700 – 750) include an increase in monochrome reds, blacks, and some creams, with fine gray ceramics as well as fine black ceramics showing distinctive new pastes. The rim eversion of plates decreased and decorated incensarios appeared. Other decorative techniques include linear red paint, incision, fluting and stamping, primarily on vases. There is also an increase in decorated serving bowls. Following in the Late Classic period (ca. A.D. 750

– 820), the Balunte complex ceramics include unslipped and polished serving wares, and coarsely textured and undecorated jars. Tripod plates were made with large hollow feet and vases are decorated with stucco and paint. The latest ceramic complex, Huipale, made after A.D. 820 includes fine orange paste ceramics.

For most of Palenque's history, it seems, pottery was not imported from far. Palenque's location on the western border of the Maya region may explain the continued localized pottery traditions. The changes in paste, Rands (2007, 22) argues, were made possible as the city grew, and the increased exploitation and modification of the surrounding landscape revealed new geological 'microzones' for raw materials. However, during the Early Classic, some decorated forms within the Motiepa phase did display Petén influences, particularly in polychromes, which Rands has suggested were produced by potters, possibly foreign or foreign trained, occupying a specialized barrio nearby (Rands 2007, 19). Extensive analyses of paste composition done by Robert Rands and Ronald Bishop (1980) identified potential zones of procurement, including the sierras against which the city was built. Clays procured from the sierras might be indicated by large grains of mica noted in some samples at the site, as there are micaceous sandstones in the sierras (Castillo 2011). Rands and Bishop (1980, 30) argued that the steep terrain and the continual rainfall would expose fresh clays with high concentrations of mica and feldspar. Other clays considered likely to come from the sierras contain quartz particles.

Documentary, Epigraphic and Iconographic Sources

There is a wealth of written documents available for Maya societies, ranging from Classic Period inscriptions through documents produced during the colonial period, using the European script, written by Maya speakers and Europeans in Maya languages and Spanish. At the site of Palenque in particular, there is an extensive collection of inscriptions, some quite long, known from architectural features, monuments and tablets, as well as pottery and incised ornaments (Stuart and Stuart 2008). Much of these inscriptions describe events that occurred in the city, some including the materials employed and the temporal scope of those events. In addition, there is extensive imagery from Palenque that often depicts the ways people dressed, the organic textiles, feathers, and body paints that adorned their bodies during ceremonial events. Those scenes also include depictions of foods, and other objects included in the events, amenable to iconographic analysis.

Most of what we know about Maya ritual practice prior to the arrival of the Spanish comes from Classic Maya inscriptions and images on stone monuments, murals, and pottery vessels. While there certainly were drastic events, interruptions and innovations in Post Classic to Colonial era Maya lifeways, continuing material practice in these periods is informed by historical precedents, and so there remains a level of continuity in practice that makes later documents important as well. Information surrounding ritual and religion in the colonial period (from the sixteenth through the early nineteenth century) comes from Spanish clergy, initially as they described Maya rituals in their effort to convert the Maya to Christianity and end idolatry (Tozzer 1941).

Other documents include those written by Maya scribes and priests such as the Popul Vuh (Tedlock 1996), the Books of Chilam Bilam (Roys 1934) and the Ritual of the Bacabs (Roys 1965). These sources provide important information surrounding material practices as well as the temporality of such rituals.

For the more recent past, there are ethnographic accounts of Maya ritual practices, many of which describe practices that carried over from Pre-Hispanic times (Bricker 1973; Fischer and Hendrickson 2003; Vogt 1976; Wisdom 1940). In many cases, the materials used have changed; for example, candles, unknown prior to the arrival of the Spanish, are now very common in Maya ritual. European animals such as pig and chicken may be included in ritual practices, and liquor or sweets are also employed. But even with these changes, the actions in which new materials were used may be similar to those already practiced.

Ethnographic and colonial texts describe the use of particular materials during rituals, including some that are found archaeologically. For example, sources often describe the need for music and dancers at festivals and ceremonies. Depending on the ritual and community, fiddles, flutes, drums, and rattles are played in ceremony (Wisdom 1940, 379). While fiddles were introduced by Europeans, ceramic drums and whistles are common Classic Maya artifact types, suggesting a continuity in ritual practice. Ancient imagery on polychrome vessels depict scenes of ceremonial events in which performers dance and play music, using wind instruments and percussion instruments, some clearly made of organic materials that have not been preserved in most cases.

Archaeologists working in the Maya region are fortunate to have a wealth of recorded text and artistic depictions of past lifeways at their disposal for this purpose. This is certainly true at Palenque, where the inscriptions and imagery are what made the site so well-known (Stuart and Stuart 2008). For this study in particular, inscriptions and images from Palenque have provided important information to understand the context of ritualized events carried out in Group IV. For those cases where there is no direct written evidence at the site of Palenque, ethnographic and colonial accounts provide valuable insight, as long as they are not homogenized or treated as unchanging. As I have suggested in chapter 2, material assemblages are unique, each resulting in different effects. The discursive nature of those material assemblages varied across space and time. Yet, the ways in which particular materials were ritualized were the result of historical processes. While matter and meaning changes over centuries of disruption, war, violence and conversion, practices did not completely disappear and historical developments allow interpretation of preceding practices.

Research Design

Excavations carried out in the eastern lowlands, primarily around the Petén sites of Tikal, Guatemala and Caracol, Belize, revealed a pattern in which eastern oriented structures in residential plaza groups were reserved for ancestor veneration. Initially defined as “plaza plan 2” at Tikal, this layout of architecture is composed of multiple structures oriented around a central patio with a square, pyramidal shape structure on the eastern side, in which burials and

caches were often placed (Becker 2003b; Chase and Chase 1994). From the outset, Group IV of Palenque, the location of this dissertation project, was distinct in comparison to other mapped residential groups at the site. Like the formal “plazuela” groups in the eastern lowlands, Group IV was constructed with multiple structures enclosing a central plaza space. Prior excavations had recovered a large number of burials concentrated on the eastern side of Group IV’s plaza, suggesting an eastern focused ritual practice (Rands and Rands 1961). The primary question with which this project is concerned is whether ritualization as a distinct way of acting results in unique material signatures when compared to other, non-ritualized, actions. The square, pyramidal shaped structures on the eastern and north eastern corners of the plaza of Group IV were chosen for excavation based on the hypothesis that, if practices were similar to those in the eastern lowland sites, those structures would yield evidence of “ritual deposits.”

The outer walls and stairs of both structures (labelled J6 and J7) had already been partially consolidated by INAH (Instituto Nacional de Antropología e Historia) in the 1990s, meaning they were reconstructed and cemented into place following Mexican consolidation standards. So, rather than trenching along the central axis of the structures, which is the normal approach in the eastern lowlands sites, excavations were laid out on the summit of the structure to go vertically down to bedrock in order to reconstruct the entire life-history of the structure and the events that took place there over time. These excavations were carried out using a modified “Harris Matrix” approach, designed to identify and map spatial and temporal relationships in sequences of depositional events (Harris et al. 1993). This contrasts with more common approaches to excavation in Maya archaeology using lots or levels often arbitrarily (see Black 1990 for an extensive review). This method, developed as a means to represent chronological relationships both vertically and horizontally, has allowed for recovery of materials stemming from single depositional events. The single context is important in this study in particular as it is concerned with the ‘event.’ But these kinds of excavations are still, of course, limited by what is visibly different in strata or matrix. The integration of micromorphology in this project, in particular, provides the means to detect fine strata that may not be visible at the macroscale, thus, accounting for additional actions or events that would have been missed under a traditional approach or even one employing the concept of depositional events promoted by Harris.

While excavating, identifiable individual contexts were extensively sampled for flotation, chemical residue analysis, micromorphology and carbon dating when possible. Each context and all architectural features revealed by excavation were mapped with photogrammetry and hand-mapped and illustrated. In addition, all durable artifacts associated with these contexts (with the exception of faunal bone) were illustrated. The goal of this approach was to recover traces of the ritual event. The ‘event,’ as an assemblage in the new materialist theoretical perspective, includes both humans and nonhuman matter. Humans, of course leave their mark: they are detectable not only by the presence of their physical remains in burials, but by their actions. Non-human plants, animals, and things also leave their mark, not only by the presence of their physical remains, but in coming together they can alter the very nature of the matrix in which they were eventually buried.

When a distinct concentration or context was encountered, it was sampled for PEB. The inclusion of flotation in field excavations is the preferred method for retrieving macrobotanicals and has proven to be useful and quite informative if deposits are sampled strategically. Sampling strategically for this project means a sampling of all individual contexts considered as resulting from ‘events.’ A stratified sampling approach was taken, recognizing that excavations recovered material deposited in two different ways. In a trench excavation inside a typical Maya building, the bulk of the material volume is comprised of loose, cobble fill, and mixed sediments dredged up from elsewhere. Any plant remains here would be uninterpretable as evidence of activities during an event. Sampling for this project concentrated on deposits recognized as primary residues of activities.

When a single context was identified in the field, loose sediments were collected from the area for flotation. Eight liters of sediment were collected from each context and agitated in a bucket on site. The light fraction was recovered using a small strainer (size 250um) and hung to dry in a fine mesh bag. The sediment at the bottom of the bucket was collected and dried to be examined in the lab for any additional carbonized remains (Pearsall 2015). The contexts that were sampled included concentrated burning events and architectural features such as an altar surface and a burial context (described in Chapter 5). In the burning contexts, large fragments of charcoal were collected and bagged in the excavation, with the rest of the sediment collected for flotation. Ideally, a systematic sampling strategy would be employed both inside and outside of the excavation for PEB to compare the quantity and type of plant remains in each context (Lennstrom and Hastorf 1995). However, the cost and labor needed for the analysis was beyond the capability of this dissertation project. As it was my goal to consider the kinds of materials present in each ritual event, a more selective sampling strategy was employed to identify plant presence and types (not necessarily quantity).

The carbonized seeds, wood charcoal and fragments recovered were analyzed by a project member trained in plant identification, through comparative studies and specializing in Maya plant use (see Appendix 5). In comparing the carbonized remains under a microscope to a library of known tropical plant species, most of the recovered plant remains were identifiable, but some were not. Macrobotanical analyses of carbonized plant remains in this study include recording morphology using a light microscope.

Whole vessels were encountered in two burial contexts and one context interpreted as a ritual feasting event. In addition to typical ceramic analyses of ware type and chronology, samples of the vessels were taken from the base of the vessel and sent to a lab located at McMaster University in Ontario Canada for phytolith and starch analysis. Those results are still pending.

In addition, all faunal remains were transferred to a project member trained in faunal analyses to identify the species through comparison to faunal species local to this region in Chiapas as well as the number of specimens present. Often, faunal remains are large enough to be retrieved by typical excavation methods, however, smaller remains such as fish, snake or bird may only be recovered by screening excavated materials. When a primary context was identified, all excavated material was screened using a 1/8” screen.

When possible, block soil samples for micromorphology were taken at sequential depths, overlapping visual soil boundaries in order to capture the transition from one depositional event to the next. Samples were taken from the altar surface, below the altar and just above bedrock (see chapter 5 for distribution of samples). In addition, micromorphology samples were taken at similar depths in the plaza outside of the structures for comparisons. Undisturbed samples were collected by cutting out blocks and putting them in lidded Tupperware boxes. They were later transported to the Geology Lab of Universidad Nacional Autónoma de México (UNAM) where they were slowly oven dried, impregnated with polyester resin and sliced into thin section slides. I analyzed and describe the thin sections following the now highly standardized descriptions developed by Stoops (2003) and Bullock et al. (1984).

In some cases, it was not possible to recover block samples, particularly inside the fill of stone structures. Following common Maya construction techniques, the height of the visible structures was produced through a constructed mass of loose cobble filling. Nonetheless, while floors and living surfaces are the ideal context for micromorphological sampling, there were recorded ritualized events that took place directly in loose cobble construction fill in Group IV. Contexts like these could not be sampled for micromorphology, but loose soil samples were collected for macrobotanical analyses.

The human remains from the burial contexts were transported to the labs of Escuela Nacional de Antropología e Historia (ENAH) overseen by Dr. Lourdes Márquez to be subjected to standard osteological analyses, to determine age, sex, and pathologies (for preliminary results see Appendix 6). The data from the series of analyses carried out on the multiple material types were then brought together, and in that coming together a ritualized event emerged.

Chapter 4: Palenque: A City of Vibrant Matter

Maya history is the sum of countless specific events that took place within thousands of communities in the lives of millions of Maya people (Sharer and Traxler 2006, 54).

Maya cities have often been presented as ruins seemingly frozen in time. Narrators of documentaries invariably describe an ancient Maya city as being reclaimed by the jungle, a picture that suggests the city is done *being*. Yet, the city of Palenque continues, it is in a continual state of “becoming” (Connolly 2011). The materials that make up the bounded landscape that is now collectively called “Palenque” is the result of the materialization of numerous events. There is no end to Palenque’s becoming; even today, the congested market area at the entrance of the UNESCO world heritage park, busy with vendors, tourists, European and American hippies, security guards, religious pilgrims, food, animals, trinkets, taxis, and music are assembling. Through this assembling, material traces emerge as a sedimentation of Palenque’s history of *mattering* (Barad 2007).

This study is an archaeological consideration of Palenque, and so it is contemplating a series of events that materialized during a particular period of time, a span of only a few hundred years roughly 1200 years ago (the “Classic” period as specialists in Maya studies define it). It was during this time that many of the visible features of Palenque as city emerged. This is but a small place in the history of assembling that has been continually happening in the area. The geological formation supporting the city, the animals and plants tangled and scurrying across the geology are all historical processes continually assembling, disassembling and reassembling. They all contribute to the city as it is today.

This chapter will provide a brief history of Palenque’s emerging urban landscape along with a consideration of the matter flowing in and out of the city, while situating the city historically and contextually within the wider Pre-Columbian Maya world. Palenque has received much attention over the last few centuries, primarily due to the impressively detailed stuccowork that decorated the temples and main palace, distinctive architectural styles, and extensive hieroglyphic texts (Marken 2007; Robertson 1973, 1983; Stuart and Stuart 2008). The texts displayed in the temples, palace and elite residences primarily detail the political and religious life of the city’s most powerful elite. They describe events of political accession, mapping of lineage claims, mythological founding, military success and defeat, and reciprocal exchanges with the gods (Martin and Grube 2000; Romero 2000). Yet this view of the ancient Maya does not account for the active materialism from which those events arose. The ornate buildings, sculpted and plastered artworks, inscribed and painted texts were material discursive acts, matter and meaning simultaneously (Barad 2007). In my review of Palenque, I attempt to trace the nonlinear, often tangled materialization of a city in its historical sedimentation.

Palenque in the Maya World

The Maya inhabited an expansive region of ecological diversity (Figure 3). Broadly defined, this includes the Pacific coast and volcanic and mountainous Highland areas in the southern region, the central lowlands, including the dense tropical forests of Southern Mexico, Guatemala, Honduras and Belize, and the drier, scrub forest of the karstic Yucatán peninsula to the north (Sharer and Traxler 2006).

The “Maya” were far from homogenous or unchanging. On the contrary, many social groups, their material interactions and the physical landscape experienced waves of change and moments of equilibrium. One of the most dramatic waves of change began over five thousand years ago with the domestication and exploitation of plants, enabling Maya communities to stay in one place for longer periods. In situations like this, microhistories or small-scale events can amplify, causing large-scale consequences whether intended or not (Sahlins 2005). Continued experimentation and manipulation of plants marked the end of a mobile life of hunting and gathering, and the beginning of more sedentary communities. This was not, however, a single event, as it would seem from short textbook summaries, it was nearly 3000 years of microevents compounding into macro-histories. Intensive paleoethnobotanical work in the Mesoamerican region has suggested that the domestication of maize, once assumed to be the staple crop kickstarting complex civilization, was in fact a long and varied process that was differentially enacted across the region. In some areas, maize was not the staple food, and in others, maize was not intensely exploited until much later (Staller et al. 2010). By 2000-1000 BCE (the Preclassic Period) a number of Maya communities had developed techniques to grow maize, chilis, squash, beans, and in the lowlands, manioc and other tubers. With a stable food supply year after year, the sedentary communities continued to exploit their material landscape, mining clay to produce pottery for cooking and eating, stones and minerals for tools and adornments. The construction of towering pyramids, a cultural hallmark for Mesoamerica, was also a long and varied process resulting from intended and unintended consequences (Joyce 2004). These practices informed the events that would follow. As ancient peoples built large earthen platforms, then experimented with stone work, the constructions grew larger and more elaborate. What would emerge across the region was large settlements, ever increasing disparity in wealth and power, materializing into a complex political structure ruled by a hierarchy of materially rich and powerful social groups.

Kin and non-kin related social groups, having a shared material investment encompassing crops or gardens, crafted goods, the constructed spaces including buildings and plazas, comprised relational units. One way to understand these is as social ‘houses’ (Joyce and Gillespie 2000). This understanding of social material groupings in ancient Maya cities differs from classic “lineage” based models as it acknowledges 1) non-kin relations within the house such as slaves and servants and 2) the active materialism of the house itself. Social bonds created through descent were certainly important for the Maya: there is extensive text devoted to parentage statements and ancestral histories. Those relationships were deeply enmeshed in a larger material estate. ‘Houses’ were the basic social units of a settlement structure. Within the houses was internal variation in status, wealth and authority.

Social houses had a history as practice and organization. Some houses experienced histories of increased wealth and power, and eventually emerged as political leaders (McAnany 1995). Heads of powerful houses often occupied political positions. The coming together of supernatural deities, existing social houses, material wealth and influence created a new collective that most scholars call a dynasty (Martin and Grube 2000; Schele and Miller 1986). Elements of this collective were inscribed in a written form.

The identity of the house and its history was often exercised through the veneration of ancestors (Gillespie 2000,12; McAnany 1995). Particular residences within a larger 'house' were the material origin of the group and it was these residences that owned the remains of the select few that were transformed into ancestors (Scherer 2015). Some house members owned ancestral shrines. These were a separate, demarcated space, usually a pyramidal structure, built to hold the remains of important individuals. The most elaborate example at Palenque in particular, being Pakal's "Temple of the Inscriptions" (Figure 7). For the rest of society, those that were non-ancestors, were buried in plazas, house floors and stairs. These relationships were experienced, created and shared through materials, including the residential structures, material objects such as jewelry, heirlooms, pottery and tools (Gillespie 2000, 3).

In Maya inscriptions, these groups are sometimes named as *nah*, or "house" (Stuart 1998). Select houses grew in power and wealth and their influence lead to the emergence of a group of lower lords (Schele 1986). Some have suggested that the growth of the "noble class" would lead to major shifts away from centralized rule during the Terminal Classic or Postclassic, to a system of shared rule among heads of influential families, a political structure reported in early colonial sources (Freidel and Masson 2002, 21).

The 'house' is not restricted to the residential structure alone, but includes the shared milpas, storage, shrines, and workshops. This appears to be the case among ancient Maya communities and was reported among more contemporary Maya communities as well (McAnany 1995; Vogt 1976). Maya houses were and continue to be living, animated entities that need to be fed (Taube 1998; Vogt 1976).

Cities were growing, buildings made taller, agricultural fields and terraces spreading, written inscriptions, mural painting, stucco work, stone monuments and ballcourts transformed the landscape. Many of these cultural hallmarks were initially thought to have developed quite suddenly during the first century BCE, with the establishment of dynastic rulership, its associated symbols and written text (Freidel and Schele 1988). But continued archaeological investigations and intensive microanalyses suggest that the extensively modified landscape, and the material culture that has come to be associated with Classic Maya culture, was the outcome of a long history of material engagement, a history filled with moments of innovation and experimentation (Clark 2004; Joyce 2004; McKillop 2002; Pohl et al. 1996).

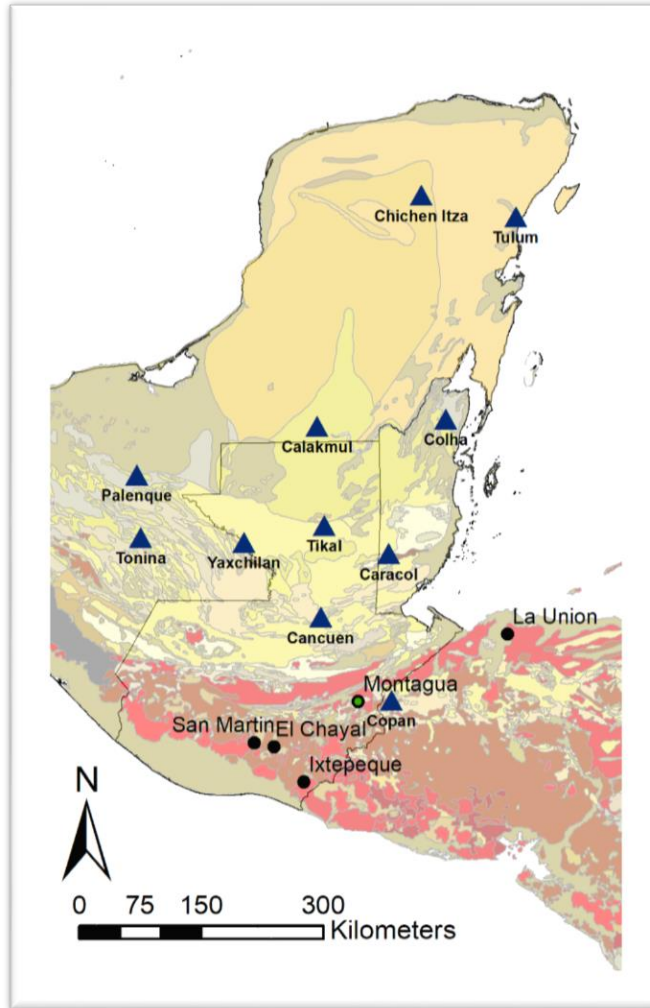


Figure 3: Geological map of the Maya region indicating the location of Maya cities and material resources mentioned in text, yellows and greens are mostly sedimentary, some metamorphic, pinks and reds are volcanic (Johnson 2018).

Each Maya center or city emerged through a localized history. While Maya cities appear similar, particularly in their larger material manifestations, individually, assemblages were unique. New combinations of humans and nonhuman things, animals, plants and landscape formed a variety of contexts leading to distinct identities, practices, and materialities. A closer look at each community reveals a unique history of sedimentation, with diversity in material practices. A number of the larger cities became heavy consumers, often supported by those communities inhabiting areas rich with material resources. This was enabled by a complex network of trade routes through mountains, rivers and along the coast. Some communities, particularly along Yucatan's coast, were heavily invested in coastal living, exploiting fish and other marine materials, constructing shell mounds, and producing salt for trade (Hutson et al. 2010; McKillop 2002). Communities in Northern Belize exploited the numerous outcrops of fine-grained chert,

developing an industry of stone tool production that provisioned cities throughout the eastern and northern lowlands (Shafer and Hester 1991). Some cities were positioned near areas with material resources acting as ports or centers for distribution and trade, such as Cancuen, a city located between the volcanic highlands and the tropical lowlands in central Modern-day Guatemala. Massive quantities of jade in various stages of production recovered there suggest Cancuen was a place of production and distribution of this material, which originated in the Motagua River valley (Kovacevich 2011). Cinnabar and mercury, probably mined near volcanic sources, passed through communities in Honduras (Pendergast 1982). Other major Maya centers were constructed near vital material sources, such as the highland center of Kaminaljuyu, built just 20 km away from the largest outcrop of obsidian in the highlands at El Chayal (Hirth 2003).

Other communities located in the dense tropical forests of the central lowlands grew at a distance from volcanic obsidian sources, marine materials, and other mineral resources, but spread across the limestone topography of the Petén region of southern Mexico, Guatemala, and Western Belize, unhindered by geological barriers or waterways (Fletcher 2011; Haviland 1970). These communities became densely populated cities, some connected by paved causeways. But within these dense urban centers, artists, scribes, and architects utilizing the various imported materials developed unique and elaborate styles and techniques, recognizable as local traditions. Distinct stylistic traditions and standardized material culture emerged in different areas of the Maya region, particularly in ceremonial architecture and ritualized practices. In this area of the Petén, including the city of Tikal, Holmul, and Motul de San Jose, distinct traditions of polychrome pottery production were developed (Becker 2003; Reents-Budet et al. 1994). Other material traditions in the central and eastern lowlands include an increased standardization in ceremonial architecture, particularly “E-Groups.” This is the term used for a multi-building assemblage that worked as a seasonal solar observatory (Aveni 1980). Where “E-Groups” are found, they are typically some of the earliest monumental architecture, centering ever-growing cities (Hendon 1999). Characterized by an emphasis on the eastern cardinal direction, the layout typically includes a long, linear platform supporting a series of smaller shrines on the eastern side of the open plaza space with additional pyramidal structures oriented to the other cardinal directions. This particular architectural design appears to have a clear boundary of distribution in the southern lowlands (Chase and Chase 1995). These early communal ceremonial spaces materialized through discursive practices placing ceremonial importance on the cardinal direction of east which carried over to mortuary practices, with the construction of mausoleums on the eastern side of residential plaza groups (Becker et al. 1992; Chase and Chase 1994).

An indigenous ontology that understood the cosmos as a collection of worlds inhabited by powerful things, places, spirits and deities, that were a very material presence, was deeply rooted in Maya practices, social organization, urban growth, politics and economy. The relationship between humans and nonhumans, particularly the powerful deities, spirits and ancestors, was often mediated through material offerings. The practice of making offerings grew a network of acquisition, trade and distribution of minerals including jade, obsidian, pyrite, and others needed for processing pigments, as well as animals, feathers, marine materials, and organics such as pine, and copal.

Many of the large cities and even communities of smaller sizes were connected by extensive trade routes, enabling materials, labor, and information to spread throughout the Maya region. The continued relationships led to a number of shared practices, including ritualized offerings, temple building, ballgames, the construction of tombs and altars, writing and crafting. Within the cities, and in the smaller communities, distinct identities materialized. While residents of the city of Palenque clearly interacted with the wider Maya region, and followed many similar practices of temple building, hieroglyphic recording of political/mythical events, use of ballcourts and tomb burials, the city was distinct both in its historical emergence and its materialization. We can attribute this to the very nature of sedimentation, as a historical process of assembling that happened in that place, with those materials, over a course of centuries.

A number of major Maya centers, including Palenque, appear to have produced written records detailing the solidification of a system of rulership during the fifth century CE (Martin and Grube 2000). Archaeological investigations in many of those other sites has revealed initial occupation and monumental construction events preceding those written accounts by centuries (Chase and Chase 2006; Pendergast 1981; Sharer 1992). Yet to date, few early archaeological remains have been recovered from Palenque, leading most to assume Palenque's emergence was relatively late in Classic Maya history (Stuart and Stuart 2008). While the generalized history of Maya society can tell us about widespread developments, only the specific history of the Palenque assemblage can illuminate that particular history.

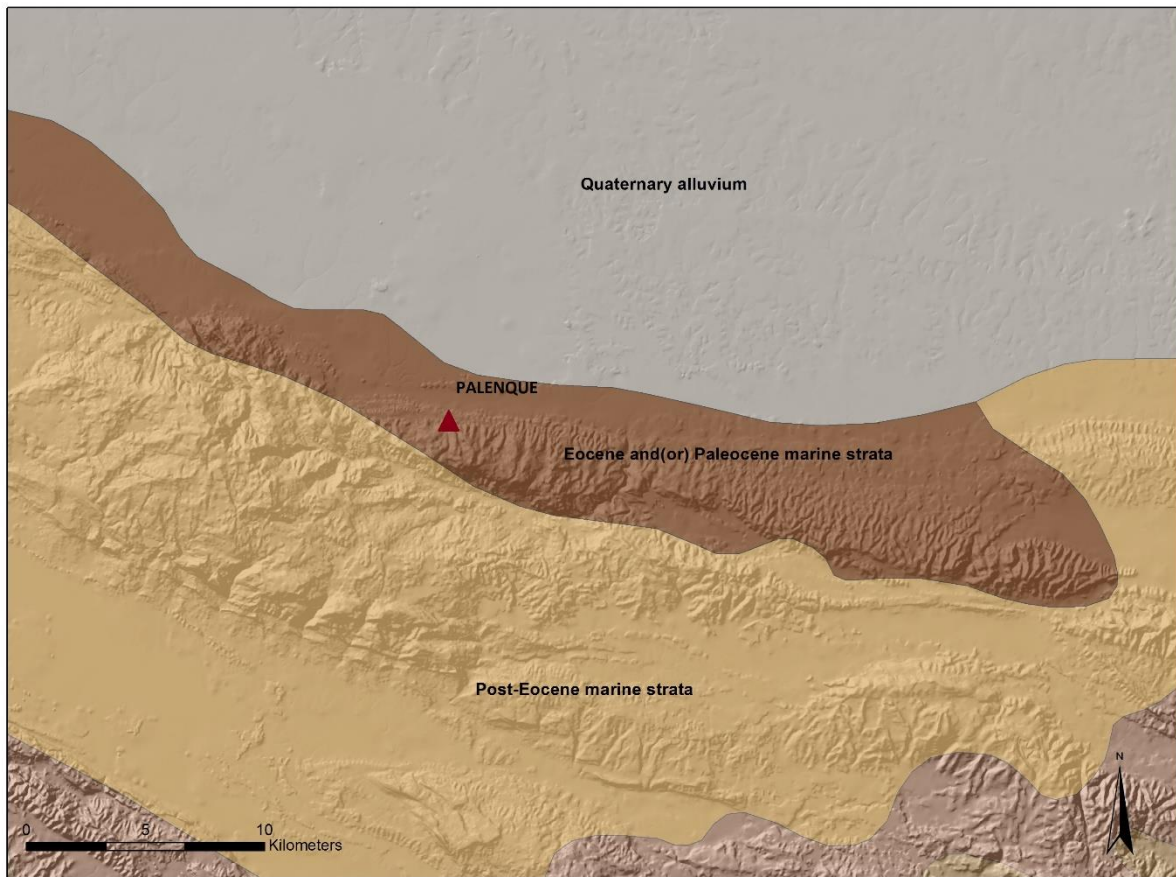


Figure 4: Map of geology indicating the location of Palenque situated between folded sierras and alluvial floodplains (Johnson 2016).

Sedimentation and a History of Becoming: The Urban ‘Exo-Skeleton’

Cities are assemblages of people, networks, organizations, as well as a variety of infrastructural components, from buildings and streets to conduits for matter and energy flows (De Landa 2006: 5-6).

We can consider Palenque’s unique history of urban growth, not as one of linear development driven by select individual rulers as has often been done in prior studies, but rather as a complex sedimentation of materials, institutions, and populations, in the manner outlined by Manuel De Landa’s historical review of European cities (De Landa 2000). The geological landscape, climate and vegetation all contribute to the growth and material formation of the city. Palenque falls within the Maya lowlands, but skirts the Tabasco plains, on the westernmost edge of the Maya region. To consider the ways in which matter flows, intra-acts, and solidifies into historical constructions, De Landa (2000) calls to mind one of the most significant outcomes of

matter intra-acting, that is, the coming together of mineral and organic tissue, resulting in vertebrate organisms. Through a series of happenings, entanglements and evolutionary dead ends, the human endoskeleton would emerge, and through a history of material manipulation, developed an urban exo-skeleton. This "mineralization of humanity" took a distinct form in the westernmost boundary of the Maya cultural region (De Landa 2000, 30). The combination of water and stone, clay, a hierarchical meshwork of people exercising varying levels of authority and subservience, a number of institutions including a market economy through which matter flowed across the landscape, shared material-discursive performances, and a series of intended and unintended historical outcomes gave rise to a unique urban landscape. While the materials and practices of the city outwardly resembled the wider Maya region in some ways, as ballcourts and temples were built, similar iconography and symbols emerged, a long and complicated history of assembling set Palenque as a city apart.

Palenque is situated on a long linear limestone stratum, with the heavily folded Chiapas-Tabasco foothills looming over its southern edge and the vast alluvium plains stretching north into modern day Tabasco (Figure 4). This "shelf" is a somewhat flat area running along the lower ridges of sedimentary rocks of the Paleocene age and geology of the Miocene age extending north into the flood plains. Built on a relatively small area of 2 sq. km, it was an ideal landscape for urban growth away from the flooded plains and steep mountainside that surrounded it. The Maya living thousands of years ago referred to their home as *Lakamha* ' or "big water," a reference to the number of perennial streams and small rivers flowing through the city. There are 56 known springs that flow into 9 separate streams and rivers throughout the city area, so much water that a system of aqueducts, bridges and dams was constructed to regulate the flows (French 2007).

But it was not just water that made the city: limestone provided a crucial mineral from which the city took shape. The geology that supported the city emerged from the ocean around 66 million to 56 million years ago, its watery beginnings evident in the extinct marine fossils visible in the surface of exposed limestone outcrops outside of the city (Cuevas Garcia 2007b). The steep sierras were formed through folded limestone, micaceous sandstone and shale (Price et al. 2006; Rands and Bishop 1980). The parent material is marked by geological diversity, a slow sedimentation on a luvic floor, mostly composed of quartz sand deposits at the deepest level and layering of Miocene age sediments of sandy loam with finer clay, sandstones, and shale. The subsequent exposure to weathering due to the constant humidity and inundation of water of these minerals turned the textures of the soils to a silty clay (Castillo 2011; Rands and Bishop 1980). Remnants of these materials, the clay, and sandstone with inclusions of mica, can be seen in Palenque's ceramic pastes, and as I will discuss in the following chapter, in micromorphological thin section, mixed with built features.

The steep terrain and heavy rainfall expose parent rock as well as newly exposed, barely weathered mica, feldspar and muscovite which characterizes the paste composition of pottery made from clays procured from the area south of the city (Rands and Bishop 1980). In contrast, clays mined from the wet plains to the north have inclusions of phytoliths from grasses, with few, weathered inclusions of feldspar and mica. In addition, volcanic dust is present in this plains

clay (Rands and Bishop 1980). The coarser textured clay procured from the plains was largely used to make cooking and storage vessels such as jars, basins and bowls, suggesting the communities in these outlying areas specialized in making these forms, which would make their way into the city. The micaceous clay from the mountainous sierras was used to make serving ware, including plates, vases and small bowls. The specialized pottery produced by the communities inhabiting the plains to the north and the sierras to the south flowed into centralized markets to be dispersed throughout the city. Artisans working inside the city developed a distinct tradition of elaborate incensario stands, crafted from clay molded with applied features, standing waist-high and depicting deities, ancestors, animals, and cosmological symbols (Cuevas 2007). Incense burning vessels and figurines were also crafted within the city (Rands and Bishop 1980).

The ecological setting is also diverse, with riverine bottomlands, sweeping savanna grasslands, and a heavily forested, steep terrain dense with sapodilla, Ramon, ceiba, mahogany, sapote, strangler figs and allspice trees. Orchids and bromeliads climbed the trees, lianas, and ferns filled the forest floor. Many of these trees would be exploited by Palenque's occupants for food, building materials, and ornamental purposes. Other flora, such as cacao, avocado, pepper and other spices, were locally cultivated.

The city, as it thronged with life, humans, jungle plants twisting and sprouting, and animals scurrying and howling, was supported by an "endoskeleton" itself constructed from the silica bodies of once living organisms, cemented into a fine-grained limestone. The limestone provided a raw material for the construction of houses, plazas, terraces, temples, ballcourts and aqueducts. More than 1,500 built structures densely situated along the geological landscape is the outcome of a long sequence of simultaneous events of matter assembling (Figure 5). The material landscape that informed the reality of the ancient Maya (mountains, animals, plants, social institutions) emerged through historical processes, but they were not the result of an inevitable outcome. As part of a "world of becoming" events of construction, warfare, ritual, politics, growth and decline at Palenque were *possibilities* out of what Connolly (2011) would characterize as countless possibilities. The numerous structures coming together were in various stages of becoming at any one time, some more rapidly than others – the geology so vital to Palenque has been in a constant state of becoming for millions of years, the stone buildings, aqueducts, and causeways that form the constructed space emerged over hundreds of years. The social structures, the knowledge and practice of those construction strategies and architectural design was informed by thousands of years of manipulation of stone, through a series of intended and unintended consequences.

The people of Palenque were part of a living ecology, dwelling in the isolated jungle environment. While the city was likely cleared with wide-open paved plazas and pathways, a number of plant species surrounded the city, and residential areas may have had private kitchen gardens like those identified at places like Caracol, Belize and Ceren, El Salvador (Chase and Chase 1983; Sheets 2000). The extensive waterways provided fish, turtle and freshwater snails for food. Monkeys, jaguars and brightly colored birds inhabited the trees. The overwhelming presence of these living things, the plants and the animals, the water and stone, is made clear

when one looks at the artwork produced by Palenque's artists, or the materials included in events of offering. Often, artistic representations of humans and supernatural deities merge with animal features or are adorned with plant like appendages, leaves, flowers, maize stalks etc. Durable materials such as jade or shell were carved into the shapes of animals and plants. The elaborate artworks, iconography and symbols have often been relegated to the domain of the "imaginative" environment, separate from the ways "people interact, practically and technically, with the resources of their environment in obtaining a livelihood" (Ingold 2000, 9). By the time Palenque was beginning to grow, there were already many shared symbols and meanings, all derived from continual human and nonhuman engagement. Many of the cosmological principles and repertoire of representation emerged through human *intra-action* (after Barad 2007) with the broader living world.

The city was also driven by social institutions, a complex and hierarchical political organization which, as in the rest of the Maya area, included ruling families, supported by varying levels of advisors, community leaders, military leaders, and specialists in ceremony. These social institutions manifested in very material ways, seen in the artworks commissioned and decorating the city with Palenque's earliest known ruling elite, an ever-growing palace complex, ballcourt, and elaborate temples peeking from the jungle canopy. "Cities are open systems with matter-energy flowing in and out continuously" (De Landa 2000, 76). Like most urban ecosystems, the city of Palenque was largely a consumer, and so, matter flowing in and out was not evenly distributed: it was largely flowing in and not as often flowing out. Palenque depended more and more on the communities immediately surrounding the city to support its growth and continued existence. The events of construction were fueled by human energy, scores of laborers required to gather and move stone across the plazas. The fine-grained limestone locally available led to innovations in art, with thin stone slabs intricately carved with elaborate scenes and hieroglyphic text inside rooms, while stucco facades adorned many of Palenque's palace and temple structures.

As De Landa (2000, 30) has noted:

There are two basic processes by which cities can emerge and grow. A town may develop spontaneously, acquiring its irregular shape by following topographical features of the landscape, or it may inherit its shape from the distribution of villages that have amalgamated to form it.

Other major Classic Period Maya cities, particularly in the Petén region of the central lowlands, emerged through the incorporation of previous smaller settlements (Chase and Chase 2007; Fletcher 2011). De Landa's observation does not explicitly mention planned cities, but there are of course, elements of intentional planning in city design in Mesoamerican cities. Palenque's growth followed the contours of the relatively isolated limestone plateau. The geology and the surrounding topography, the mountains and the wet plains, delimited the area in which ancient Palenqueños constructed an urban "exo-skeleton," its "endo-skeleton" full of vibrant matter, things, families, neighborhoods, animals, substances, smells; all matter flows through the city.

The growth and emergence of Palenque's distinct urban landscape can be attributed at least partly to its active role in a complex, hierarchical and heterogeneous meshwork in which other Maya cities were entangled. This meshwork, and the continual interaction that occurred between people with influence, the flow of materials, language, and ideas across the landscape, at times reached elevated moments of instability, innovation, and growth. Those moments often coincided with or led to episodes of construction, with the city continually growing upward and outward.

The city of Palenque emerged during a time when complex institutions of rulership, economy and religion had already solidified across the Maya region. An account of Palenque's earliest history of becoming is patchy at best. There have been limited stratigraphic excavations, particularly outside of the central district, so it is difficult to consider discrete episodes of growth and expansion. Instead, Palenque's development is considered here as a flow, with periodic moments etched in stone, or materialized in discrete assemblages.

The earliest foundations would influence the way the city would continue to grow. The visible layout of Palenque's urban landscape suggests a combination of centralized and decentralized urban planning. Unlike the well-ordered grid-based design implemented by many cities under centralized planning, Palenque's design was irregular, compact and clustered. The layout of Palenque was most likely the result of a history of growth and expansion as houses grew and filled in any available empty space. The city design in this case, was not planned, but rather, as De Landa would say, was 'organic' (De Landa 2000, 30). It *was* organic, its growing exoskeleton followed the ridges of the limestone mountains, adhering its foundations to the bedrock slopes. Its veins were well worn paths, tamped by feet for thousands of years. The design of the city can also be attributed to the material practices performed within it every day (de Certeau 1984).

Like most Maya cities, Palenque's older buildings remained visible for hundreds of years, even as new ones were filling in the empty spaces. Rather than demolishing an existing structure, they were expanded, upgraded and maintained, or carefully entombed in a larger, newer building. Temples and houses were alive. The monumental temples were modelled after mountains and considered spiritually powerful, much like their natural counterparts (Stuart 1998; Taube 2004). They were fed and cared for. Architects and builders blended the natural limestone topography and the crafted stone limestone blocks together to become towering temples (Stuart and Stuart 2008, 167), where the boundary between the cut stones and underlying bedrock was often blurred. The large mausoleum structure known as the "Temple of the Inscriptions" that housed the dead body of the most famous ruler, K'inich Janahb Pakal, was built up against a mountain, with an elaborate set of stairs and structure on top (Figure 7). A similar strategy was employed in the Temple of the Cross complex, with the Temple of the Cross and Temple of the Foliated Cross built against the side of a limestone slope.

In the earliest detected events, taking place in the first centuries A.D., communal platforms were constructed, providing space for public ceremonial and ritualized events. The earliest known in what is today called the "North Group" was initially an elongated platform with small structures, with thatch roofing (Marken 2007b; Stuart and Stuart 2008, 117). Periodic events afterward

would result in an ever-growing architectural complex and the emergence of an architectural feature, the vaulted roof, in a distinct mansard-style that would be repeated throughout the city (Marken 2007b; Tovalín and Manrique 1996). This complex of structures also led to innovative decorative practices.

The people of Palenque, taking into consideration the continuous inundation of water flowing through the city and out into the plains, and the saturated soils, constructed their urban “exo-skeleton” to accommodate these flows. In the area around the palace, aqueducts, steep stairs, and sloped plazas were constructed to drain water away (Acosta 1976,51). The architectural strategies used to construct stone archways in buildings and tombs carried over to the building of aqueducts to regulate the flow of water throughout the city.

The construction of the aqueducts led to innovation in architectural strategies, with the installation of a system of drainage inside the palace, for what are presumed to have been indoor bathrooms, the only known example in the Maya region (Ruz 1952b). Extensive terracing projects were initiated around the main core of the city to stabilize the sloping hillsides to the north, providing additional space for construction of houses, without the risk of erosion (Barnhart 2007).

Homes, too, expanded and rose, through a series of construction events as the social ‘houses’ grew both in number and in wealth. Many of the largest homes became complex compounds, with a series of rooms and multiple stories, similar to the residential compounds of Copan in Honduras (Fash 2001; Lopez Bravo 1995).

As matter flowed into the city, a noble class emerged, intensifying demand for matter-energy, both in materials and in labor. Extended families, those that married in, their children, and for the nobility, their servants or slaves, settled throughout the city, their large stone-built residences growing into multi-room complexes and elaborate patio groups. Many of the individuals that formed these ‘houses’ filled hierarchical positions of local administration, religious specialists, military leaders and merchants (Izquierdo and Bernal 2011). The social groups that inhabited these compounds had a shared investment in the communal space, resources (including subsistence production), and ritual practice, leading to the emergence of powerful ‘houses’ across the city. These social and residential groups crosscut descent, marriage and non-family relationships. Often multi-family groups resided together. Within the house, relationships were hierarchical, with some members exercising more authority than others. Hierarchy existed across houses as well, with some houses more powerful than others.

Yet, the house is not a whole, removed from the innerworkings of individuals, materials and space as they shift, come together, and re-organize forming different combinations of components, emerging as assemblages. Some assemblages leave longer, more lasting material impressions on the physical manifestation of the house over time, particularly those events directly related to the expansion, building or modification of the built space. The most powerful social house of Palenque governing from the palace complex, although possibly living in a separate residential complex overlooking the cascades of the Otolum river (Stuart and Stuart 2008, 154). The “palace” itself was a historical construction, evident in its irregular positioning

of structures (Hartung 1980). As the generations passed, new structures crowded existing structures, and older structures were covered deep within, transforming them into underground chambers and hallways.

The large temples and mausoleum structures throughout the center of the city were elaborated forms of the common house. Classic period mausoleum structures were houses for the dead, and temples, houses for the supernatural. These spaces were often implicated in ritualized events.

The hierarchical social structure of the people that lived in Palenque added to its complexity. Ever-increasing control and consumption of materials led to a wider gap in wealth, and eventually, a wealthy class of rulers, military leaders, smaller scale community leaders, advisors, and specialists in ceremony. Their need of material and wealth would drive the growth and elaboration of the city. However, like an ecology of sorts, farmers, laborers, cooks, crafters, and a host of materials were needed for this privileged class to exist.

It is difficult to say where lower sectors of society lived, as commoners have not been sufficiently investigated inside the city. But if Palenque was anything like other Maya cities, commoners and a “middle class” may have been living throughout the city, and alongside the large complexes that housed the privileged (Chase and Chase 1996).

Palenque was part of a larger meshwork of Maya centers, connected through long-distance trading, warfare and marriage alliances (De la Garza et al. 2012; Marken 2007; Stuart and Stuart 2008). These relationships also brought material into the city, most from very far away. If one were to imagine the goods being carried over mountains on foot, merchants hunched with packs full of jade, obsidian, poisonous but prized bright red cinnabar from the highlands of Guatemala, colorful spondylus shells from the Pacific coast, all flowed into the city and their wares flowed throughout Palenque’s richest homes, funerary constructions, and temples.

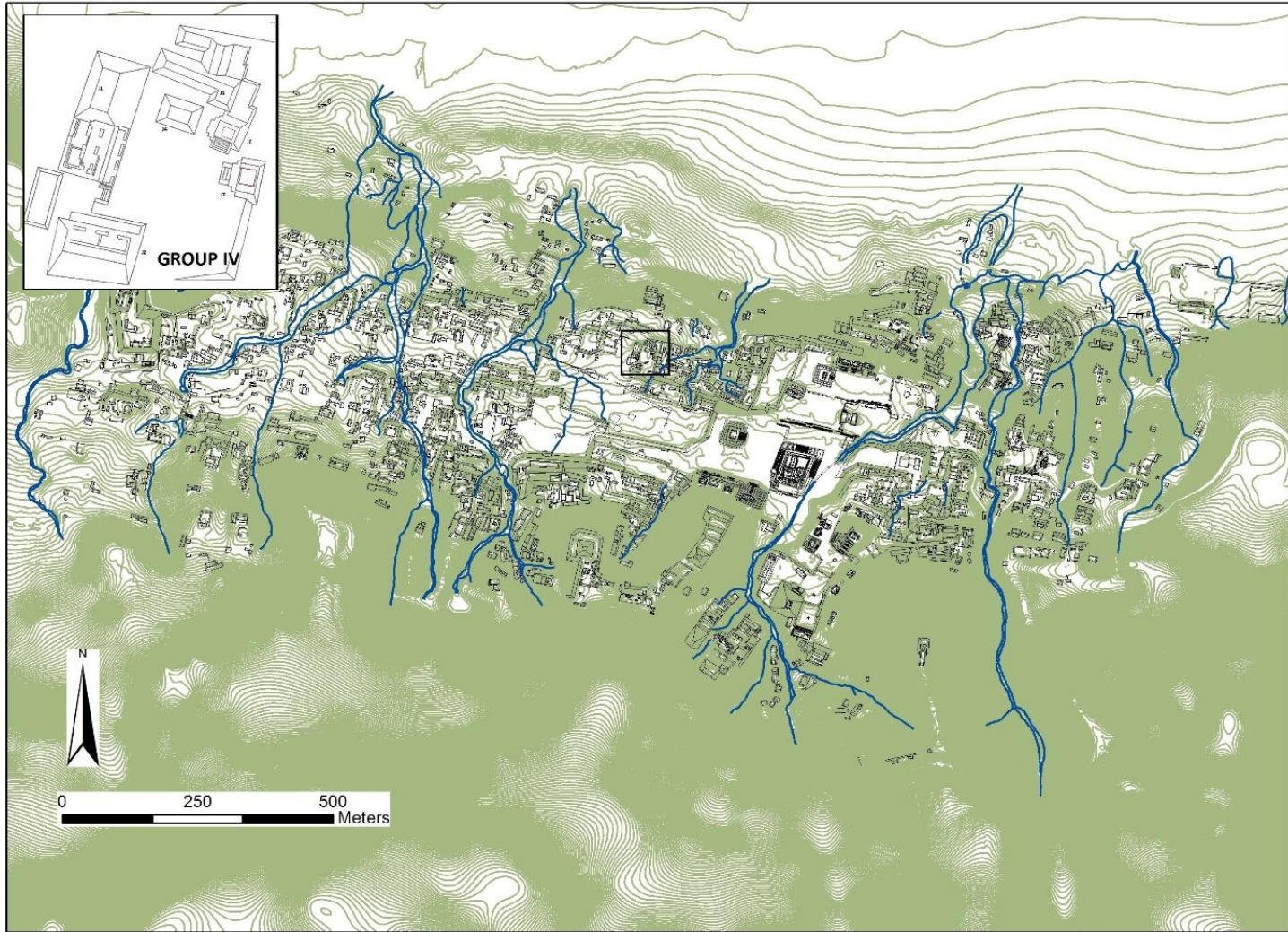


Figure 5: Map of Palenque built against the side of the sierras, location of Group IV indicated in upper corner (Modified after Barnhart 2001).

Matter-Energy Flow

An urban landscape does not grow from mineral alone: the stone buildings that make up the visible features of Palenque as city were but one component of a heterarchical meshwork of materials. In describing an ecosystem as one of flows of energy, De Landa (2000, 106) describes the emergence of cities as another kind of ecosystem, circulating biomass to feed its inhabitants. In this particular kind of ecosystem, the city is largely a consumer of energy, whereas the surrounding smaller communities are the producers of energy.

The city of Palenque and its people relied in large part on smaller communities out in the plains and the surrounding area for food and other materials such as clays (Rands and Bishop 1980, 42). The mineralogical and geological landscape was diverse in the area around Palenque. While mostly limestone, there are also exposures of sandstones and shale. Clay was procured from the surrounding area and brought into the city to be shaped by knowledgeable potters (Rands and Bishop 1980), and carefully fired by those knowledgeable in controlling the distribution of heat and timing of the moisture extraction of clay. Minerals, such as mica and feldspar from the low sierras, were needed to temper the clay so that durable pots could be made to withstand heat in cooking, or thick-walled ollas could hold the large amount of water which the house relied on for everyday cooking and cleaning.

— To accommodate the city, irrigation canals and agricultural terracing were carved into the landscape to grow maize and other staple crops (Liendo 2007). Inside the city, small groves of trees laden with cacao, avocados, Ramón, and other fruiting trees providing other prized foods, may have occupied residential orchard plots, as they did in other Maya cities (Lentz 1991). But those edible fruits would hardly be enough to sustain nearly 6000 people on a daily basis. Yet the fruit trees formed a specialty part of the diet that was clearly significant. Pakal's sarcophagus displays his ancestors as trees of cacao, avocado, chicozapote, coyol, guayaba and mamey, some trees that provide foods and others that are typically made into drink (Barthel 1980; Schele 1978).

The limestone of the Palenque region was easy to quarry and made into good quality stucco. Limestone rocks were piled and burnt with mixtures of soil and wood to reduce it to lime to be mixed with water, providing a thick putty-like texture. The energy from humans and heat needed to produce this mixture was great, resulting in complex operations of human-matter-energy flows. The stucco was malleable and was crafted into sculptures, masks, and panels, decorating the stone structures.

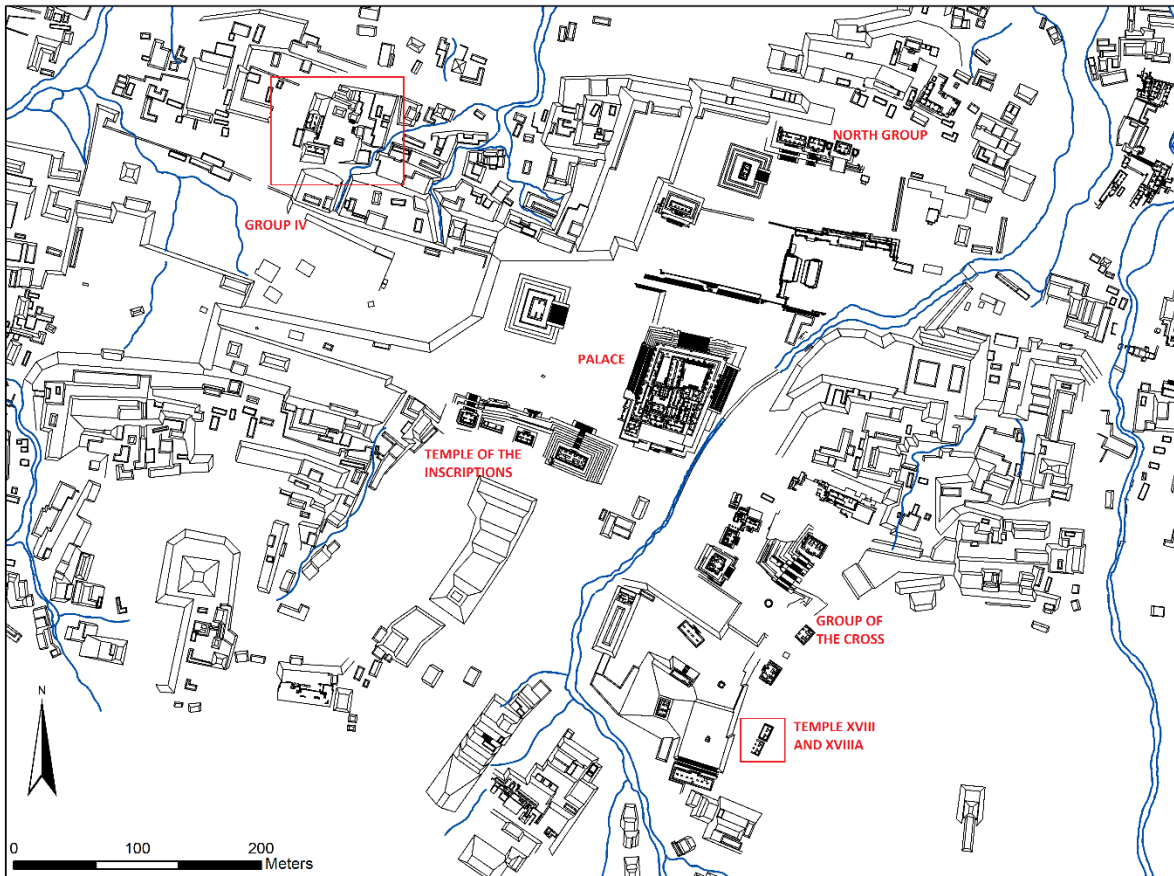


Figure 6: Palenque center indicating location of architecture mentioned in text (Modified after Barnhart 2001).

Just as distinct accents and dialects develop within cities, the symbols, text and iconography coming out of Palenque were a distinct form of a larger set of vehicles of communication shared throughout the Maya area. The style of representation and the subject of texts were rooted in the material landscape from which Palenque emerged.

Throughout the city's becoming, emerging material discursive practices, symbols, artworks, hieroglyphic texts were implicated in making meaning. The temples constructed throughout the city were often adorned with elaborate panels and carved with texts and images. Human, plant, animal, stone and supernatural deities merge together in the pictorial language, written, carved and painted by scribes and artists. The iconography and text were not pre-defined concepts, but rather emerged through the "dynamics of intra-activity" (Barad 2007, 335) between the ancient Maya people and the world in which they were a part.

Imported cinnabar and malachite were mixed with local calcite to produce pigments of red, greens, blues and black for the decorated incensario stands, and buildings. Cinnabar mixed with calcite was also prepared as a paste to coat the remains of the dead (Vázquez Negrete and Velázquez 1996).

The material world of the Maya was intimately caught up in the world of the supernatural: gods, spirits, ancestors, had a large role in the matter flow. The bulk of the imported materials, such as jade, shell, and cinnabar, were used in ritualized events that took place in the city's temples, palace, and at tombs and altars.

Ritualized Events in the City

Across ancient Mesoamerica, there was a shared cosmological model in which the world plane was arranged in a four-sided layout, oriented to the cardinal directions, around a central point or *axis mundi* (Freidel et al. 1993; Taube 2003). There are multiple worlds that are vertically layered. These cosmological principles were often replicated in architectural arrangements (Ashmore and Sabloff 2002), and structured ritualized events (Chase 1988; Joyce 1992; Lomitolá 2012). While these basic principles were shared across the Mesoamerican region, they materialized in diverse forms. Palenque, it seems, did not so much follow the four-sided arrangement in their architectural plans or ritualized events, although the act of layering is repeatedly evident in ritualized events recovered in the city center.

Ritual events among the Classic Maya were initiated by a number of different situations, such as agricultural cycles, warfare, life-cycle events (i.e. marriage, birth, coming of age, gaining of titles etc.), yearly celebrations in honor of the gods, and the most visible archaeologically, death and veneration of ancestors (Fitzsimmons 2009; McAnany 1995). Ethnographic, ethnohistoric, iconographic and hieroglyphic texts all suggest these other kinds of events were prevalent, and yet, archaeologically, the remains of rituals detected are limited to caches and burials, and in some cases, termination events (Becker et al. 1992; Mock 1998).

Ritual was required to sustain the stability of the city. Each ruler celebrated calendrical rites with offerings to the gods. The periodic conflicts with neighboring cities disrupted those rituals. Text inscribed on the panels of the Temple of the Inscriptions describes the importance for the ruler Pakal to resume rituals (Stuart and Stuart 2008, 167). Events varied in scale and with materials that differentially leave archaeological traces. Some events are more visible, yet they are only a recognizable moment in a long history of heightened moments. Many of the more visible are restricted to the Palace complex and the temples immediately surrounding it.

The matter-energy flow of Palenque included active souls, spirits and supernatural beings. These beings had real material effects in the city. Palenque's public spaces, temples, and the more restricted palace complex, were brightly decorated in color and imagery of deities, animals, supernatural creatures, and text describing political and military events alongside the presence of gods, suggesting a cosmology embedded in city politics, war, and everyday life (Grube 1996;

Schele 1996). From the perspective of the ‘assemblage,’ these components materialized together, and the city emerged. Military conflicts with neighbors also included the supernatural, with the very presence of Palenque’s patron deities under attack (Grube 1996). Colonial accounts describe the role of local leaders as caretakers of the idols, mediators between the community and the supernatural (Orellana 1951). Similarly, Palenque’s ruling class legitimized their authority through active ties with the supernatural.

Ritualization, as stylized actions, often occurred during heightened moments, events. And in Palenque, similar to other Maya cultural groups, these events included mourning and burying the dead, making offerings during temple construction and renovation, periodic temple visits, and the construction and use of altars. While these are the most visible types of events in the archaeological record, images and objects found throughout Palenque also suggest that there were dances, music, stories, and feasts. Acts of offering were carried out in a variety of ways and implicated a host of materials. The offering is what we encounter archaeologically. However, it was but one component of the ritualized event.

Through a history of material practice patterns emerged in the materialization of ritualized events at Palenque. Similar kinds of materials are repeated as well as the locations in which the events materialize. Each “ritual deposit” encountered by archaeologists was an event in which people, things, nonhuman animals and plants, and the supernatural were brought together, bounded by space and time, which is why the materials in Palenque’s ritual deposits are unique groupings. The materials engaged during these events spark the senses through their bundled qualities. The smell of a substance through burning, the texture and feel, the sound of instruments, chanting, songs, or stories, the color of stones, shell, minerals, memories of enchainment relationships created through the itinerary of the materials, all were brought together in a single moment. Their appearance in these groupings followed different paths, initiated by their physical or symbolic qualities.

A history of material practice informed the series of events that materialized over centuries, implicating numerous generations of living Maya and a host of vibrant materials. Tracing that history reveals one possibility among numerous possibilities (Connolly 2011). The earliest known ceremonial architecture in Palenque’s central core area is a long, linear platform with multiple temples, known as the “North Group” (Tovalín Ahumada and Manrique 1996). Unlike the “E-Groups” in the central lowlands, the Maya of Palenque constructed these temples on a ridge facing the rising sierras (Figure 6). The line of temple structures is located north of the central palace but one cannot assume cardinal directionality inspired the location of this set of architecture. Geology and relationality with surrounding spaces may instead have been a driving factor.

During the Early Classic Period (A.D. 200 – 400) the first version of Temple V was constructed. Three events of offering were carried out along the central line of the structure walking into the inner shrine area (Ruz1959, 247). In one event, an offering of eight miniature vessels, ranging from 6-9 cms in height were inserted into the stucco floor just outside of the inner shrine area. The vessels were laid in a mixture of “lime and gravel.” Miniature objects are not common, but

when they are found, they are typically found in ritual contexts, particularly pottery vessels (Aoyama et al. 2017; Chase and Chase 2011).

The next offering was inserted into the floor in the entryway of the inner shrine room, and included charred textile and fragments of jade, shell and pearl, most also charred (Ruz 1959, 247). These materials were mixed with charcoal suggesting that the collection of jade and shell was most likely bundled in cloth and then the offering was burnt *in situ*. Among the burnt objects were 30 fragments of jade mosaic pieces, including two matching deity heads with traces of cinnabar, other fragmented incised pieces, and a long, linear jade piece with glyph-like designs. The shell pieces were mostly drilled and smoothed fragments of bivalves, also most likely mosaic pieces, and they may have been attached to textile costumes.

Then, walking into the inner shrine, another offering was inserted into the stucco floor in the center of the room. This offering included a stone cylindrical vessel, internally carved into a cruciform shape. A small vessel containing a Tertiary-age fossilized shark tooth, and a small fish tooth, was placed inside the stone vessel and lidded with a small plate (Ruz 1959, 247).

Each one of these assemblages was distinct, both in performance and materialization. While the first set of materials was transferred to the supernatural realm through sealing away with lime and gravel, the next was burnt, transferred through smoke. The position, contents and treatment of the offerings, were both material and meaningful.

As events, the placement of these offerings included assemblages of temple, ritual specialists, observers, and a religious institution that defined the need for such an event. The materials, including marine animals, and precious green jade, index a shared Maya cosmology that associated green jade with life and vitality and marine materials with the watery underworld (Freidel et al. 1993). The two materials were often paired together to materially reproduce cyclical death and regeneration. The placement of the offerings along the central line as one walks into the central shrine is another commonly shared material practice throughout many Maya centers (Joyce 1992). Both actions and materials are meaningful. Placing offerings along the central line of a building was an action by which, through practice, meaning emerged. While the Maya at Palenque did not typically place their offerings in cardinal patterns, layering, as well as nesting inside lidded vessels, was replicated throughout numerous ritualized events. In the case of the stone vessel, cosmological principles of the four-part world can be seen in the cruciform carving.

The event of offering carried out in the doorway of the inner shrine room included the act of bundling and burning, both acts made meaningful through their stylization in a ritualized event. Bundling emerged in early Mesoamerica as a commonly enacted practice both in offerings of things and in the treatment of dead bodies (Guernsey and Reilly 2006). The event at Palenque was rooted in a history of practice that spanned centuries across the Mesoamerican landscape. Burning, as we will see, became a commonly enacted practice in the ritualized events of Palenque. Burning is one means by which offerings are transferred to supernatural beings, the smoke emitted from the fire transporting the offering to other realms.

Additional, smaller temple structures were built along the original long, linear platform, but only the largest, and earliest, Temple V, had collections of materials inserted into the floor. Once the space was fed, it was anchored as an active and sacred space. The architectural plan of the temple and the location of the offerings inserted in the floor set a precedent, establishing a material practice that would last centuries at Palenque. Temples built elsewhere, particularly in the “Cross Group,” a large plaza space with pyramidal temples situated on three sides, were designed with similar architectural plans, particularly in the construction of an inner sanctuary.

Offerings were repeatedly placed along the central axis of the structure and inside the central entryway leading to the inner rooms. As in other Maya cities, the first ceremonial architecture such as the North Group appears to have been initiated prior to the rise of divine kings. The temples constructed multiple generations later included the addition of decorated scenes of rulers and supernatural beings with extensive texts narrating their status as divine and connected to the gods (Baudez 1996), marking the emergence of a new practice of political historicization alongside older practices of offering.

The backwalls of the inner rooms and the piers of the entryways provided space to inscribe the narration of select events in which Palenque’s leaders interacted with the patron Gods, GI, GII and GIII. Cosmological founding events spanning thousands of years are included, in conjunction with accession events, and ancestral claims, bringing the world of the rulers in line with the supernatural. Imagery included the supernatural realms of the underworld, the earth monster, and the world tree (Baudez 1996). The burning of copal incense was one of the most common features of the events carried out in these spaces. Numerous elaborate incense stands, standing nearly waist high were placed along the terraces of the temples. The style of the large incensario stands, with both human and supernatural faces, wearing elaborate headdresses, and earflares was replicated in the decoration on the palace (Acosta 1972, 10). The style and the skill to craft and mold the elaborate features onto the clay tubes was likewise, carried over to the stucco work on the palaces, suggesting the same community of crafters may have worked in multiple materials, both clay and stucco work, both materials that share similar plastic qualities.

Other ritualized events were centered around the dead. A tradition of burial practices was shared across the city, but like other Classic Maya societies, funerary constructions for the noble and ruling class were more elaborate. Most of the city’s residents were buried in residential plaza floors, the floors of houses or in rare cases, given a separate structure to house their remains (see chapter 5). Some Palenqueños constructed limestone boxes for the dead. The limestone used for these constructions were similar to those that were carved and inset into the walls of the temples and palace. They made a box for their dead by laying thin, flat stone slabs as a floor, vertically as walls and sealed them with long, thin slabs as a lid. These constructions have been referred to as “slab-crypts” but a select few privileged individuals were given formally crafted sarcophagi (Scherer 2012). This practice is only seen in one other Maya city, Tonina, which is located within the immediate region and had continual interaction with Palenque. The ruling class were interred in tombs in publicly visible temples. A series of “slab-crypts” were constructed along the lower terraces of the Temple of the Cross in the Cross Group (Scherer 2012; Thompson 1896). Just west of this ceremonial complex, large mausoleum temples were built against the

steep mountain side, their imposing height overlooking the open plazas below. Called “the Temple of Inscriptions” and “Temple XIII,” these constructions contained the sarcophagi of the ruler K’inich Janaab Pakal, and possibly his wife, “the Red Queen” (Stuart and Stuart 2008). The sarcophagi and stone box constructions provided some protection against the continual flow of water and saturated, clay-rich soils of the city. An aqueduct ran below Pakal’s mausoleum, which may have providing another way of diverting water away from his tomb (Romero 2016). As discussed in chapter five, others protected the bodies of their dead by elevating the crypt with cut stone blocks set into the wet bedrock.

Some city residents chose to construct crypts with niches to place offerings to the dead, as seen in the elite residence of “Group A” (Blom 1923). In some cases, as in Temple XIV (Ruz 1962), crypts were constructed with double niches, giving the construction a cruciform shape, a practice that was replicated in other parts of the city.



Figure 7: Temple of the Inscriptions (Johnson 2016).

In addition to temple offerings and funerary events, other events materialized around altar spaces in the city. One altar, built in the center of the Cross Group was “fed” by means of a material offering placed in the fill of the construction, including a layering of clay balls, incomplete

vessels and a fossilized shark tooth (Sáenz 1954). Altars were constructed in marked spaces including the base of the palace stairway, at the base of the stairway of the Temple of Inscriptions, and in the upper level of the Palace tower (Cuevas 2007a). The altars were active spaces of interaction, bringing the city's living residents together with the supernatural and ancestral spirits residing in other worlds.

While this is the most visible evidence of the assembling of Palenque through ritual events, the same framework makes it possible to explore how ritual events assembled in diverse sectors of the city.

Chapter 5: Group IV: The House of Chak Sutz' and His Ancestors

One elite house in the city of Palenque is called by archaeologists as Group IV (Lopez Bravo 1995; Rands and Rands 1961; Schele 1986). This residence is a large, elaborate plaza group, with a two-story structure on the western side of the plaza that was built with a series of small rooms (Str. J1), another two-story structure in the south-western corner of the plaza (Str. J2), a long-range “L-shaped” structure on the northern side of the plaza (Str. J3), and three small pyramidal structures clustered on the eastern and northern corners of the plaza (Str. J4, J6, J7). Excavations by two other projects had been carried out prior to the research described here. Robert and Barbara Rands investigated the group in 1959, and later, a project led by Arnaldo Gonzalez of the Proyecto Especial Palenque in 1993 followed, both mostly concentrated on the eastern side of the plaza (Figure 10).

Based on the sequence of ceramics recovered by Rands and Rands (1961), this house is considered quite old, with generations of continuous occupation and expansion spanning over three hundred years from roughly A.D. 450 - 750. This residential group may have included an extended kin group that were also acting in support of the economic well-being of the house (Joyce and Gillespie 2000). The people that lived here built structure J1, the largest structure, and possibly one of the first, as a long, rectangular, two story stone structure, with a series of small, rooms, many less than 2 meters wide, which was common due to the way the ceiling was vaulted (Lopez Bravo 1995). This first floor was built directly on bedrock. The rooms were small, dark and cool, with only one room built with a formal bench (Lopez Bravo 1995, 100). The rooms on the second floor were wider and taller, nearly three meters wide, and may have been a later addition as these rooms were set back from the first floor and built on solid fill (Lopez Bravo 1995; Schele 1986).

The long, linear building just south of this main building (Structure J2) was built with a mansard roof similar to those elsewhere in the city. This building may also have been built as an extension to the first building, connected by a stairway and elevated platform. The rooms in this structure were somewhat larger, and small windows were built above the entryway to provide additional light. The entryways are rounded, different than those of structure J1. These additions most likely reflect a growing social group. Structures J1 and J2 served as the primary living area, with multiple rooms for sleeping, and storage. Stored in the corner of a room in J1 were two stone incensarios, carved in similar style to the numerous ceramic incensarios used in the temple precinct of Palenque. A number of elaborate incensario stands with finely crafted and life-like faces were used in the Temple of the Cross complex of Palenque, and in elite residential groups, such as this one (Cuevas Garcia 2007b; Lopez Bravo 2004). These incensarios are crafted in a style unique to Palenque. Because some of them are so life-like in their facial features, they have been argued to be the representations of ancestors, rather than deities. The large stone incensario stand found in Group IV depicts a stern, square jawed face, with Tlaloc iconic elements in the headdress, with text inscribed along flanges flanking the face (Figure 8). The inscription has been argued to identify two people. One man, Aj Sul, who the incensario is thought to represent, acquired a title of military leader in 610 A.D., just a year before Palenque is

defeated by Calakmul. The second individual named, possibly another ancestor, carried a different title that is still unclear, given by the ruler Pakal I who died in 649 A.D. (Bernal and Izquierdo 2011).



Figure 8: Stone incensario stand from Group IV (Johnson 2016).

The members of this house were very much entrenched in the political atmosphere of Palenque as evidenced by a carved limestone tablet in structure J1, labelled the “tablet of the slaves” (Josserand 1986; Schele 1986). The tablet was set into a relatively, small and private room on the second floor, and was similar in style and architectural placement to the “Palace Tablet,” placed on the back wall of House A-D, depicting the accession of a Palenque ruler as he received

objects of rulership by his parents seated on each side of him (Robertson 1983; Stuart and Stuart 2008, 216). The placing of a carved limestone tablet on the back wall of a residential room is otherwise only seen in the palace, suggesting that the residents of Group IV were of a privileged group that had ties with the ruling family and the means to solicit the services of the city's skilled artisans.

The carved scene on the "Tablet of the Slaves" depicts a central figure sitting on two male figures and holding an incense bag. On both sides of the central figure appear a man and a woman, possibly the parents of the central figure. The man and woman are sitting on supernatural creatures and are presenting the central figure with ceremonial regalia. A series of written text was carved above the figures. The text is currently understood as a narrative account of significant events in the life of Chak Sutz', a lower lord, or "territorial governor" of Palenque (Josserand 1986; Martin and Grube 2000; Schele 1986). The central figure on the panel has been interpreted as a Palenque ruler, and the beginning text refers to the accession of Palenque rulers, yet the primary name throughout the text was not a high ruler (Schele 1986). The imagery and the text, associates a man, Chak Sutz' with the ruling family, relating his life and his house to the larger political circles within the city (Figure 9).

The text begins with the accession dates of a series of Palenque rulers, then immediately follows with an accession event for Chak Sutz' in 723 AD. To what role he acceded is unclear. That same year, a war event occurs in Chak Sutz' territory. In 725 A.D., Chak Sutz' successfully captures three named individuals. There is another war event in Chak Sutz' territory in 729 AD, a year before Chak Sutz' celebrates the completion of three katuns (or twenty tuns of 360 days) of his life. He is described as carrying "many titles" which he may have earned over the course of his lifetime. The only clear title listed seems to be that of *sahal*, or what is now understood as "lower lord." The carved stone was most likely commissioned for the katun event, which was celebrated with an event in which he held "a bundle" and the stone was dedicated and set into the wall, an offering of a mirror was inserted in the floor below it just after the completion of the third katun, making Chak Sutz' roughly 60 years old (Josserand 1986; Schele 1986).

The select individual occupants of Group IV that had been named in text, both within the residence and in areas of the palace of Palenque, lived during the 5th and 6th centuries, generations after the initial occupation of the house. The carved panel and incensarios formed part of the material makeup of the house at a time when the residence was already expanded to resemble its current form. The spatial design of the residence, the materials procured and used there reflect ties to the larger Maya region.

Group IV combined elements typical of Palenque, such as the construction of buildings with multiple stories and the mansard roof style, with elements more typical outside of Palenque, such as the formal patio group arrangement with buildings situated to each cardinal direction, enclosing a central patio space. This design was employed in one other residential group, "Group C," located in another neighborhood east of Group IV (Lopez Bravo 1995). Group C also has structures with similar architectural design, particularly the inset corners seen on the mausoleum structures J6 and J7, although it is uncertain whether the house members of Group C buried the dead in each inset corner like those seen in Group IV. Like Group IV, Group C

appears to have been an old house, with multiple generations spanning hundreds of years (Martín 2005). It is possible that Group C was a similar kind of house to Group IV, carrying out similar roles and occupying a similar place in Palenque society.



Figure 9: Illustration of the Tablet of the Slaves (Schele Drawing Number SD-131, used with permission).

While the residents most likely slept, cooked, ate, entertained and carried out their everyday activities in the area surrounding the western side of the plaza, the eastern side of the plaza, and the three small pyramidal structures built there, was sacred space, reserved for the dead. For over 300 years, many generations of people lived, died and were buried in this space (Rands and Rands 1961; Schele 1986). The three buildings on the eastern side are mausoleum structures, built to house the remains of prominent individuals of the house, who would transform into ancestors, guardians to their living descendants.

The cluster of buildings surrounding Group IV appear to be spatially related and may have formed a “neighborhood” within the city of Palenque. It is possible that members of this house served as community leaders for the surrounding neighborhood. As an old house, the residents of Group IV may have established “first occupancy” as described by McAnany (1995, 96-97):

We are reasonably confident that the pre-Hispanic Maya did not buy and sell land; regardless, there were several ways in which land rights were established and recognized. Land could be inherited from ancestors, land claimed by someone else could be encroached upon, or one could be the initial “occupant” or cultivator of land and thus lay claim to it in that way. This latter means, herein referred to as the principle of first occupancy seems to have been a practice of Yucatec Maya of both twentieth century and earlier. In Yucatec Mayan, the term YAX CHIBAL UAI TI LUM refers to the “first founding lineage of the land”. Although the principle of first occupancy sounds fair and equal, given time and the expansion of lineages this custom sets in motion a chain of events that inevitably results in pronounced *inequality* in access to resources.

The ritualized actions carried out in Group IV were largely enacted for the dead. These were spaces that were often repeatedly revisited as the ancestors buried within were fed, petitioned, and commemorated. The relationship between the living descendants and their ancestors was a two-way relationship. Ancestors were active members of the house.

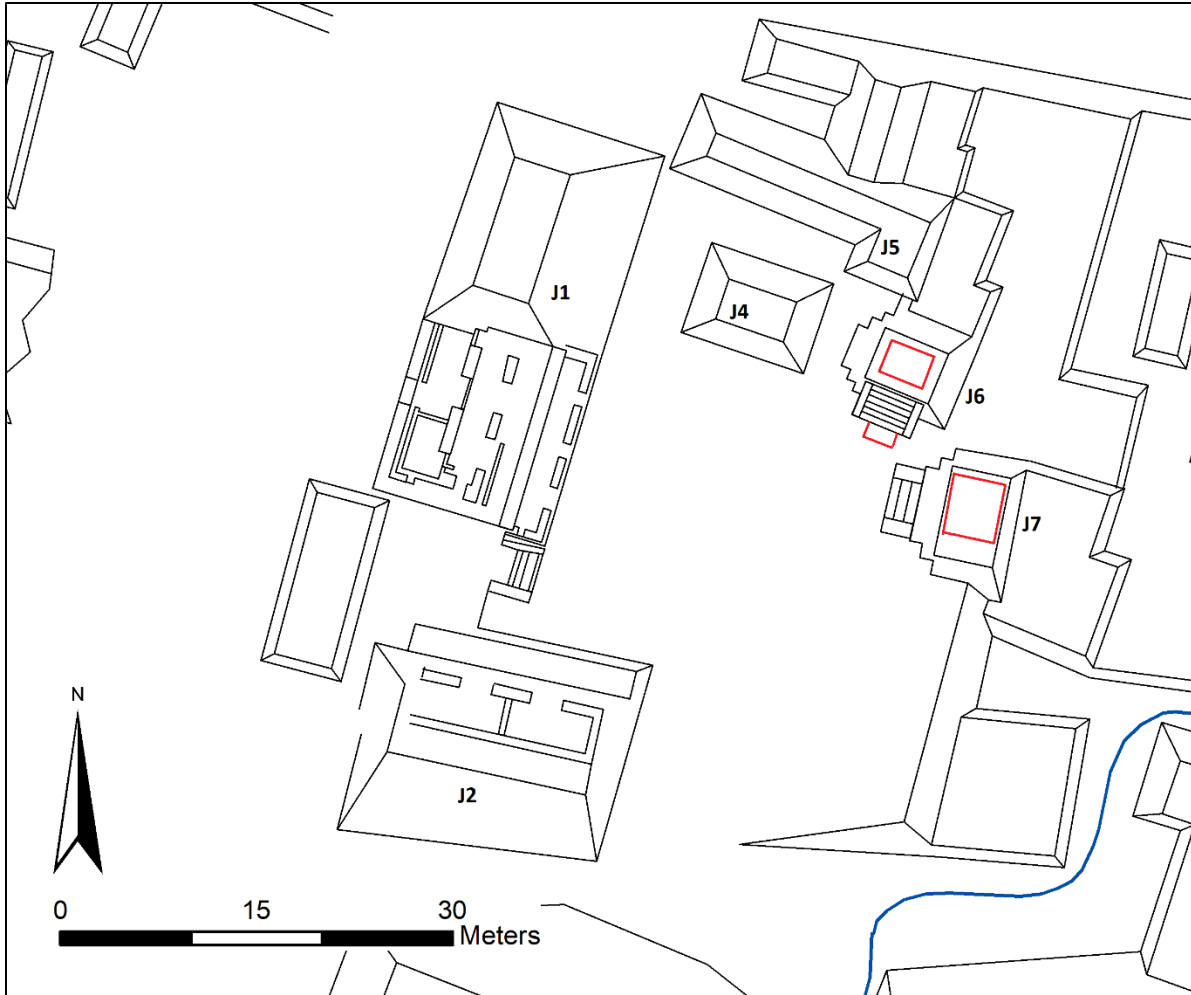


Figure 10: Map of Group IV, excavations in red (used with permission by Campiani 2016 and modified).

Ritual in the East

Excavations carried out by this dissertation project detected the earliest living surface directly above bedrock on the eastern side of the patio. These first depositional events were dated to the mid-500s A.D, early in Palenque's political and written history (Appendix 2). An official dynastic system of rule had already been in place by 490 AD, and the first series of monumental temple structures, the North Group had been constructed over 100 years prior (Stuart and Stuart 2008; Tovalín Ahumada and Manrique 1996). In Rand's ceramic chronology, this is considered Cascada or late Motiepa phase (Rands 2007, 18).

Micromorphological analysis of deposits from these earliest layers reveal the weathered limestone bedrock material with bioturbation, and a boundary marking the first episodes of historical sedimentation implicating the residential group members (Figure 11).

Microscopically, these episodes included those components that resulted from weathered regolith and subsequent soil formation with silty sandy clay aggregates forming with trampling and macroscopically, the deposition of ollas and other coarsewares related to food preparation and storage by the groups earliest residents. Among these materials was a finely made whistle in the shape of a woman's torso (Figure 12). The head was missing from the whistle and there was bright red paint around the neck. The head was not found in the excavation. In addition, the remains of turtle (most likely from the surrounding rivers and streams), some of which were burnt, fish (species unidentified), and jute were also deposited. The collection of water jars, and other coarse wares (over 1,500 sherds), food, and the whistle were layered with traces of burning as the residues of the first series of ritualized events carried out in the eastern side of the plaza (Figure 13).



Figure 11: Loci 45, 46, and 47 showing clear layers of burning and concentrations of artifactual material in the earliest periods of occupation, micromorph sample #6 taken from the center (Johnson 2016).

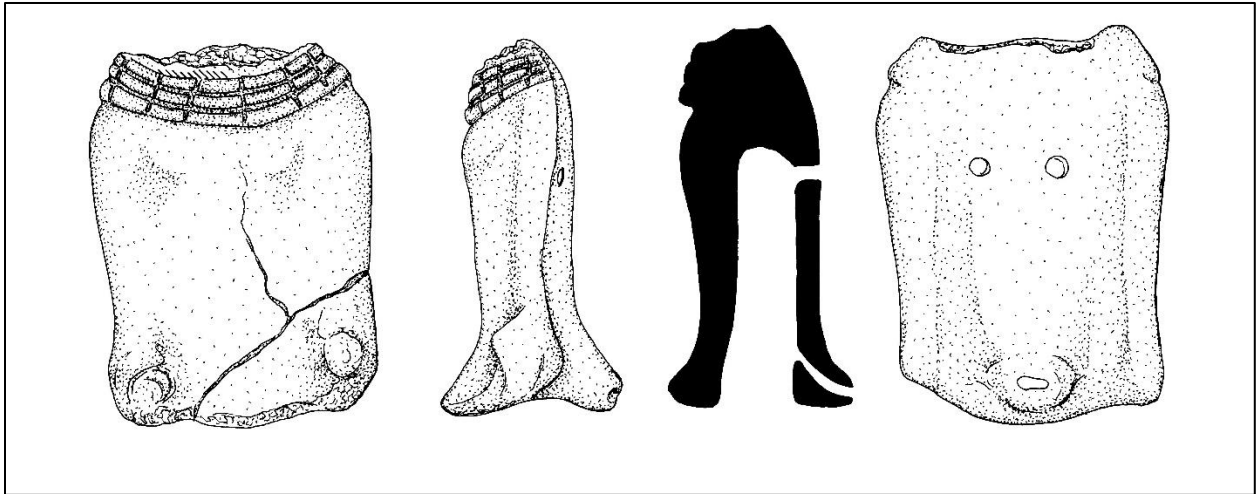


Figure 12: Ceramic whistle of a woman's torso, head removed (Johnson 2016).

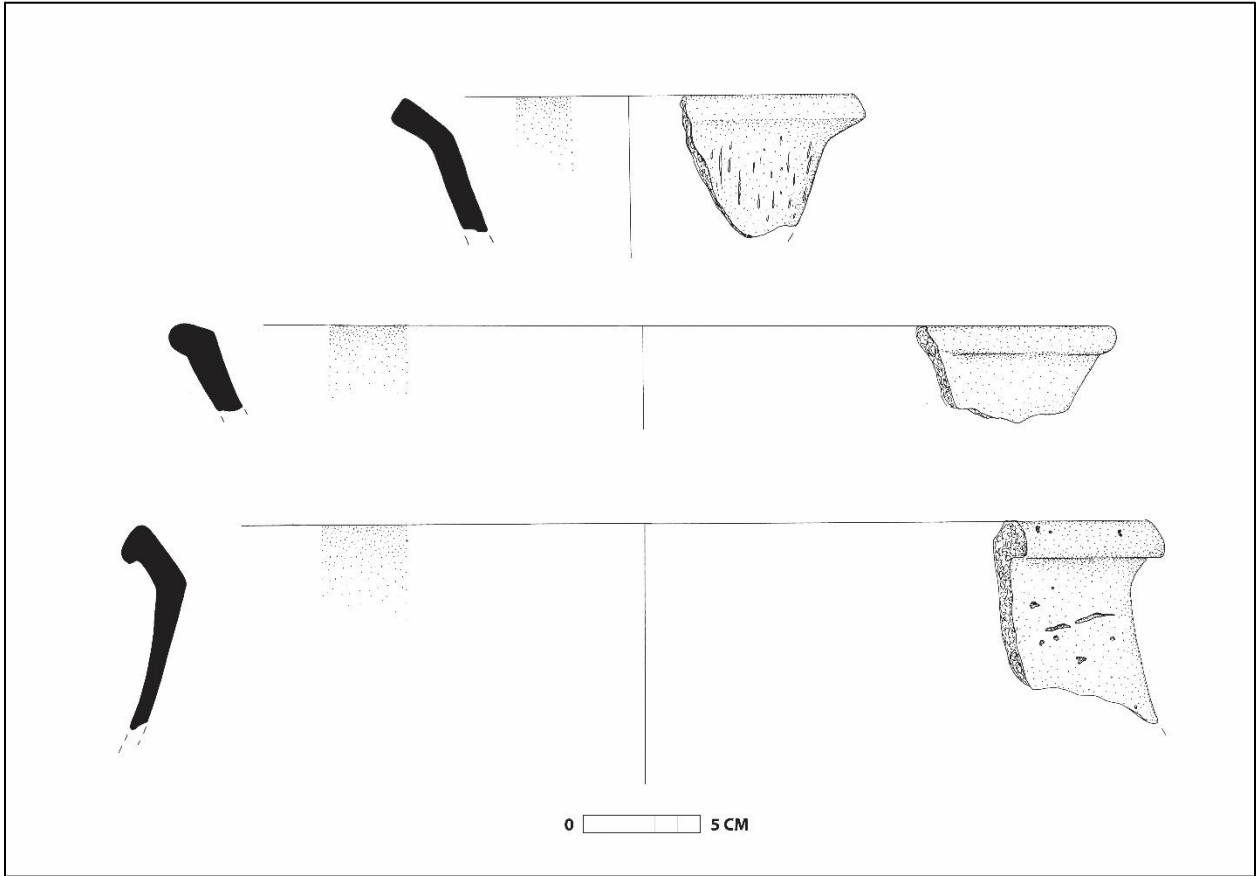


Figure 13: Selection of ollas and coarse ware bowls deposited just above bedrock in the earliest periods of occupation (Johnson 2016).

Event 1: Burying a Founding Member

Carbon dates indicate that between 576-651 A.D., roughly fifty years or less after the initial occupation of the house, the living members of the group dug into the earliest plaza and into bedrock to bury a member of the social group (Figure 14). This period in Palenque's history has been described by epigraphers as a period of significant growth and transformation, as the city appears to have been increasingly involved in wider regional politics and trade (Stuart and Stuart 2008, 137). Inscriptions in the city include the names of a series of rulers during this time, including the city's first recorded female ruler, Lady Yohl Ik'nal ruling for over 20 years. Palenque also appears to have been engaged in military conflict with the polity of Calakmul to the east (Grube 1996; Martin and Grube 2000). The name of an individual that may have been living in Group IV, Aj sul, is carved into the stone incensario found in the main house on the western side of the plaza and is described as receiving a title during 610 AD. (Bernal and Izquierda 2011).

The living members of the house constructed a very well-built stone-lined crypt in a cruciform shape with niches on the eastern and western side and plastered the entire interior, including the niches. Based on the robusticity of the cranial features and the pelvis, the buried individual was determined to be man (Appendix 6). The man was between 32 to 40 years old at the time of his death. This makes him an older adult. It was rare to live beyond the age of 50. Population studies of Palenque have revealed that just 1% of the population was older than 50 (Màrquez et al. 2006, 76).

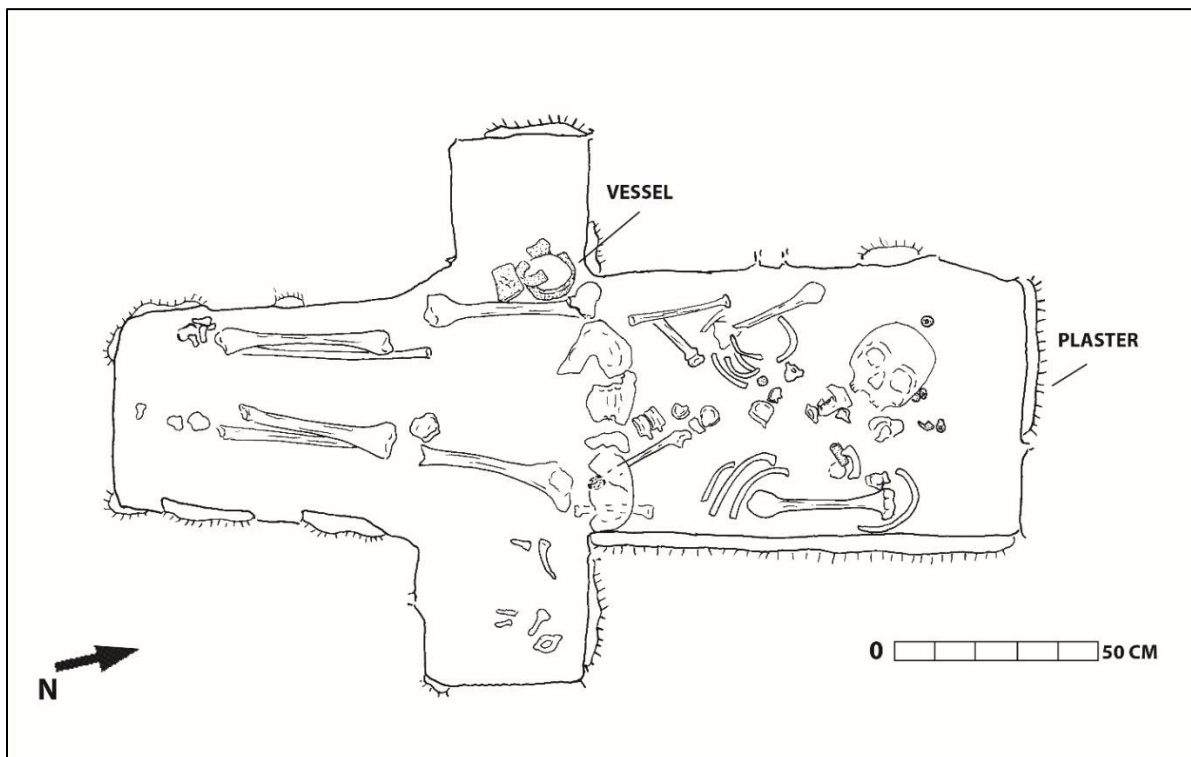


Figure 14: Burial of a single man inside a cruciform shape crypt within Structure J7 (Johnson 2016).

His body provides some evidence of his itinerary leading to the burial in the crypt where we encountered him. It is often difficult to determine a cause of death in archaeological skeletons; however, it is much easier to observe the injuries and pathologies experienced by the person in life (Pearson 1999, 3). Osteological analyses indicate he experienced some periodontal disease evident in the teeth, and some irregular shaped ribs, most likely a result of physical activity in life. There was a presence of moderate osteophytes, bony growths due to degenerative changes to his spine, on the lower lumbar vertebrae. The acetabulum, the socket on the pelvis where his femoral head articulates, was quite porous, suggesting pathological injury that resulted in tissue destruction.

In addition, he had slight traces of *cribra orbitalia*, which is characterized as a porosity in the bone of the orbital roof (Roberts and Manchester 1999; Wright and Chew 1998). This was a common affliction for Maya peoples during the Classic period and remains so today (Wright and Chew 1998). Cribra orbitalia is thought to result from any of a number of factors including inadequate diet, lack of animal protein, poor sanitation, or infectious diseases that affect the production of red blood cells (Walker et al. 2009; Wright and Chew 1998). While it has traditionally been thought to be the result of iron deficiency in societies, like the Classic Period Maya, that are heavily dependent on maize, recently, others have argued that there may be multiple factors behind this, not limited to nutrition alone, but also a reaction to microorganisms in hot, humid tropical environments that rely on human hosts to supply them with iron, considered a parasitic infection (Wright and Chew 1998). Chronic parasitic infection may have led to the body withholding iron, resulting in the porous traces on the bones. The high population density of Palenque likely produced extensive waste that contaminated the rivers that crossed the city, causing the spread of contagious diseases (Màrquez et al. 2006, 77). This may also suggest that the city of Palenque was already quite populated during the early sixth century A.D. at the time of this man's life. *Trichuris trichiura* (otherwise known as the human "whipworm") was also prevalent among the ancient Maya (Wright and Chew 1998). This parasite lives in warmer, tropical areas, and spreads through contact with infected human feces, either through touching dirty soil associated with the feces or ingesting unwashed vegetables that had been exposed to the feces. Whatever the cause, whether diet related or an infection, the impact on this man was light and he healed from it; it could even be the result of a healed infection as it is so slight.

The man also had slight hypoplasia on his teeth, which is a dental defect where the enamel forms unevenly and leaves characteristic linear breaks in enamel development, typically due to some kind of disruption in growth as the teeth were developing. In this case, their presence may point to diet-related growth disruptions during childhood (Cucina 2013). While he may have come from a family that was influential, perhaps even wealthy, at the time of his death, he had health issues not entirely uncommon for the Maya living in densely populated cities.

The entire context of his burial and the associated materials associated with his body reveal much about the event of his passing. The event of burying the dead involves the living as much as it involves the dead. The ways in which the events are carried out, the materials included, the

techniques employed to build the construction for the dead, were all rooted in a history of practice at Palenque, and so similarities can be seen elsewhere in the city.

That his family was wealthy when he died is indicated by his burial costume. He was dressed with shell and jade ear plugs, along with three jade beads that may have been strung on a necklace that is no longer preserved. A limestone spindle whorl was found near his pelvis (Figure 15).

He was given a small serving bowl, found containing only soil, from which starch and phytolith analyses are still pending (Figure 16). Analyses of the bowl suggest that it was locally made, using a coiling technique, smoothed with a tool, then slipped with a pale-brown clay slip. The flat bottom and thinner walls are typical of the Early Classic Motiepa ceramic phase.

The moment when he was laid to rest did not end his engagement with the living. Traces of red pigment were in the eye orbits, suggesting that there was a re-entry event after burial to apply the pigment to the body.



Figure 15: Shell and jade ornaments and limestone spindle whorl included with burial PREP400-44 (Johnson 2016).

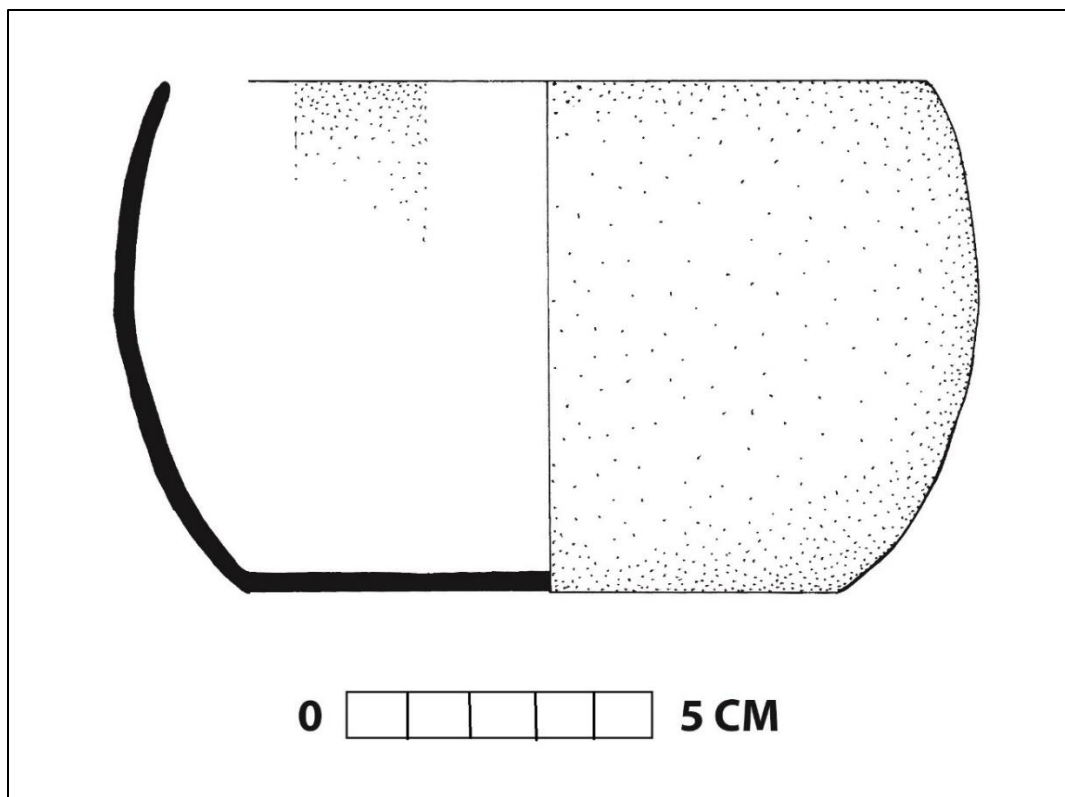


Figure 16: Unslipped motiepa bowl included in burial (Johnson 2016).

Following the burial, there were a series of actions that carried symbolic overtones, enacted during a ritualized event. The crypt was sealed with a series of well-cut, formal capstones. A thick layer of loose plaster was spread over the capstones and immediately capped by another set of large, very thin, fine-grained limestone *lajas* or slabs. Another thick layer of loose white plaster was spread over the *lajas* and then another series of thin limestone *lajas* were laid down and then covered with another layer of plaster (Figure 17). Layering is a widely shared practice in Maya ritual that directly indexes a Maya cosmology in which the cosmos is vertically layered.



Figure 17: Loose, white plaster layered between limestone lajas, sealing a burial below (Johnson 2016).

Following the sealing of the burial, a bulk of limestone cobbles and mixed ceramics were piled above, sealing the burial event into memory. The mixed fill is represented by a mix of Late Preclassic Period Picota era “slab feet” alongside other, later, polychrome vessels and ollas. After the burial event, the material assemblage in this area shifted from an overwhelming representation of pottery for food production and storage to that of serving ware, suggesting that the nature of ritualized events had changed once the remains of the ancestor was in place.

Event 2: Feeding the Dead

Above the mixed construction fill was a dark-colored, dense sandy clay layer with a substantial increase in artifacts, including ceramic sherds, obsidian, figurines, both whole and fragmented, faunal remains, and lithics many of which were flat lying (Figure 22). This area, directly above the burial was interpreted as an occupational surface with concentrated areas of smashed vessels (loci 21,22,23), burning, and artifact concentrations (loci 24, 25, 27 and 29). There was a clear distinction in ceramic assemblages. While the earliest occupational level, loci 45, 46 and 47, had a majority of large coarseware, ollas and other storage vessels, the surface sealing the burial below yielded, overwhelmingly, a collection of decorated serving ware, primarily incised thin-

walled *cajetes* (bowls), and tripod plates with polychrome design (Figure 18). Artifacts included a wooden awl (Figure 19), a ceramic figurine of a sitting woman (Figure 20), and obsidian blade fragments. Over 70 jute snail shells (riverine univalves, genus *Pachichylus*), the remains of turtle, and four fish, including one mojarra pinta (*Cichlasoma urophthalma*), two tenguayacas (*Petenia splendida*) and a pejelagarto (*Atractosteus tropicus*) (Varela personal communication 2017). These are typical fish present in lowland tropical Maya areas (Nations 2006). The jutes are freshwater snails and were commonly boiled before cutting the tip of the shell off to loosen the meat of the animal inside (Nations 2006).

Carbonized plant remains recovered from this area included a flowering plant in the Leguminosae family, allspice (*Pimenta myrtaceae*), possibly Chicozapote (*Manilkara zapota*) and Spanish cedar (*Cedrela odorata*) (Figure 21).

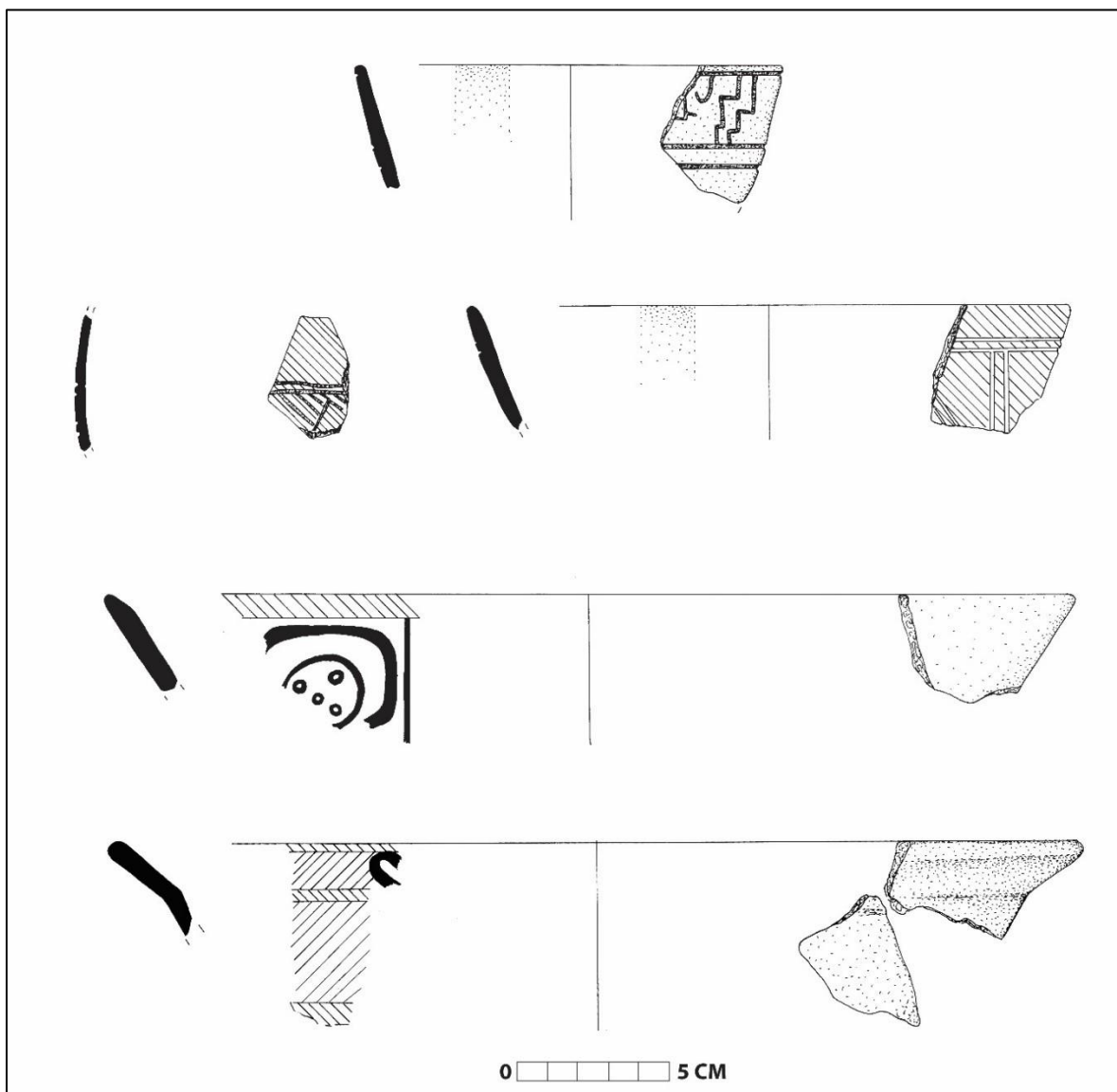


Figure 18: Slipped and incised plates and cajetes associated with plaza surface (Johnson 2016).

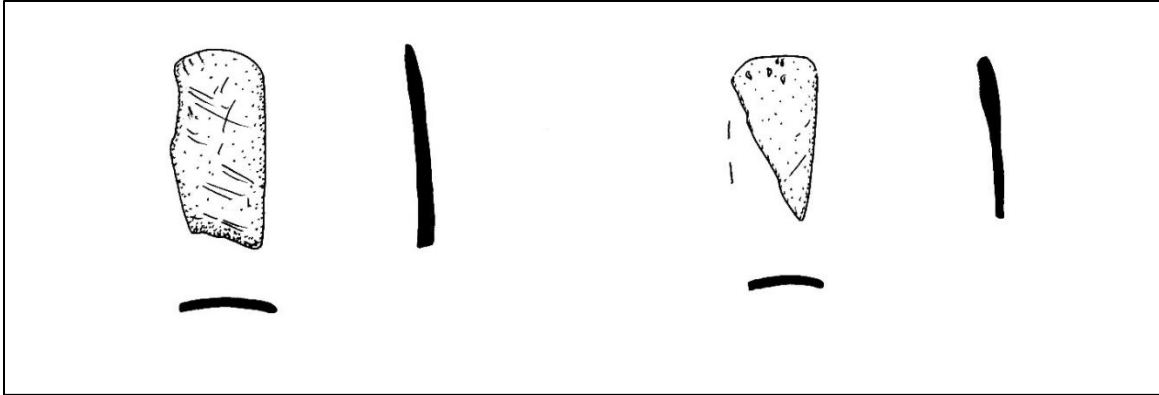


Figure 19: Bone awl fragments associated with plaza surface (Johnson 2016).

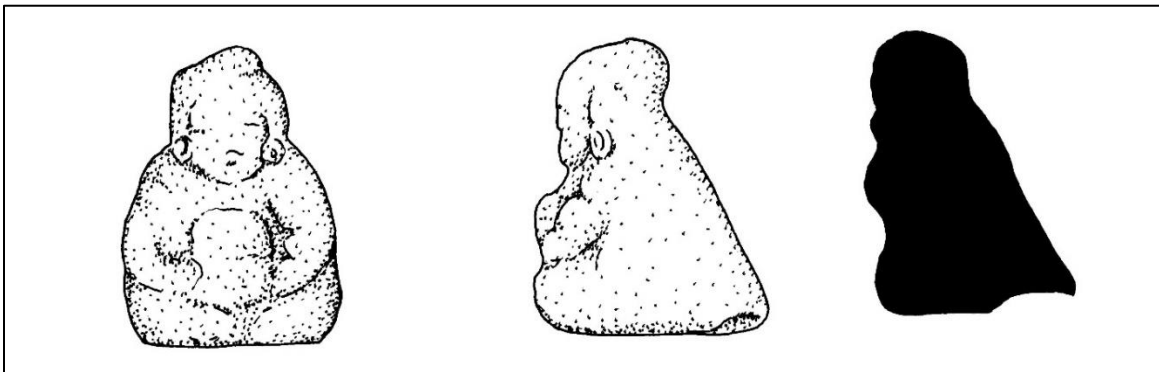


Figure 20: Small figurine of a sitting woman, unslipped associated with plaza surface (Johnson 2016).

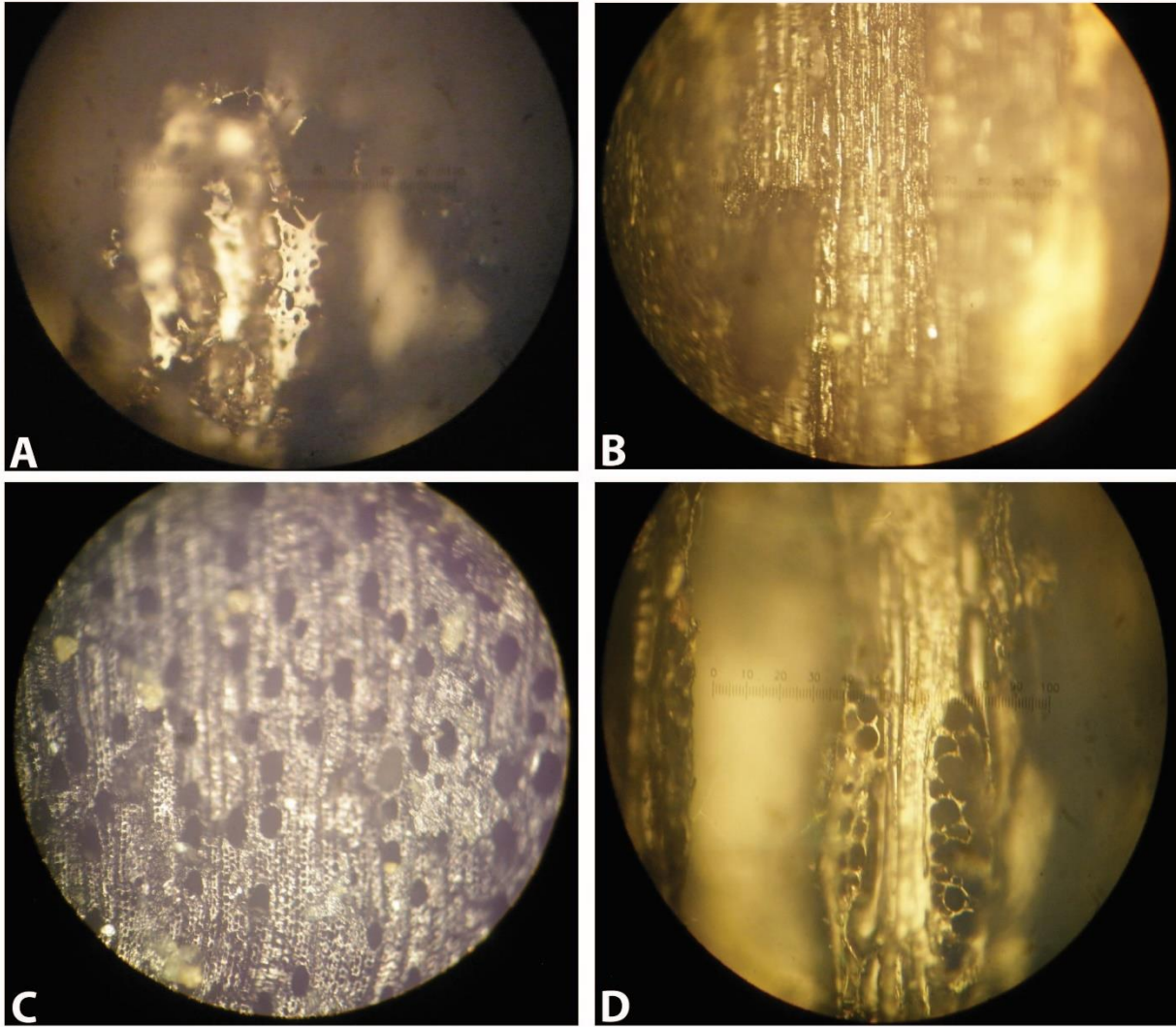


Figure 21: Carbonized plant remains from the occupational surface below the altar (loci 24, 27, 29) including (A) *Pimenta* (allspice), (B) *Manilkara* (C) Spanish Cedar and (D) Leguminosae (Trabanino 2016).



Figure 22: Surface deposit below the stone altar, with concentration of flat-lying ceramic sherds visible (locus 29) and an intense concentration of burning including a whole incensario burnt in-situ (locus 25) (Johnson 2016).

Over 4,000 ceramic sherds were deposited in this dense and compact layer directly above the burial. Of the diagnostic rim sherds, 60% of the assemblage was serving ware including cajetes (thin walled, small diameter bowls), plates and vases. 40% of the assemblage included ollas (jars) and large cazuelas (bowls). Other artifacts from this area included bone awl fragments and a small figurine of a sitting woman with a bundle in her lap.

To the south, alongside this area was a whole unslipped pedestal base incensario with residues of burnt copal and pine (Figure 24). The entire vessel, copal, pine, and the four whole fish were burned *in-situ* (locus 25). Two ceramic lids, both with a single nob, were deposited just outside

of the area of burning. One of the lids was slightly larger than the incensario, the other, fit perfectly (Figure 26).

Micromorphology samples taken from this layer show clear boundaries delimitating these activities from depositional episodes that preceded and followed. This event produced a distinct material signature in thin-section. While there were mineral components that appear in all the samples taken in Group IV, namely quartz and small amounts of mica, the fabric of sample PREP400-04 (designated microfacies 4, Appendix 4.2) had a different texture and larger diversity of components present. In addition, coarse fraction components displayed a greater degree of parallel orientation. Samples taken directly above (PREP400-03) and below (PREP400-05) this layer were markedly different in composition (Figure 30). In addition to components common to the geology of local area (surveys reported areas of micaceous sandstone, limestone and clay rich sediments), Sample 400-04 included phytoliths, fragments of lithics, charcoal, ceramics, and bone. The types and quantity of components, in addition to their linear orientation support the interpretation that this area was a floor, experiencing trampling and compaction from activities related to daily living with moderate to high traffic, where a single (occupational) event took place.



Figure 23: Concentrated area of burning, Locus 25 (Johnson 2016).



Figure 24: Burnt incensario, Locus 25 (Johnson 2016).

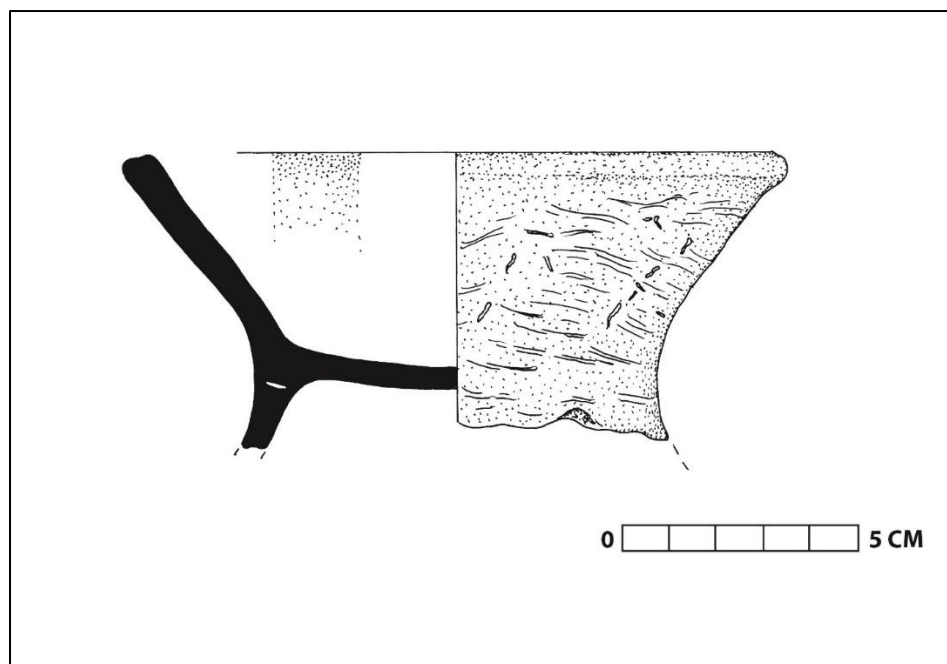


Figure 25: Unslipped incensario with pedestal base (Johnson 2016).

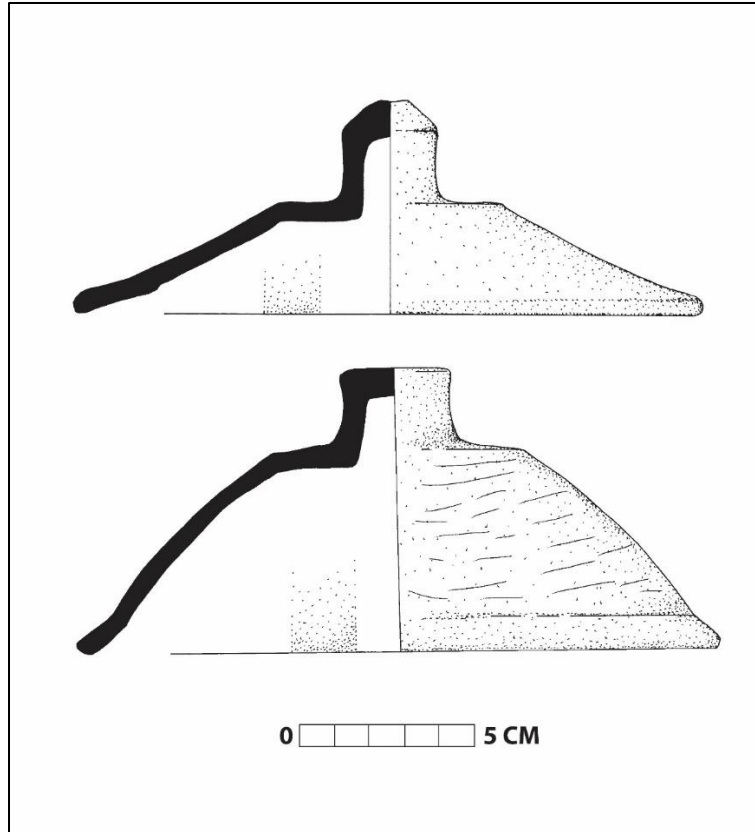


Figure 26: Two unslipped incensario lids found beside the incensario (Johnson 2016).

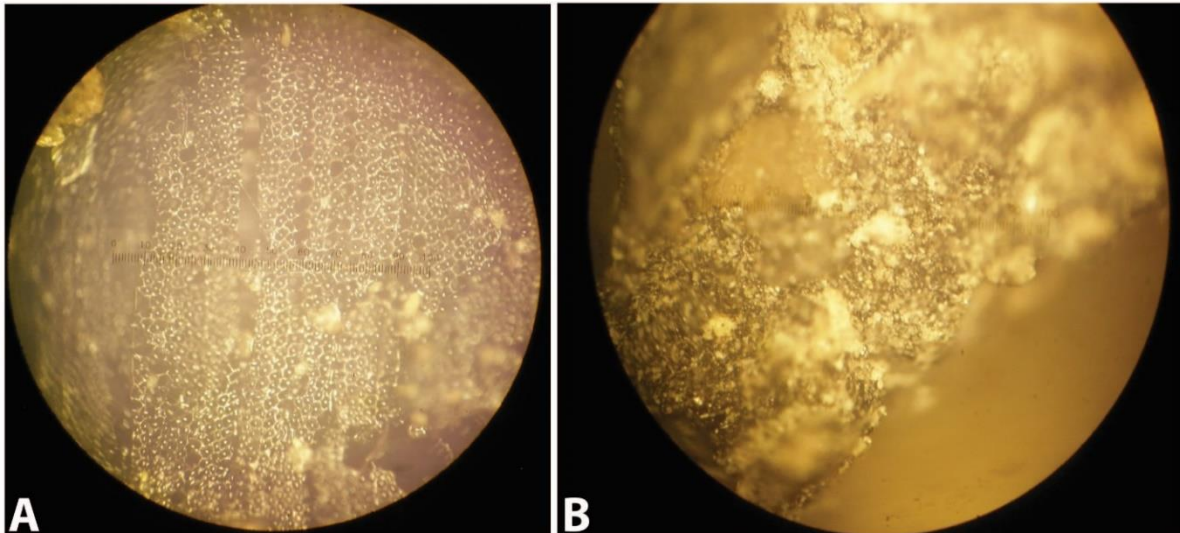


Figure 27: Carbonized plant remains from the incensario, Locus 25, including A) pine (*Pinus* sp.) and B) indeterminate, possibly copal (Trabanino 2016).

Event 3: Constructing an Altar

Micromorphology reveals that after the burning and deposition of pottery, lithics, and remains from food consumption, a thick, clay-rich matrix, devoid of artifacts was laid on the surface before constructing a stone altar. What macroscopically appears to be one elaborate ritualized event including the sealing of the burial and the building of an altar, was instead, a series of punctuated events, detectable by the combination of macroscale excavation techniques concerned with spatial relationships and micromorphological analysis. The groundmass (designated microfacies 3) was a dense, orange yellow clay similar to the bedrock material typical of Palenque, with frequent components of quartz. This layer was interpreted as a dense, homogenous material used as a foundation to prepare the surface for the construction of the altar.

The altar was built above the burial to receive offerings. It was similar in size to the burial, now invisible meters below. At nearly 2 x 2 meters exactly, and almost perfectly positioned over the burial and its layers of *lajas*, the altar was most likely constructed within the lifetime of those who had attended the burial event just years before and remembered with clarity, its location. The altar provided a more visible marker prompting memory of the man buried below.

A series of actions preceded the completion of the altar. The altar was built by positioning a series of cut stones around a square perimeter and infilling the center with loose, cobble fill. Just before completing the altar surface, a flat square stone was set into its center. Directly above that stone, was another, square stone, distinctly pink in color. And finally, on the surface of the construction, a large square stone was set into the center and scorched from burning, suggesting an offering was burnt before the altar was completely plastered (Figure 28). The flat square stones were clearly distinct from the rounded, cobbles that surrounded them. These stones may have served to mark, or “center” a sacred space within the cosmos (Freidel et al. 1993), perhaps recalling the cosmic “three-stone-hearth” (Taube 1998).



Figure 28: Aerial photo taken of the surface of the altar with the central square stone scorched from burning before being covered by plaster (Campiani 2016).

Following the completion of the altar, between 583 – 654 A.D. (based on AMS dating), less than 50 years following the burial below, the living residents of Group IV revisited the site of the ancestor's grave to carry out another burning event on the altar surface. This area of burning included burnt turtle shell fragments and what may have been burnt ceiba fibers or another fibrous plant substance. In addition to the fibrous plant, fragments of human cranium and human phalanges were found on the surface of the altar. It was not possible to recover a block soil sample from the area of the surface directly associated with this burning event due to the thinness of the plastered layer directly on the stone construction. However, a sample was taken directly north of the burning on the surface in an area that had a thicker layer of soil and plaster (Sample PREP400-01). Ideally, a sample would have been taken from the visible area of burning in hopes of detecting the material components included in the event. However, Sample 400-01 did reveal information surrounding plaster production and one component of plaster had a sharp boundary with a distinctive layering indicating at least one episode of re-plastering (see Figure 31). Not surprisingly, this sample included primarily weathered plaster components, mixed in a ground mass of sandy clay. The high levels of rainfall and fairly regular rainy seasons led to considerable weathering of components in all the samples recovered in Group IV. The movement of water was also evident in the striated b-fabric composed of an orange-yellow colored clay. There was, however, a burnt fibrous component in the upper boundary of Sample

400-01 that may have been the same material detected by paleoethnobotanical analyses and interpreted as possible ceiba fibers.

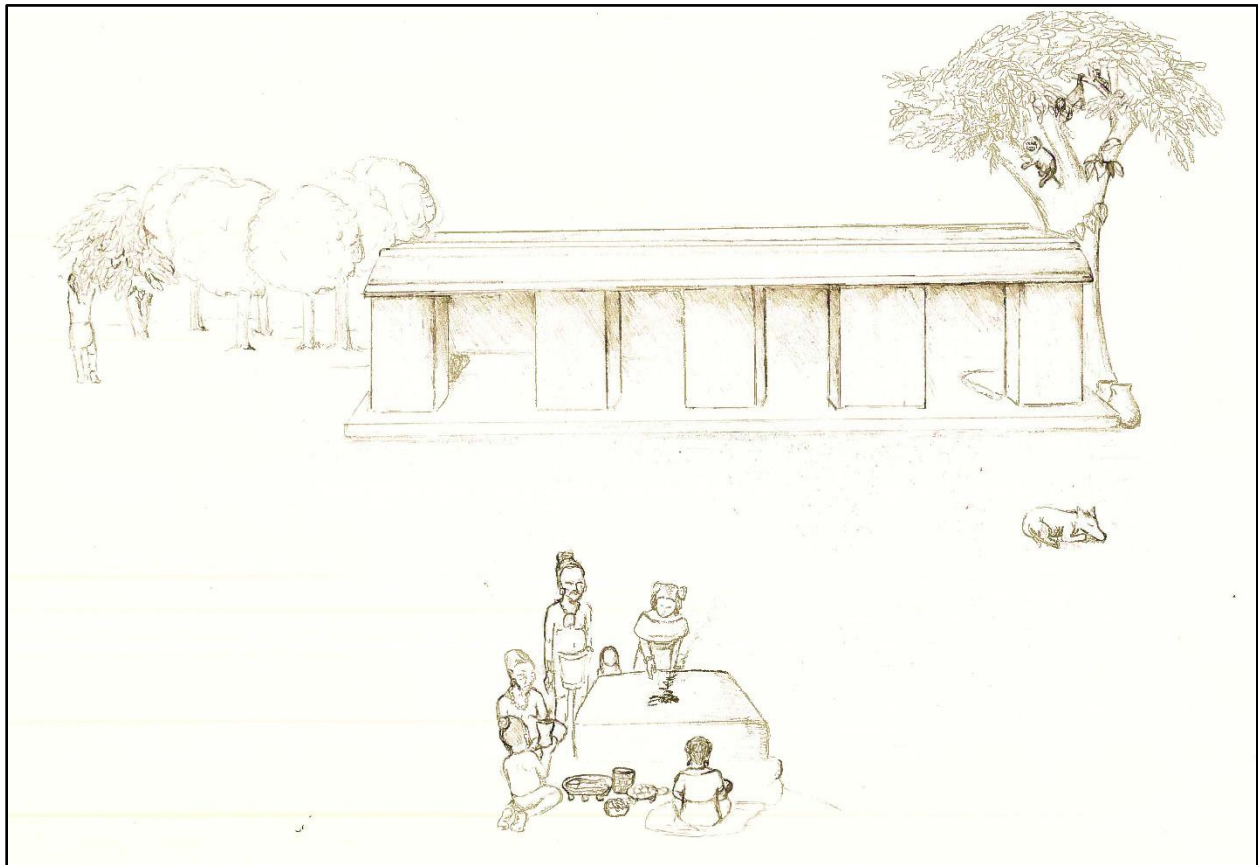


Figure 29: Artist reconstruction of a ritualized feasting event for the dead carried out in Group IV during the Middle Classic Period (Johnson 2018).

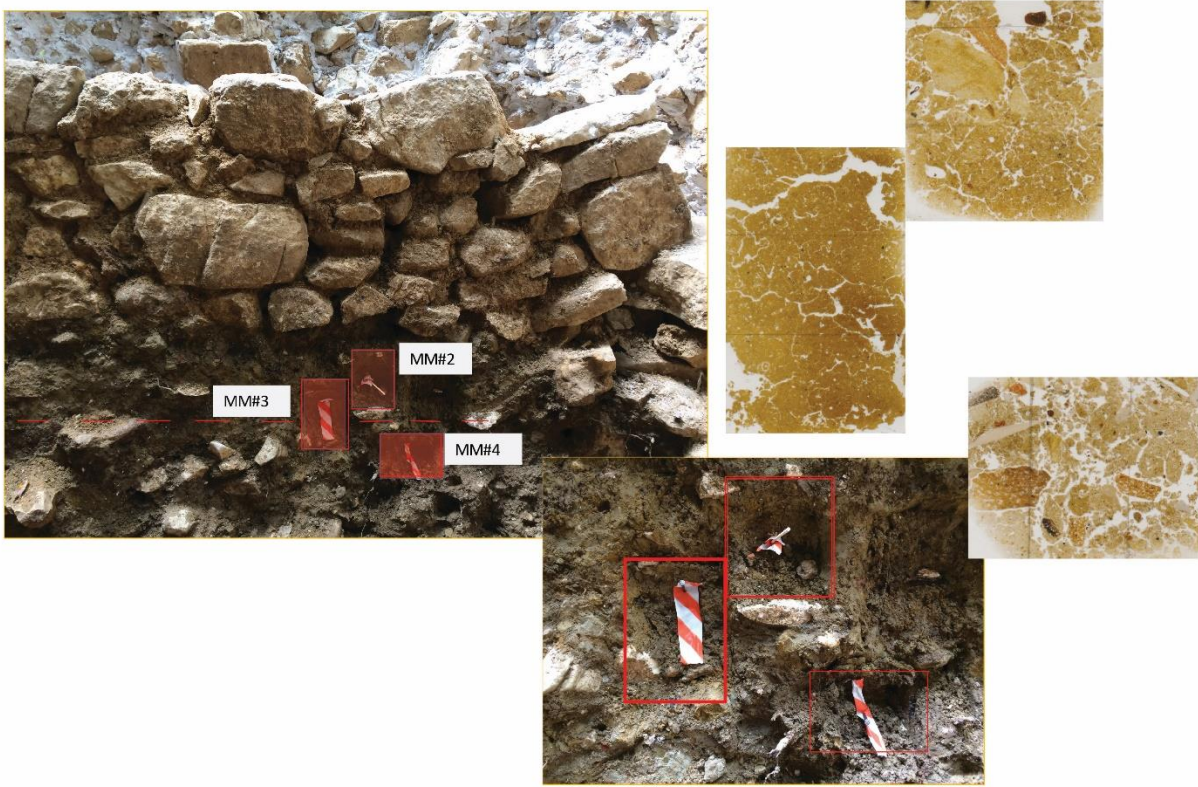


Figure 30: Micromorphology Samples, 400-02, 400-03, 400-04 taken at the base of the altar inside Structure J7 (Johnson 2016).

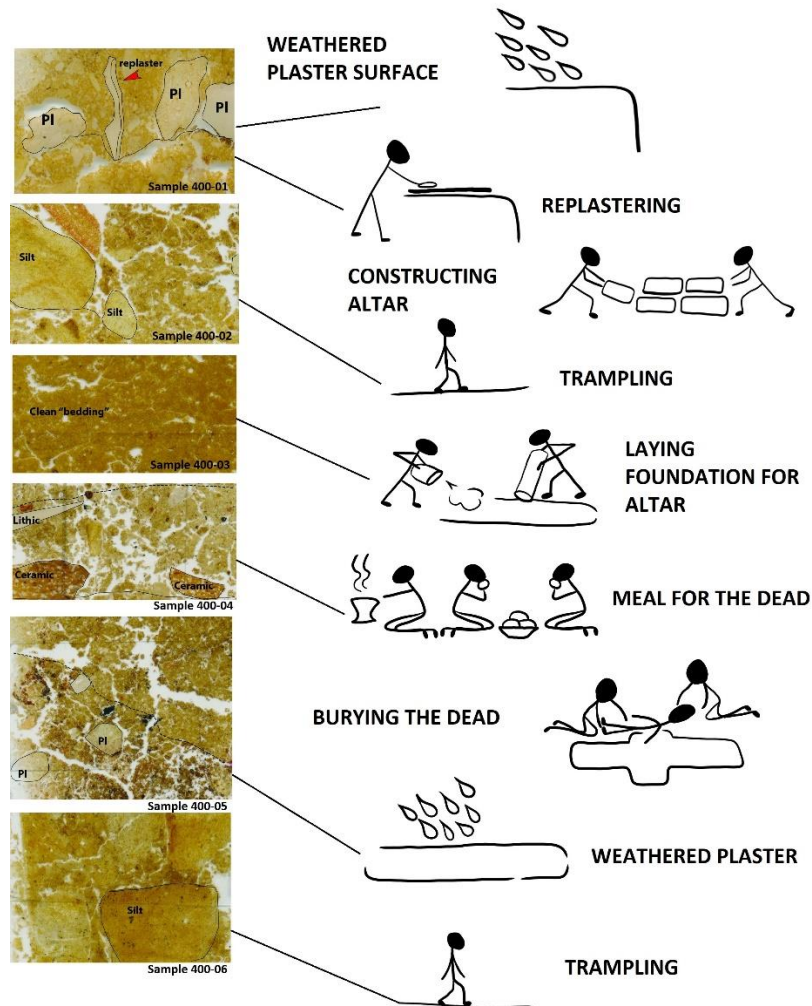


Figure 31: Sequence of events as seen in thin section; Silty-Clay aggregates possibly representing trampling just above bedrock in the principle period of occupation (400-06), followed by a complex groundmass represented by soil formation and anthropogenic components including the presence of plaster, heavily weathered by high soil moisture levels, mixed with charcoal (400-05), the archaeological stratigraphy suggests that the burial event occurred between sample 400-05 and sample 400-04. after the burial event, a thick plaza surface was detected, with an increase in artifactual materials, most aligned parallel to the ground surface. macroartifacts and micromorphology together suggest that this may have been a location for a feasting event. sample 400-03 exhibited a massive clay rich microstructure devoid of artifacts. this layer most likely represents a sterile architectural layer, deposited to stabilize the stone altar constructed above it. sample 400-02, taken just below the altar wall includes silt aggregates and a complex microstructure. this layer may represent both trampling and some mixing of materials as the altar was constructed. sample 400-01 was taken from the altar surface and includes mostly weathered plaster components. one plaster component has a clearly defined boundary representing one replastering event (Johnson 2018).

Event 4: Events of Burning during the Construction of a Formal Mausoleum

The next generation of occupants (living sometime between 636 and 710 AD, based on AMS dates) buried the altar within a large, pyramidal structure, transforming it into a formal mausoleum (Figure 37). The construction was most likely prompted by the need to bury additional members of the group considered influential or important enough to be given space associated with the principle burial (recent excavations have recovered additional crypts built into the stairs of the structure, informants pending). Chak Sutz', the individual described in the inscriptions of the tablet of the slaves would have been a child during this time and according to inscriptions found elsewhere in the city, the most well-known ruler, K'inich Janaab' Pakal I was at the height of his reign. The "Olvidado" temple was constructed in the western side of the city and the palace was expanding (Martin and Grube 2000; Stuart and Stuart 2008). The individual named on Group IV's stone incensario (interpreted as Aj Sul) is recorded as having attended the dedication of House E, of the palace in 654 A.D. (Bernal and Izquierdo 2011; Martin and Grube 2000; Stuart and Stuart 2008). Other inscriptions found in the palace have been partially translated and believed to mention a relationship or interaction with Tikal at this time (Martin and Grube 2000, 164) as well as a series of war-related events in the region (Stuart and Stuart 2008, 159). The population of the city was growing and new communities were building smaller settlements in the area immediately surrounding the city (Liendo 2007). As the social group of this residence were constructing their own formal mausoleum structure, construction of the city's largest mausoleum structure, the Temple of the Inscriptions, built for the ruler Pakal, was most likely also underway.

During the construction of Group IV's first formal mausoleum structure, the living members participated in a series of ritualized events before the final completion of the structure (Figure 36). After laying less than 50 cm. of dirt and cobble fill, they paused for a burning event directly above the altar (Figure 32). This area of concentrated burning, designated Locus 9, yielded remains of copal resin, and carbonized remains from plants from the Leguminaceae, the sapodilla (zapote) family, Malvaceae (a family of flowering plants that includes ceiba, cotton and cacao), and pine. There were no macro artifacts, suggesting that this particular event included only plant remains (Figure 33).



Figure 32: Burning event during construction of mausoleum Structure J7, locus 9 (Johnson 2016).

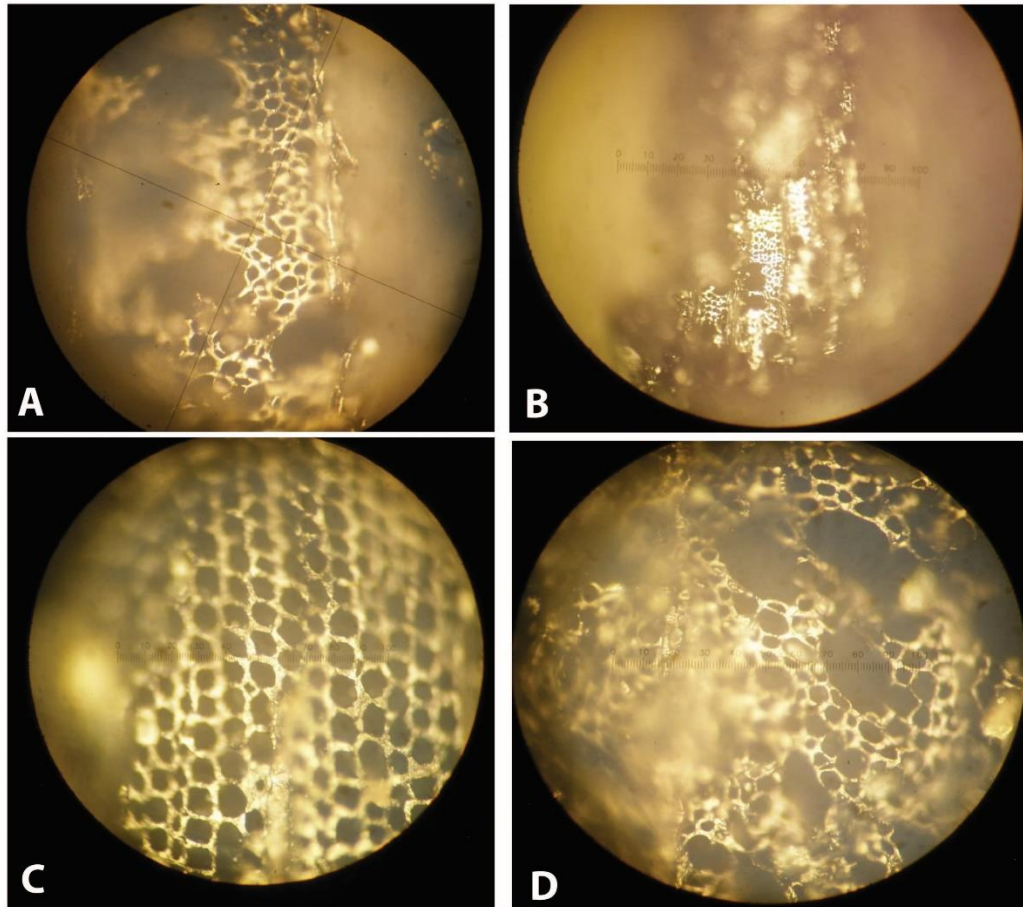


Figure 33: Charcoal fragments recovered from Locus 9, a burning event in construction fill: A) leguminaceae B) malvaceae C) pinaceae and D) indeterminate (Trabanino 2016).

The living members of the group continued to fill the structure with loose cobble fill, which was mostly clean, with very little artifacts suggesting the material may have been mined from outside the occupied area. Before completing the structure, the members of the house carried out another burning event directly in construction fill (designated Locus 8). As they had done previously, this event of burning only included plant remains, there were no other materials included. Among the identifiable carbonized plant remains were that of the Leguminaceae family, Pine (*Pinus* sp.), Pimienta, (possibly allspice, dried and used for flavor) and other species that were indeterminate (Figure 34).

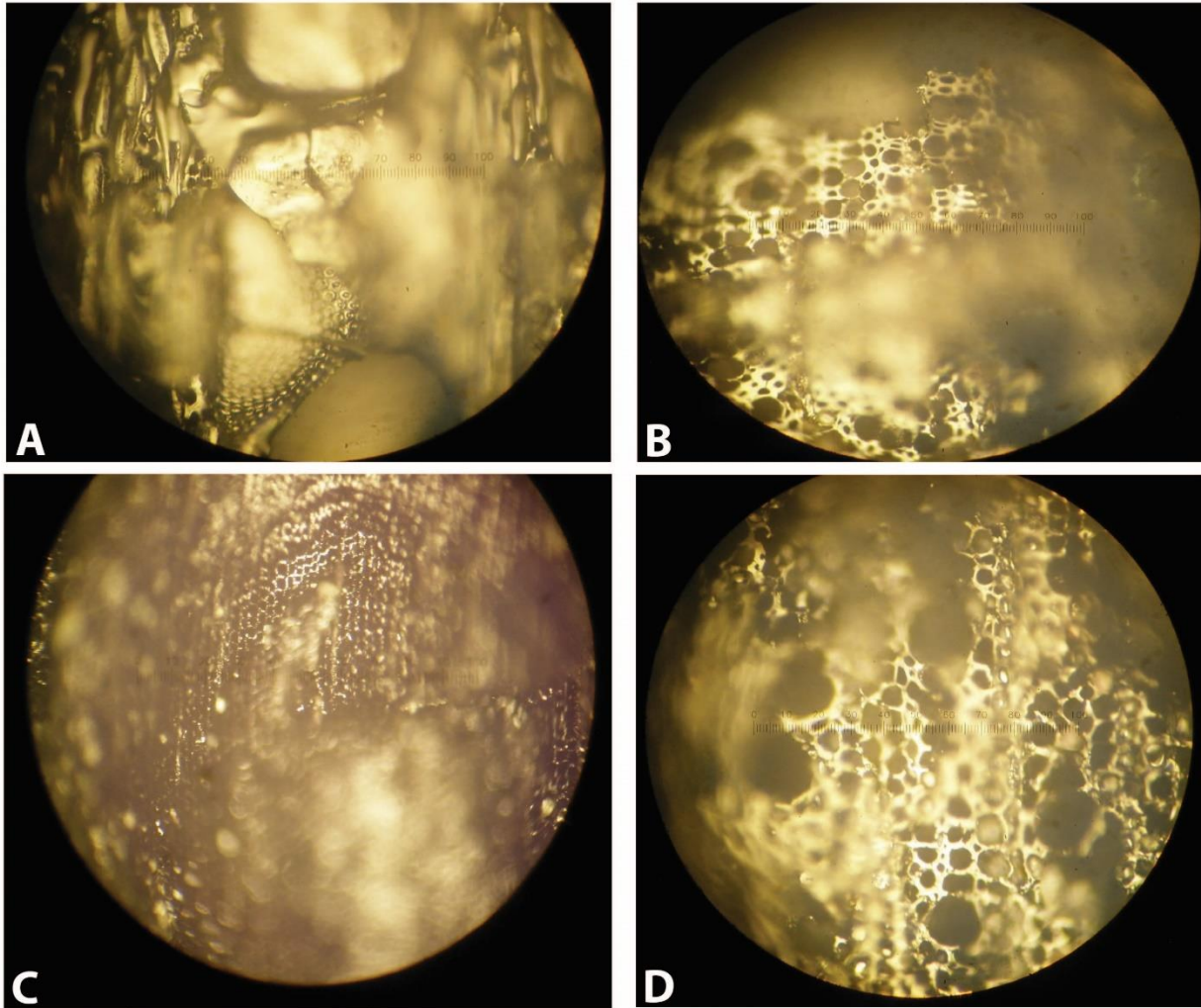


Figure 34: Carbonized plant remains recovered from burning event in construction fill of Structure J7 (Locus 8) including A) leguminaceae B) pimienta, allspice C) pine (*Pinus* sp.) and D) indeterminate (Trabanino 2016).

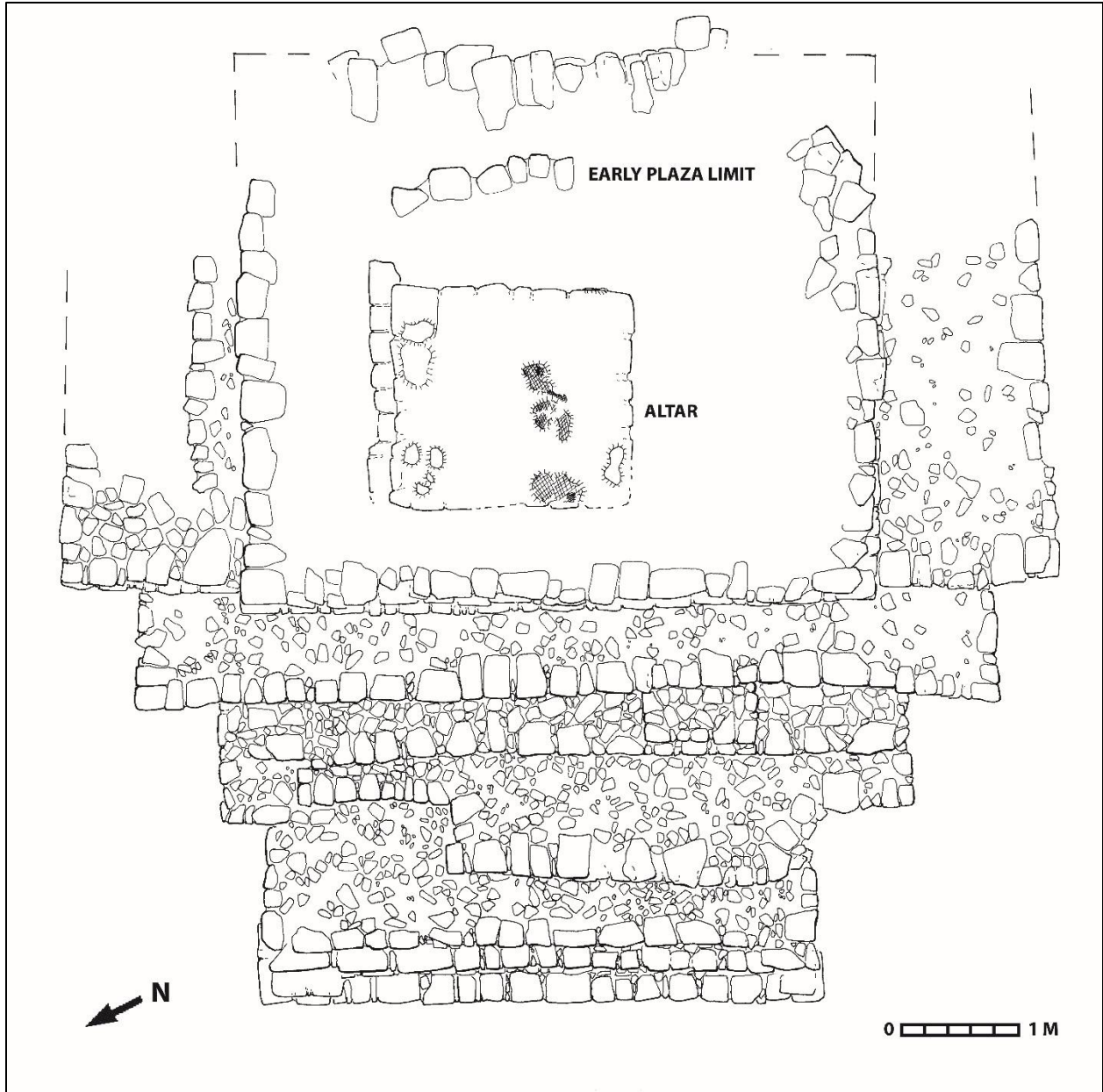


Figure 35: Illustrated plan of Structure J7 with the square altar buried within (Johnson 2016).

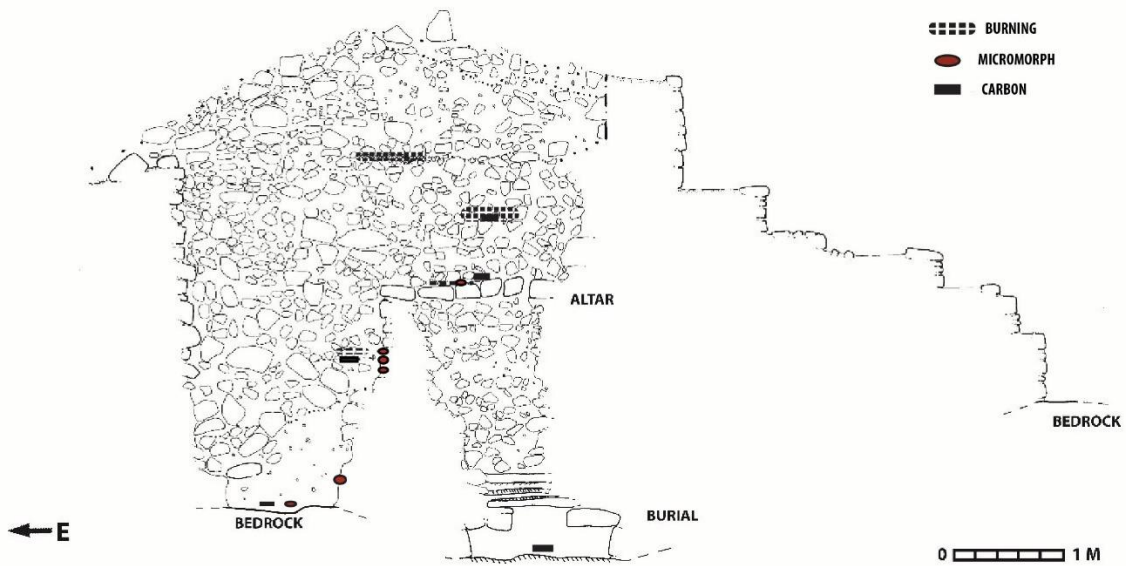


Figure 36: Illustrated section of Structure J7 indicating the location of carbon and micromorphology samples (Johnson 2016).

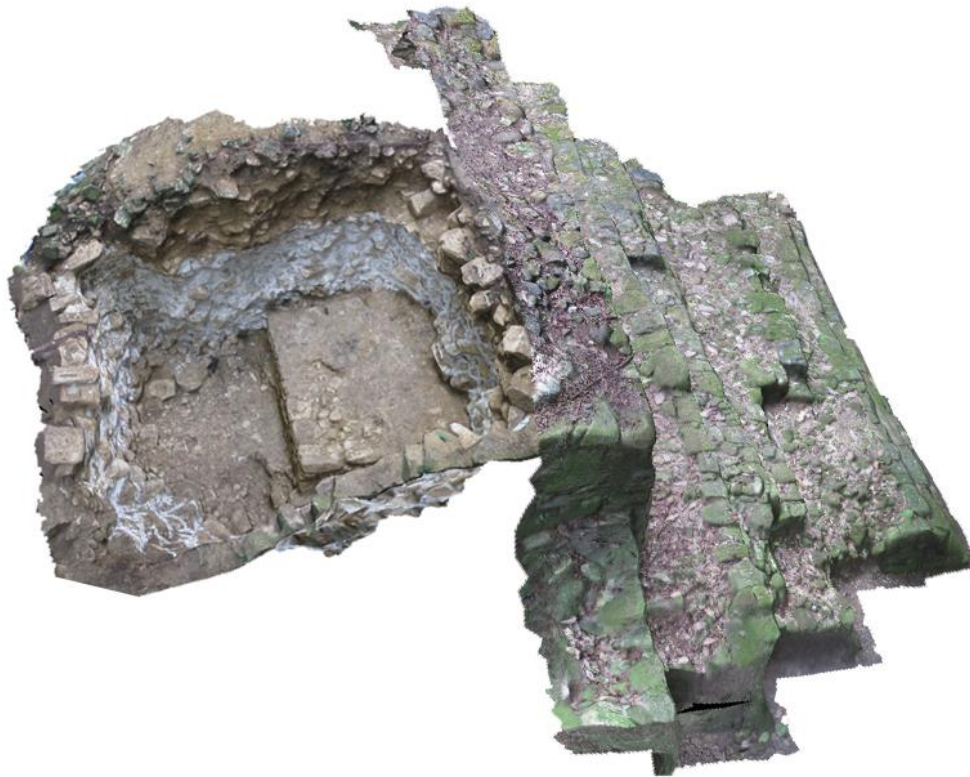


Figure 37: Three-dimensional model of Structure J7 showing the location of the altar buried within the later structure (created by Campiani 2016, used with permission).

Another mausoleum is built (J6)

Structure J6 is a four-meter-tall structure (from summit to plaza level) situated in the north-eastern corner of the plaza group and located directly north of structure J7, facing south (Figure 10). The stairway and western outer wall of the structure had been consolidated in the 1990s by the *Proyecto Palenque*. Previous excavations carried out by the *Proyecto Palenque* and earlier, by Robert Rands during the late 1950s, recovered human burials at the base of the building and on the lower step (Lopez Bravo 1995; Rands and Rands 1961), but no trench excavations had been carried out on the structure itself.

The structure is pyramidal in shape with a tall, narrow staircase. Much like structure J7, structure J6 appeared at the outset to have had later architectural additions, horizontally expanding the structure (see illustrated plan of structure). The inset corners were later found to have been utilized to accommodate burials in the plaza, just like structure J7.

Initially, a two-meter-wide (east/west) by seven-meter-long (north/south) trench was placed on the summit of the structure. However, this original excavation limit was later expanded on the east and west side to accommodate increasingly narrowing side walls as the excavation penetrated deep into the structure, with the final dimensions measuring three meters in width (east/west) and seven meters in length (north/south). The total depth of the excavation inside the main structure reached 5.62 meters down to bedrock. In addition, a small square excavation was later carried out at the base of the stairs measuring 2.5 meters wide (east/west) and 1 meter long (north/south). This smaller, separate excavation was also later expanded to the south with the final dimensions measuring 2.5 meters wide X 1.50 meters. This smaller unit was excavated down to bedrock to reveal a sealed entryway leading into the stairway (see below).

Event 1: Burying another loved one

Nearly 200 years after the earliest burial in the eastern mausoleum (J7), another older man aged 42-64 was buried with his head to the north inside a stone box crypt (Figure 38). The crypt was supported by stone blocks embedded in the wet and periodically saturated bedrock. Following the burial, the mausoleum structure was constructed in a single effort. Unlike the eastern mausoleum, there were no burning events carried out during construction. Roof stones found toppled down the side of the structure suggest this structure had a stone roof.

The man inside the main crypt was dressed in large jade ear ornaments, jade beads around his neck and wrists and a single jade bead in each hand. His jade ear ornaments were carved with a star or flower design and surrounded by four small circles (Figure 40). One of his jade beads was incised to resemble a small seed, similar in design to beads found adorning the ruler Pakal buried in the Temple of the Inscriptions Sarcophagus (Ruz 1954).

Two large polychrome plates, a small cup, and a fluted cylinder, were placed at his feet (Figure 39). The fluted cylinder is similar to others considered part of the Murcielagos ceramic complex (Rands 1987, 226). The cup was worn around the base suggesting it had already had a history of use. Carbon dates indicate that the burial most likely happened between 768 and 905 A.D. This person may have lived a generation after Chak Sutz celebrated his 60th birthday and the installation of the carved panel in 730 AD.

This man had what appeared to be deciduous incisors still embedded in his maxilla, behind his permanent incisors. The deciduous incisors had notches in them, at first glance they appear intentionally shaped, but studies elsewhere suggest this could have been a result of a partial splitting of the tooth crown (Massey and Steele 1997, 66).

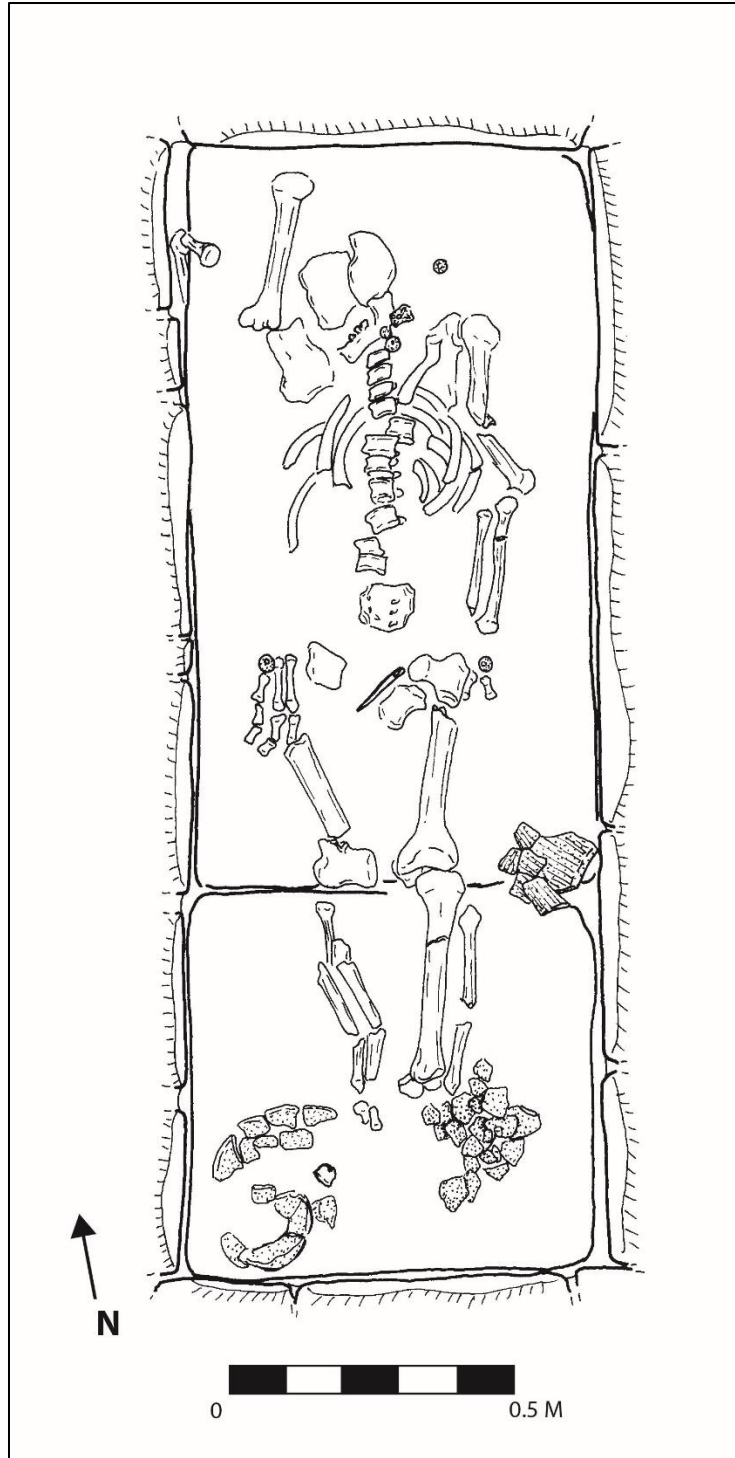


Figure 38: Illustrated plan of primary burial of an adult male inside Structure J6 (Johnson 2017).

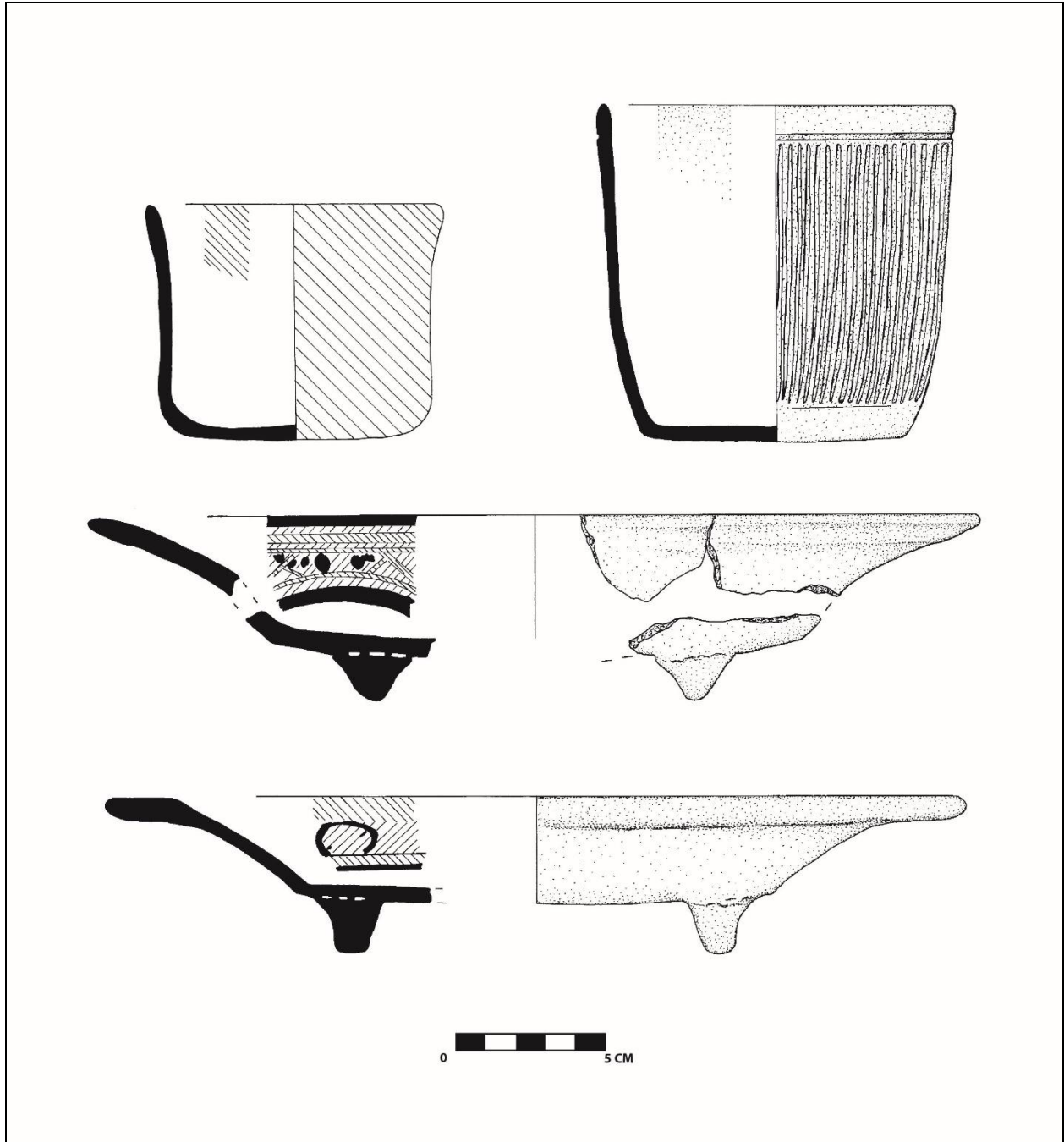


Figure 39: Vessels included with the burial inside Structure J6 including a small, red-slipped cup, a fluted cylindrical vase, and two polychrome tripod plates with black and red on orange slip (Johnson 2017).



Figure 40: Jade ornaments, two bone needles and a bone spindle whorl included with the primary burial inside Structure J6 (Johnson 2017).

Event 2: A Re-entry Event to Dress the Body

Living house members returned to this burial in a re-entry event and carefully applied a cinnabar coating to each bone, the deceased's jewelry, and a bone needle carefully laid across his pelvis. Such protracted rituals typically marked the transition from deceased to ancestor (McAnany 1995). Cinnabar, a substance procured from at least as far as the Maya highlands, was typically

a noble prerogative and was highly valued for its color symbolism, with red the color of blood, life and vitality. Around this time, the ruler Pakal and others in the royal family were also painted with cinnabar after their death. Pakal was also buried holding jade objects in his hands. So, it appears that this generation of descendants, through their continued relationship and engagement with the ruling family of Palenque, were replicating shared material practices.

Following this re-entry event, the symbolic act of layering was repeated as the residents sealed the burial in layers of *lajas* and loose plaster much like the burials nearly a hundred years before. After sealing the burial, another pyramidal mausoleum structure was constructed to house the ancestor within. The mausoleum was constructed in a single construction episode. There were no pauses for burning events, as seen in Structure J7. There were also no surfaces or architectural features inside the structure, it was all large, cobble fill. It was not possible to take block soil samples for micromorphology. There were no loose soil samples taken for flotation within the structure either, as the material is mixed and did not represent a discrete ritual event. Samples were taken from inside the vessels included in the primary burials to be subjected to phytolith and starch testing. Those results are still pending.

Event 3: A Vaulted Chamber

This building was constructed with a large front chamber under the stairs, accessible by a walk-in entryway cut into bedrock. The building of the mausoleum may have been prompted by the need to bury a person in this chamber, just as the eastern mausoleum was constructed to accommodate additional burials (informe in press).

Sometime later, this chamber was emptied, the primary person buried inside removed along with any materials that may have been included in the burial. When excavated, a long slab of limestone was found inside the chamber, roughly the length and width of a short person, in the center of the chamber. The slab was found directly on a stone lined floor, with two stone slabs set vertically on each side lengthwise (Figure 45). The long slab fell in, but like other burials in the city of Palenque, the slab and vertical walls would have formed a pseudo-sarcophagus, with the slab serving as the lid, also called a “slab crypt” in other burials of Palenque (Scherer 2012, 251). Under the north end of the slab, most likely where the head of the person would have been oriented, was a small stone box feature with the bundled remains of two people, an adult male of about 35 years of age and a child. When the chamber was emptied, these individuals were left behind.

The emptying of this chamber is unusual for Palenque. During 1959, Robert Rands excavated a series of burials at the base of the stairs of Structure J6 (Rands and Rands 1961). Of them, he described Burial 4 as a single extended individual with the head resting on the bottom step. Below this burial, aligned along the center of the structure was Burial 7, also containing a single extended individual with head placed in what Rands described as an "open area" between two cut stones (Rands and Rands 1961, fig.7). This open area can now be identified as the top of the arch of the entry way to the main chamber under the stairs. After clearing Burial 7, Rands noted:

“Burial 7 slopes markedly downward toward the north. Below its stone floor and partially under Structure C (J6), lay an earlier architectural feature *which was not excavated*” (emphasis added).

However, later, Linda Schele (1986, 8), in describing the archaeology of Group IV, stated:

although unpublished, Rands (personal communication, 1975) also found a chambered tomb in the lower pyramid at the center of the plaza. The chamber was vaulted and contained only a few sherds, but its form is like dozens of small burial chambers located throughout the archaeological zone.

This vaulted tomb found empty by Rands was most likely the chamber under the stairs of J6 that our project explored. Rands may have already found the entryway sealed, like other burials encountered in Palenque. Following his excavation, Rands and his team would have been responsible for infilling the tomb and re-sealing the doorway (Figure 41). This disturbance would account for the late carbon dates determined from samples recovered outside of the chamber entryway on bedrock and inside the chamber on the floor, that yielded dates of 1718 – 1819 A.D. The backfill inside the chamber was most likely a mix of plaza material and bedrock. The infilling and sealing of the door after finding the chamber empty may have been done for stability (Figure 44).

The documented placement of burials above the entryway and on the bottom steps, recovered by Rands, confirms that the chamber was emptied in antiquity. Living members of the house returned to this area to place additional burials around the structure after the chamber was already emptied. Of the numerous burials recovered in Group IV, this is the only case that was disturbed. The fact that living group members continued to place burials above the chamber suggests the group was still occupied at the time.

It is possible that the remains originally in the chamber were important and were conserved elsewhere. The remains of an ancestor can be of particular importance for social houses, as they not only fix the house within the landscape, they also mark a continuing identity. Although the bones of buried individuals themselves were not the ancestors for the Classic Maya, as their soul had already moved on to the supernatural realm where ancestors dwell, they did act as material intermediaries (Sherer 2015). Bones could be displayed, as shown on monuments from Tikal.



Figure 41: Infilled tomb at the base of the stairs, Structure J6 (Johnson 2017).

When the remains of the primary individual were removed, the secondary bundled burials in the box feature at the head of the tomb were left behind. The adult placed in the box within the chamber of Structure J6 had a disfigured femur and teeth worn to the roots (Figure 42, Figure 43). Worn teeth or dental attrition was common for those with a diet high in processed foods, typically foods processed on a stone metate, such as maize, which introduces large amounts of stone grit into the food, that is then chewed and ground between the teeth over time (Saul and Saul 1997, 46).

The disfigured femur suggests this adult lived a harsher life and was less healthy than people in primary burials around this structure in Group IV. Osteological analyses suggest the disfigurement may result from treponemas infection, or “yaws”, common in tropical areas. This is a tropical infection of the skin, bones and joints that in its advanced stages can disfigure the bones. It is spread by direct contact with fluid from a lesion of an infected person, also common in areas with issues of sanitation and cleanliness (Saul and Saul 1997). As the city became more and more densely populated, particularly after 700 A.D., many non-elite communities occupied the open plains to north. These areas would have been downstream from the main water sources flowing through the city and occupants here were most likely exposed to unsanitary water (Stuart and Stuart 2008, 237).

The mausoleum was constructed in a single construction episode. There were no pauses for burning events, as seen in Structure J7. There were also no surfaces or architectural features inside the structure, it was all large, cobble fill. It was not possible to take block soil samples for micromorphology. There were no loose soil samples taken for flotation within the structure

either, as the material is mixed and did not represent a discrete ritual event. Samples were taken from inside the vessels included in the primary burials to be subjected to phytolith and starch testing. Those results are still pending.



Figure 42: Photo of disfigured femur of single male placed in box feature within the vaulted tomb below the stairs of Structure J6 (Johnson 2017).



Figure 43: Heavily worn teeth of individual inside box feature of vaulted tomb below the stairs of Structure J6 (Johnson 2017).

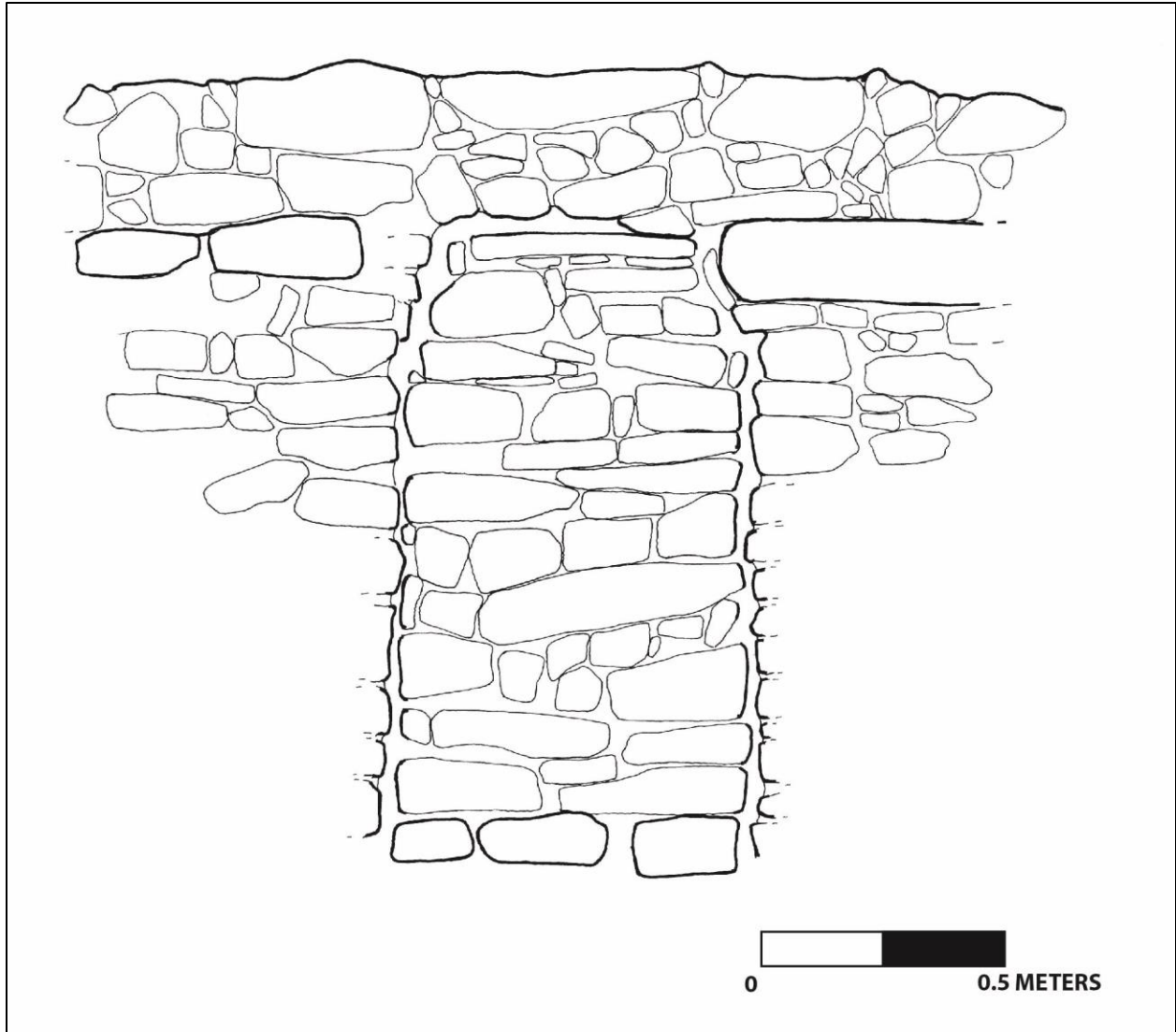


Figure 44: Illustrated profile of the sealed entryway beneath the stairway of Structure J6, the head to Rands' Burial 7 was positioned in the open space at the top of the entrance, level with the bottom step (Johnson 2017).



Figure 45: Inside the vaulted tomb under the stairs of Structure J6 following the removal of fill. The long, linear laja would have provided a top to a constructed stone box for a single burial, but had fallen in (Johnson 2017).

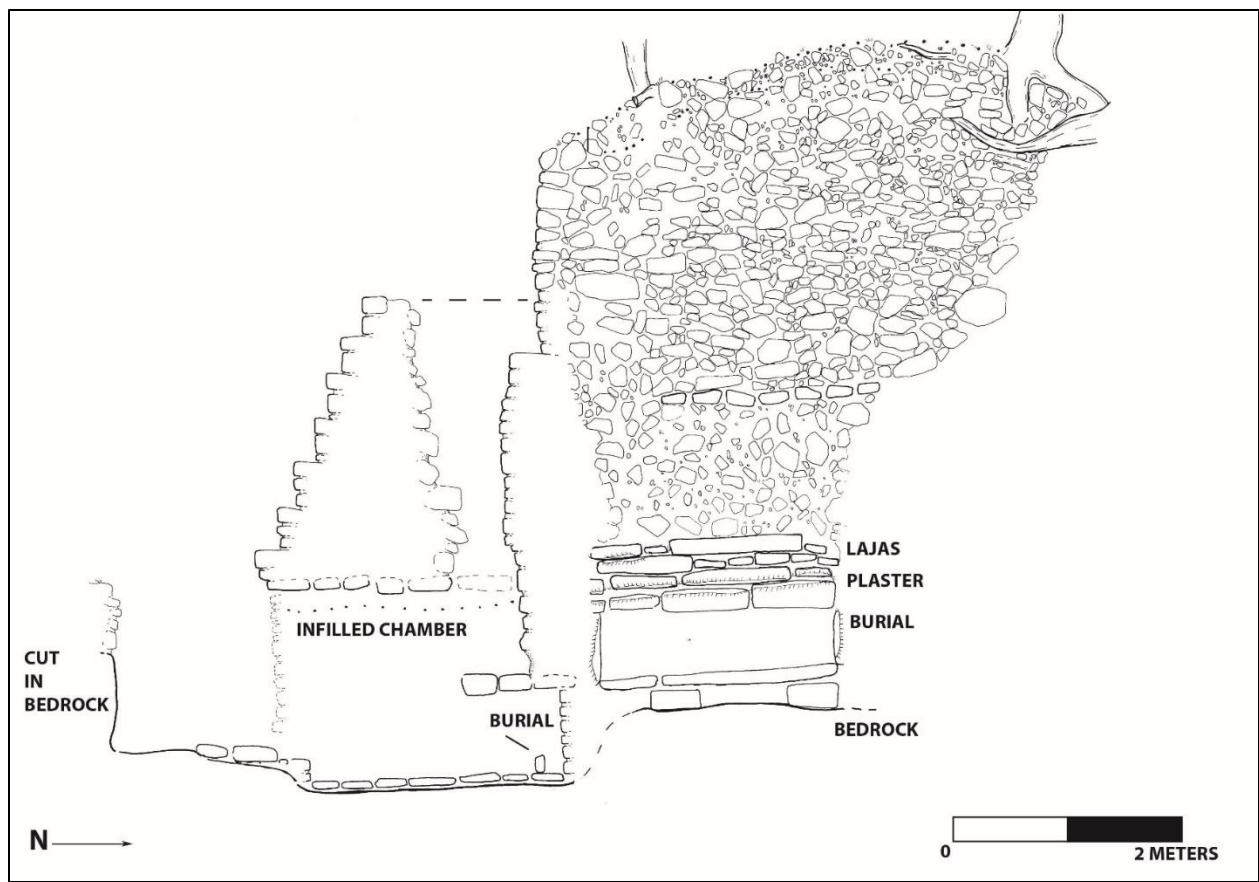


Figure 46: Illustrated profile of Structure J6 indicating location of burials (Johnson 2017).

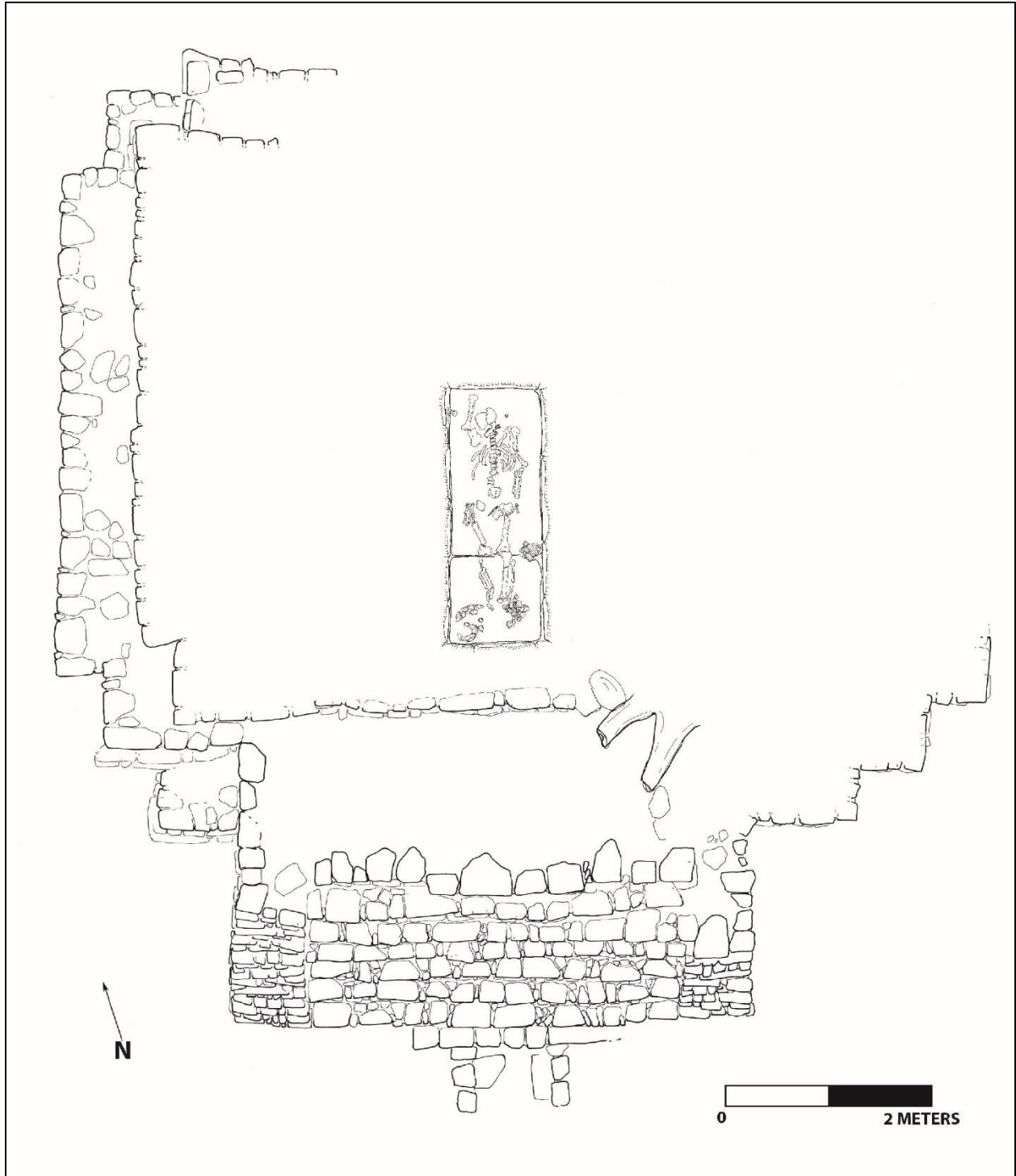


Figure 47: Illustrated plan of Structure J6 (Johnson 2017).

Discussion

The residence of Group IV was a large, elaborate house with a long history. Carved inscriptions suggest that select individuals that presumably lived there were influential in the city of Palenque and most likely served as community leaders that may have experienced and actively fought in Palenque's military conflicts. As the residence of the leading social group, extended kin, even those that may not have lived in the residence itself, returned to be buried in the plazas and around the stairs of the stone-built mausoleums of the house. Once the primary residence was marked as the burial place of a founding member, living members of the house continued to return to bury their dead around this location, where both earlier projects (Lopez Bravo 1995; Rands and Rands 1961) and the current project (Liendo 2016) encountered them. Over time, this formed an extensive cemetery, spreading over succeeding plaza levels spanning hundreds of years. The number of burials likely exceeds the number of people who physically resided in this residence. To date, over 60 burials of men, women and children have been recovered representing the only known "cemetery" in the city (Liendo 2016; Lopez Bravo 1995; Rands and Rands 1961). As suggested by Scherer (2015), it is possible that this pattern indicates this was the residence of the leading family of an extended social group some of whose members returned there for burial. Their control and access of the remains of the ancestor buried below ensured continued authority and rights to house resources.

The presence of a dense concentration of burials of more individuals than were likely resident, forming an apparent cemetery, is similar to the Sepulturas group, a noble residential neighborhood east of the main acropolis at Copan. That group also had cruciform shape crypts (Ashmore 1991; Fash 1986; Hendon 2000). Linda Schele (1986, 8) has suggested that both Group IV and the Sepulturas group were similar kinds of compounds, both, possibly the residence of a leading lineage. In both cases, the residents had inscriptions and iconography commissioned that linked them relationally with the primary ruler. At the time of Schele's assessment, she explained that the residential compound of the Sepulturas Group was dedicated to the patron gods of writing, the arts, and crafts. But she goes on to say, "Group IV is the equivalent kind of compound at Palenque, but the specialization of the lineage that resided there is less evident" (Schele 1986, 8). The continued excavations both in the patio and for this dissertation project suggests that in addition to war-related occupational activities, the residents of Group IV were also weavers. Their spindle whorls, needles and bone awls were curated and included with the dead in a number of funerary events both inside the mausoleums and out in the plaza.

The architectural plan of Group IV, can be described as a formal "plazuela" group as the structures were constructed (more or less) to the cardinal directions, enclosing a central patio. This arrangement followed a larger Maya practice that was more typical in cities outside of the Palenque region, suggesting that this particular social group were unique in the city of Palenque, making choices that ultimately set them apart from their neighbors. However, Group IV's visible form was four hundred years in the making. The patio was not enclosed by structures immediately, it became enclosed as structures were added; initiated by significant ritualized events, a growing social group and possibly, growing material wealth and political influence.

From the earliest occupation of the house, the eastern area was ritually important. At the eastern edge of the leveled plaza space, events of burning coincided with the use and deposition of ceramic ollas, large coarseware, a whistle in the shape of a woman, and food remains including turtle, fish, and jute. That space was transformed when the first generation of Group IV dug through the plaza surface and down into the bedrock to carve out a cruciform shaped crypt to bury a member of the household. The symbolically important space chosen for the burial, coupled with the elaboration of the construction and funerary event suggests that the older man was most likely one of the first founders to become an ancestor for the Group IV house. Ancestors were powerful agents in Classic Maya society who held influence over the world of the living. As others have argued, ancestors were often buried in prominent locations, including spaces with visible monuments or markers, locations that were accessible to the living, to enable interaction. While contemporary Maya consider ancestors as a general collective, iconographic and epigraphic materials from the Classic Period suggest some ancestors were more individualized.

Themes of foundation and the “centering” of sacred space proliferate these earliest periods of Group IV’s ritual events in the actions performed and the materials incorporated. The practice of digging into bedrock for human burials is common across the Maya region. Classic Maya inscriptions likened the burial of the dead to “planting” or “sowing” (Fitzsimmons 2009, 68). To dig into bedrock was to anchor the ancestor into place so that they might regenerate in their new form, much like corn is sowed, dies, and returns. His cruciform crypt was constructed in a form reminiscent of the world tree depicted in the central ceremonial precinct of the city, the most well-known example being the world tree depicted on Pakal’s sarcophagus lid (Freidel et al. 1993). Placing the body there was to place the body along the center of the world tree. In Classic Maya cosmology, the world tree provides a conduit between the living world, the underworld and the worlds of the supernatural above. After the grave was reopened to apply cinnabar, a series of *lajas* were layered above the crypt, sealing his remains below.

Layering materials above burials has been found in other Maya cities, Ashmore (1991, 215) describes one example, with burial XLII-7 in the residential group 8L-12 of Copan in Honduras, “the burial itself consisted of a vertical series of masonry blocks or slabs (three sequential sets of differently oriented pairs) among which were embedded two human skeletons, either dismembered or secondarily deposited, all in a midden-like matrix.” In Group IV, the layering did not include human remains, but instead, loose, white plaster. Which appears to have been replicated in later burial events in Palenque, with a similar, cruciform crypt sealed with layers of white plaster in Temple XVIII A (Ruz 1959; Stuart and Stuart 2008, 119). The combination of layering and the color white actively linked the dead man below with the layering of the cosmos. In Classic Maya inscriptions as, a common sign for death describes the termination of a pair of elements, a floral form including the *sak* sign for “white” and the *ik*’ wind sign as the breath spirit (Taube 2004, 74).

The theme of foundation and centering were continued in the construction of the altar directly above his remains just years later. During construction of his altar, three square, cut stones were set into the center, the middle stone, a striking pink color. This was the “three-stone-hearth” of

Group IV (Freidel et al. 1993; Taube 1998). The upper stone was found scorched from burning, transforming the space into an active hearth.

The botanical remains recovered from Group IV's altar surface provide further evidence of such an interpretation. The possible presence of burnt ceiba fibers in the burning event is symbolically linked to the theme. The ceiba tree was itself considered the "world tree" or axis mundi (Zidar and Elisens 2009). Karl Taube (1998, 433) describes the connections between incense burners, the world tree and the three stone hearth "as the axis mundi, the hearth is also a conduit between the levels of earth, sky, and the underworld. Similarly, it will be seen that, for the Classic Maya, the sacred hearth is also portrayed as a watery place and frequently fuses with the verdant ceiba, or *yax che*, also marking the world center." In ancient Maya ritual practice, these themes were fused in the design of ceremonial objects, the use of space and the collections of materials integrated into the event, such as incense burners designed with applied ceiba spikes, commonly found throughout the Maya region during the Classic Period (Rice 1999).

The excavations carried out here, and later, lab analyses of micro stratigraphic evidences as seen in the micromorphology thin sections have elucidated a series of actions and ritualized events spanning multiple generations, all concentrated in this one area of the plaza. It took a series of ritual acts to bury the individual and construct an altar to make exchanges with his ancestral spirit. Many of those actions occurred during the establishing of the sacred space. It was not uncommon for the Maya to carry out ritualized events during the construction of space. Prehispanic examples similar to the context described here include a feature recovered at the Classic Maya site of Dos Hombres in Belize. There, archaeologists excavated a low platform feature, which they designated as a ritual shrine, on the eastern side of a plaza (Lohse 2007). When they excavated through the surface of the Dos Hombres altar, they encountered what they called "an enigmatic plaster patch" directly on top of bedrock with no apparent function. This plaster was laid in the same location as what would later be the altar. That plaster patch most likely served as a foundation or centering space before the altar was constructed. There is some continuity in this practice as similarities are also found in both colonial era documents and later in more contemporary observations among Maya communities. The creation stories outlined in the colonial book of Chilam Balam of Chumayel describe the raising up of thrones, or what were later identified as altars, in each of the cardinal directions, but only after each had established "the white foundation, the black foundation, the red foundation and the yellow foundation" (Roys 1933, 102). Versions of this practice can still be seen in contemporary house-building ceremonies among the highland Maya communities (Vogt 1976).

Ritualized actions continued in the building of the formal mausoleum structure generations after Group IV's founding member was buried. During the construction, pauses were evident as the living members carried out intense burning events directly in the construction fill. The burning in fill only included plant remains and was likely meant to feed the new ancestral "house" (Taube 1998). These feeding events were distinct from the much larger feasting event that occurred directly above the grave. After the burial was sealed and covered by a plaza surface, the living members of the group revisited this area and participated in a ritualized event that may have been meant to "feed" the ancestor buried below. During this event, incense, lit by pine

sticks, was burnt in a small incensario vessel. Food was offered, including four fish of a local variety, along with turtles and jute snails. These were all typical foods, enjoyed by the living and shared with the dead. The same foods that were included in the earliest events of the house. In order to transport the feast to the supernatural realm, it was burnt. Even the incensario was burnt *in situ*. All the remains were left behind as a single moment materialized. The everyday act of eating was ritualized during this event, evident in its specialized treatment and demarcated space. While the living members of the house may have eaten some of the food, outside of the typical eating area, above the resting place of the dead, the rest was burnt in order to transport it to the world the ancestor inhabited where it could be consumed by him. However, the later burning events in construction fill were not meant for the ancestor himself, or for the altar, but rather, for his living house. In which case, the affair was smaller and included only plants. The altar itself was activated with fire as its large, square, central stone was scorched, just prior to plastering. After the altar was activated, it was able to receive and transport offerings to the supernatural. The burning events carried out during construction of the larger structure J7 entombing the altar and the ancestor within served a different purpose. In this event of burning, the ancestor's house itself was activated. Together, the house, altar and ancestor within were materially charged. The fuel needed for these ritualized events was specific and followed a larger pattern seen across the Maya region. Pine was used in all of the ritualized burning events, a resource not local to Palenque. The resinous pine would have produced a particular visual and olfactory effect.

Continued paleoethnobotanical analyses across the Maya region, particularly those concerned with ritual contexts explicitly have shown a pattern in the kinds of plants chosen for ritualized events among the Maya. In the city of Rio Bec in the Campeche region just east of Palenque, analyses of a series of burning events related to burials found that pine was the preferred wood for burning in ritual, including burials and incense burning (Dussol et al. 2016). Pine was present in each ritual burning event carried out in Group IV.

Burning is a materially meaningful act among the Maya. Epigraphic, iconographic and archaeological evidence suggest that fire often accompanied Classic Maya ritualized events. "Fire Entering" ceremonies are mentioned in Classic Maya inscriptions, and are understood as causing transformation or becoming (Fitzsimmons 2009, 31; Stuart 1998). Burning was a pause, a moment to sanctify the space and ensoul the house of the ancestor before completion. The fire and smoke transform the structure, activating the vibrant matter of the building itself. In other cases, the smoke from censers cleanses houses in renewal ceremonies. Stuart (1998, 389) showed that the Tablet of the 96 Glyphs, an inscription in Palenque's palace, record similar events, described as "the fire enters into his house." He argues that the participation of fire and smoke in activating or ensouling the house has a long history and continues among Maya communities. Ethnographic accounts of contemporary Maya communities describe the importance of fire in ritualized events today:

Fire is an important element of Maya ceremonies, and a fire must be built to consume the offerings given. These offerings include incense, liquor, candles, sugar, and other flammable items. When they are burned their essence rises into the sky to serve as an offering to the gods (Fischer and Hendrickson 2003, 87).

Excavations in structure J6 in the northeastern corner of Group IV showed some similarities in burial practice but yielded significantly different results in the building of the structure itself. There were no feasting events for the dead. There were no events to feed this ancestral house. The overall themes of the ritualized events carried out in the earlier space of structure J7 was one of foundation, and space centering. The later, structure J6 did not have those kinds of contexts suggesting the actions and affects were different. Sacred space had already been established and founded, in structure J6, the only need was to maintain the ancestor's space.

These two houses for the dead were monuments, visible reminders of the important ancestor buried within. Generations of Maya would return to these marked spaces and bury their dead in every available space around these buildings. The two "houses" for the dead were open in continuity, for generations until finally closed when a single burial was placed, with head on the bottom stair of each building (for discussion of house "closing" see Arnauld et al. 2013). The placement of the body this way, rendered the building out of use, the stairs, now impassable.

Considering the 'event' in Group IV

I have described each event that culminated in Group IV. Archaeologically, we encounter them as *contexts*. Under an active materialism, those contexts can be considered as bounded moments that implicated humans, non-human living beings such as plants and animals, alongside other materials in a demarcated space. As Gilmore (2015, 121) has argued, "the location of an event is an integral aspect of the event itself." For nearly four centuries (c.a. 450 – 850 A.D.) generations of Maya returned to these same locations to participate in events, that were materially grounded, sensually potent and powerfully memorable. The space engaged in those events was implicated following centuries of Maya cosmology emphasizing the eastern direction as meaningful. As a material discursive act, rooted in a history of practice, burying the dead in the east was common across the Maya region throughout the Classic Period.

Archaeologically, we have detected traces of those events that were initiated by the death of a group member. We can call them 'events' as the effects of those material actions extended beyond the immediate moment (Gilmore and O'Donoghue 2015). Each event was informed by a larger history of practice, and in turn, informed the events that followed. Following the initial events carried out in the eastern side of the plaza, subsequent events occurred. Each event was distinct from other daily happenings in the house, leaving discrete material assemblages. Each event did different things, were experienced differently and produced different memories.

Swenson (2015) and Walker (2008) both have described ritual as a heightened relationality between humans and non-humans, marking those actions and events as distinct. Maya ancestors are ever-present, but in those bounded moments, the living participated in direct material exchanges with them. In addition to the living Maya and the deceased ancestor, the materials that formed the assemblage were also active in the event.

For example, the altar was a marked ritual space, a material actor that *participated* in events of foundation and renewal. The altar is spatial, it is material, and historical. On its surface, in the space surrounding it and directly implicating it, events emerged time and time again. When we describe these as foundational events, it is not just a passing reference to a Maya cosmological belief, but also, acknowledges a material process. The components that make up an assemblage are not completely new, they are components from previous assemblages, yet they are combined in new ways, and a new, indivisible whole emerges (Deleuze and Guattari 1987). The altar was a new construction, emerging through centuries of altar building and use in Mesoamerica that began as early as the Middle Formative period (Joyce and Grove 1999). Yet the collective of altar, offerings, human participants and ancestors conjured was new, bounded by the ‘event’.

Under an active materialism, we can argue that altars *do* things. The altar provided a space, a point of transfer in which gifts and exchanges could be made with other worlds. In this way, the altar space was a ‘portal’ in which ancestors, gods or spirits could visit the world of the living and partake in the offerings placed for them. Yet, it is a visible and material marker. It can generate and recall memory and incite the senses. It defines a bounded space, distinct from other spaces in which the ongoing pulse of everyday life was carried out. In this space, the intangible and tangible converge. Altars provide a space in which the history of ancestors, family or lineage can be recalled.

Before a coming together during the ritualized event, the altar was something different, it was a square stone construction, the various substances, were not offerings or nourishment for the ancestors, they were plants, minerals, and animals. The human participants too are temporarily transformed during the event, thereby exercising a power that was not there prior to the event. Yet, together, a materialized whole emerges.

Within the event, human experience is altered. Matter sparks the senses, and time is experienced differently, recalling a point made by Connolly (2011, 4) “we live in at least two registers of temporal experience, action-oriented, perception and the slower experience of the past folding into the present and both flowing toward the future.” Ritual in particular has been described as a distinct kind of time, or “ritual time” perceived differently from the daily tempo of time (Bloch 1989). Ritualized events involve multiple temporalities; bringing the past simultaneously alongside the present, its effects informing the future. The initial death followed by the burial event, we can imagine, was a sensual experience, solidifying it into social memory. Memories of touching the corpse of their leading group member, the sounds of mourning, the smell of the stone crypt, damp from being dug deep into the dense clay bedrock material were most likely easily recalled. As an archaeologist, who found myself inside the crypt, I can still recall the dampness, and the smell of clay rich bedrock material.

The men, women and children of Group IV returned to the site of their ancestor’s burial in ritual events that simultaneously recalled the memory of their lost loved one in the present moment of the event, effectively creating a social memory that would carry into the future nearly 350 years later. Memory needs matter. Sounds, smell, touch, visual qualities of materials bring the past into the present. Death and mortuary events are one of the most common ritualized events cross culturally, and in every case, no doubt those events are emotional, sensual, and memorable. How

matter is experienced, understood, and the nature of the kinds of memories it evokes is culturally and historically particular. Susan Kus (2013, 12) reminds us to take that into consideration in our “effort to understand and appreciate how the senses, emotions, and the symbolic are implicated in cultural experiences, understandings, imaginings, and practices surrounding death.” An archaeology concerned with death and ritual cannot ignore a consideration of the senses, of materiality, nor can it ignore meaning that emerges through that intra-action. Taking the burial of the first founding member as an example, the actions and materials implicated in the events that surrounded the man’s passing were material discursive acts (Barad 2007). Meaning emerged through the intra-action of a dead body, living bodies, a hole dug into bedrock, flat, limestone slabs and loose, white plaster. As an indivisible whole, the assemblage that was the ritual event was understood as one of “foundation,” because centuries of material discursive acts in the Maya region have reinforced that understanding. Meaning making is a historical process, just as matter making is a historical process (De Landa 2000). The event whose traces are represented by these features was one of liminality (Van Gennep 1960), as the man was in transition from the world of the living to the world of the dead. Through this event, the living members of the group could gather and mourn the man’s death. And later, events in which the graves were re-entered to coat the skeletal bodies with a red cinnabar paste, marked a transition from becoming dead, to becoming ancestor. Funeral events and the experience of death while culturally variable, are emotionally charged and powerful memory markers (Kus 1992; 2013).

The materials that formed part of the assemblages, or ‘events’ were detectable through a comprehensive methodological approach. Those materials included plants and resins, remains that have not typically been identified at the city of Palenque. Identifying the scope of materials present facilitates a consideration of the event as a sensual experience. The events carried out in Structure J7 included materials such as pine and pepper, both of which produce a distinct smell when burnt. Pine is not local to Palenque but was incorporated into each burning event carried out in this space. Pine is the most common type of wood utilized in ritual events across the Maya region, and was most likely preferred because of the resinous and odorous qualities. Combined with copal, fish, turtle and jute, the smell and smoke from the burning would have been powerful, maybe even central to the event itself.

The event as proposed in this dissertation is an active assemblage that produces affect that goes beyond the moment (Gilmore and O’Donoughue 2015). The heightened relationality of the ritual event in particular sets it apart from the daily tempo of happenings that blend into the everyday. Events can transform the moments that follow, permanently altering them, or they can temporarily rupture that tempo, only to return to relative equilibrium.

Micromorphology Outside of the Ritual Event

A series of block soil samples were taken from areas outside of the mausoleum structure, primarily in the plaza for the purposes of comparison. If, as I have argued, ritual events are distinct material groupings, they should produce distinct material signatures. Not surprisingly,

micromorphological analysis revealed this area to be relatively clean, with very few artifacts. The groundmass was mostly a fine sandy clay-rich soil matrix. The coarse fraction included only a few phytoliths, burnt bone, and in one case, shell. Outside of quartz and small mica minerals, the most common components seen in all three of the samples was excrement. Most of which were most likely deposited by burrowing micro fauna, others may have been from larger meat-eating mammals. All three samples showed considerable weathering from the high levels of soil moisture, as evidenced by the striated b-fabric and *in situ* crystal growth. In contrast to the high quantities of carbon, ceramics, lithic fragments, and food debris seen in the slides from Structure J7, Samples 9, 10, and 11 suggest the plaza area was kept clean. The only detectable disturbances include trampling, and possible micro fauna disturbance.

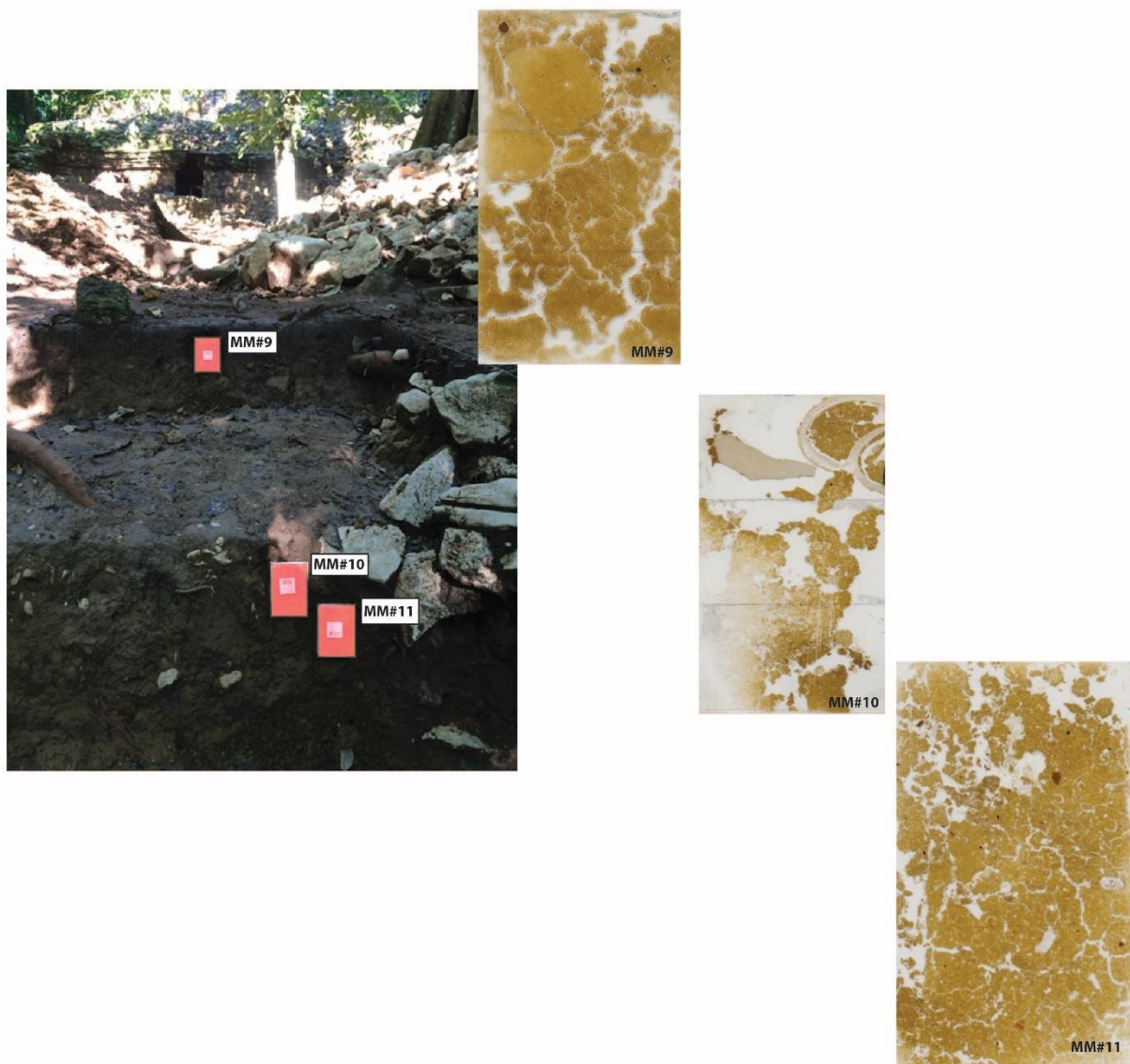


Figure 48: Micromorphology Samples 9,10,11 from the plaza, looking west toward Structure J1 (Johnson 2016) .

Chapter 6: Conclusion

This dissertation set out to ask a set of questions surrounding the distinction between ritualized events, non-ritual moments. Such questions are grounded in an understanding that ritualization is a stylized way of acting that can emphasize those aspects of social life that are deemed socially important (Bradley 2003) and that ritualization is both culturally and contextually variable (Swenson 2015). I set out to identify what ritualization looks like for the Maya residing in Group IV, Palenque, during the Middle to Late Classic Period (500-800 AD). I have argued, following others, that ritualization as a distinct way of acting that will produce distinct material signatures.

Pursuing these questions, this project found that assembled materials during ritualized events *did* produce distinct traces. Most of the materials utilized in the ritualized events were largely everyday materials, including food such as fish, turtle, jute, beans, and spices, like allspice. They are materials found in any other contexts on-site. However, it is the coming together of these materials in particular contexts that makes them participants in ritually significant events. Those events also included materials such as polychrome and decorated serving ware, an incense burner and copal that may not have been every-day materials. Together, they were assembled in distinct ways, and in spaces associated with the dead. Those materials were transformed in distinct ways. The food, similar to food found in the household trash (see informe of basurero, Liendo 2016), was not just eaten and haphazardly discarded. Some of it may have been eaten by the living, but the remaining food was clustered around the altar and burnt. As a stylized material practice, ritualized events can lead to structured deposition. This was evident in different ways, both macroscopically during excavation, and microscopically through micromorphological analysis.

In the case of the feasting event around the altar, the micromorphology revealed a distinct material signature. The quantity of materials and their spatial arrangement was different from the samples taken in the plaza. The plaza appeared relatively clean of artifacts. In contrast, the area around the altar had a layering of flat-lying pottery and lithics, a mix of carbon, bone and phytoliths. This collection of materials assembled in that space associated with the dead was distinct as compared to non-ritual contexts. Each event materialized in distinct ways, while still following larger Maya practices. In Group IV, there were events carried out specifically as acts of foundation, and other events that were most likely carried out as a means to commemorate and interact with the spirit of the dead man buried nearby. The events of burning that took place in the construction fill fed the structure itself, animating it, differing from the events carried out directly for the dead, yet related as it activated the house of the dead.

Further, I have argued for a comprehensive methodological approach as a means to detect the singular ‘event’ and the diversity of matter assembled within it. The incorporation of fine grained stratigraphic analyses as seen through examination of anthropogenic deposits in thin-section, has enabled the identification of single episodes of deposition and alteration. In addition to the feasting event, micromorphological analysis enabled the detection of an additional moment in which the living members of the group laid a foundation of clay-rich bedrock

material before constructing the stone altar. Micromorphology also detected an episode of re-plastering of the altar. These actions were not detectable with traditional excavation methodology. With the carbon dates and recorded text, it is possible to say that the excavations carried out by this dissertation project have recovered traces of ritual events spanning multiple generations from roughly 500 – 750/800 A.D.

The implementation of multiple kinds of analyses in this archaeological project was carried out in order to identify the discrete material traces of events. Events, as described in chapter 2, are considered bounded moments, that emerge through assemblages of matter. Approaching ritual studies this way is an attempt to move away from an archaeology of ritual concerned with the “ritual deposit,” as a static collection of materials to be read for their symbolic representation. Instead, I am attempting to re-articulate an archaeology of ritual, particularly an archaeology of Maya ritual within an active materialism. Inspired by the work of interdisciplinary scholars, in physics, political science and history, I have argued that a relational ontology which has most recently been described as a “new materialism” is a productive way forward for ritual studies in general and Maya ritual studies in particular as it is closer in perspective to Amerindian ontologies (De Castro 1998).

Material relations, both active and fluid, can be difficult to examine in an isolated context. Inspired by the work of Connolly (2013), I have suggested that the ‘event,’ a concept that has considerable roots in social theory, is one way that ritual can be examined as a material assemblage. Other approaches to the ‘event’ primarily consider it in its temporality, or as an aspect of time. The inclusion of Connolly’s approach to the event brings in the material qualities of the event. The event stands apart as memorable, it has effects that reach beyond the moment. The event culminates as a heightened relationality, or plateau (Deleuze and Guattari 1987) that can bring abrupt change or transformation (Pluckhahn 2015) or they can be a momentary plateau that is followed by a return to equilibrium and the noneventful tempo of everyday life. If we were to visualize these moments, I would argue, they would resemble waves in the ocean, each cresting wave, a heightened crescendo interrupting the rhythms of the everyday, and so its temporality was experienced differently, easier to remember because these events were out-of-the-ordinary. Simultaneously rooted in the past while influencing those moments that followed, each event evoked elements of social memory through a sensual engagement with materials. A history of practice informs those events that follow and so often there are similarities over time, yet those events are also sites of innovation: materials included in ritual change, at times reflecting larger social and historical context. Events are not predetermined but materialize as one outcome from a series of potential outcomes (De Landa 2000). Although taken together, they can incrementally lead to change.

Archaeological studies of ritual following this approach, permits a better understanding of how transformations such as ancestor veneration and rituals enacted for the dead, although similar across the Maya region, can vary locally. The micro-histories can be seen in micromorphological soil studies. Those microhistories can compound to produce macro-histories and may lead to changes in material practice (Sahlins 2005). Further, studies from the event-by-event basis provides “resolution commensurate with actual human experience”

(Gilmore 2015, 120). To do that, the future of ritual studies will see a need for more microscopic methods including micromorphology, paleoethnobotany and residue analyses enabled through careful excavation strategies.

Investigations throughout the Maya region have increasingly employed methods to recover plants and residues. They have been very informative in terms of understanding agriculture (Hageman and Goldstein 2009) and diet (Lentz 1991). Rarely have the microscale methods described in this chapter been employed in the study of ritualization. More often, investigators rely on the integration of text and imagery in addition to the recovery of macro artifacts from contexts considered ‘ritual.’ Those investigations often assume there were organic and perishable materials present in past rituals but have not explicitly tested for them. This may be due to the elevated costs of analyses as well as the increased time and effort involved. As I have argued elsewhere (Johnson 2018 in press), it is hoped that the comprehensive approach outlined in this study provides potential for future studies in the Maya region to consider *how* elements from the everyday were ritualized (Bradley 2003; 2012). These methods alongside linguistic, iconographic, colonial and ethnographic datasets provide ample evidence for exploring the ways in which relationships between human and nonhuman entities were heightened and elaborated during ritualized events (Swenson 2015; Walker 2008).

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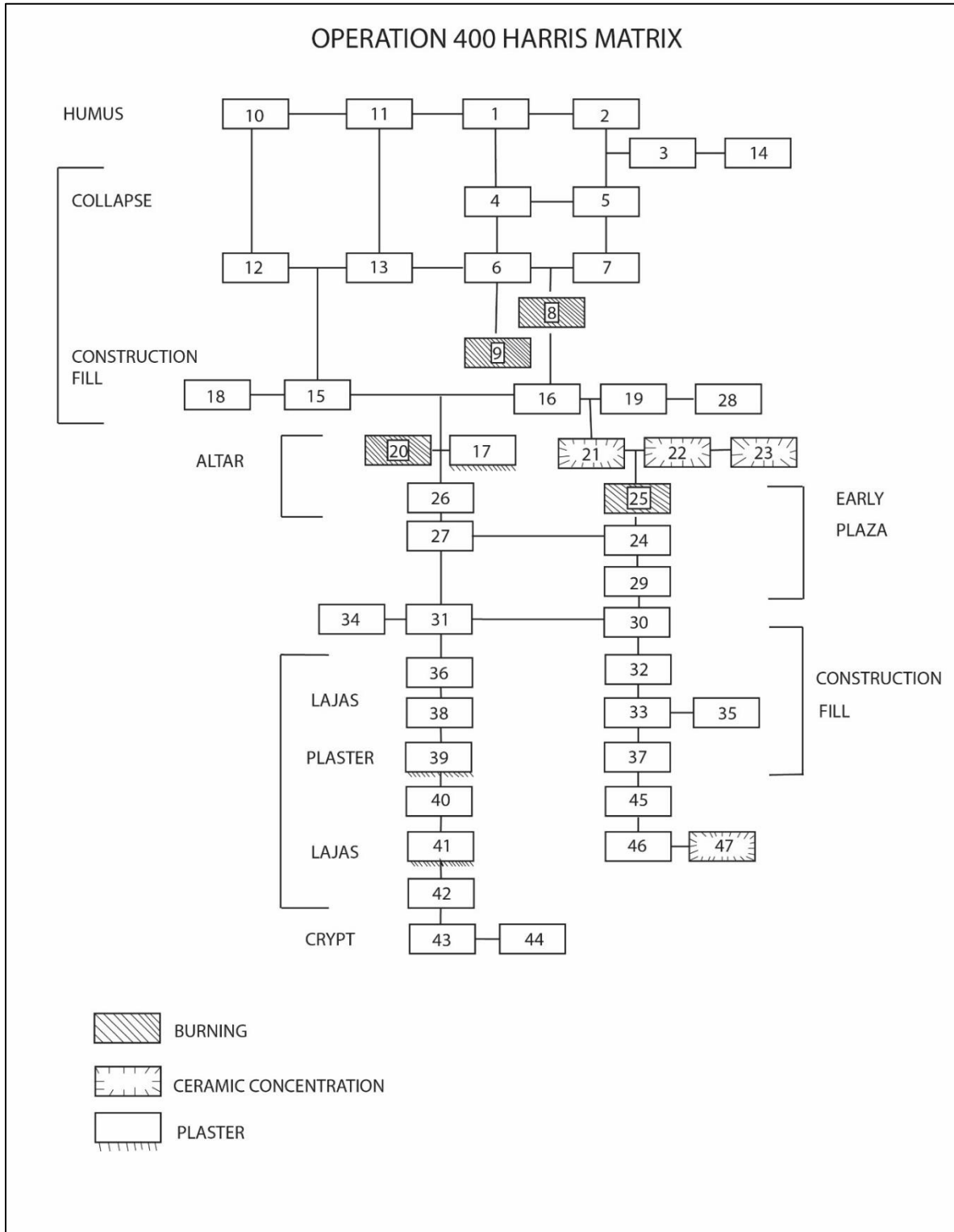
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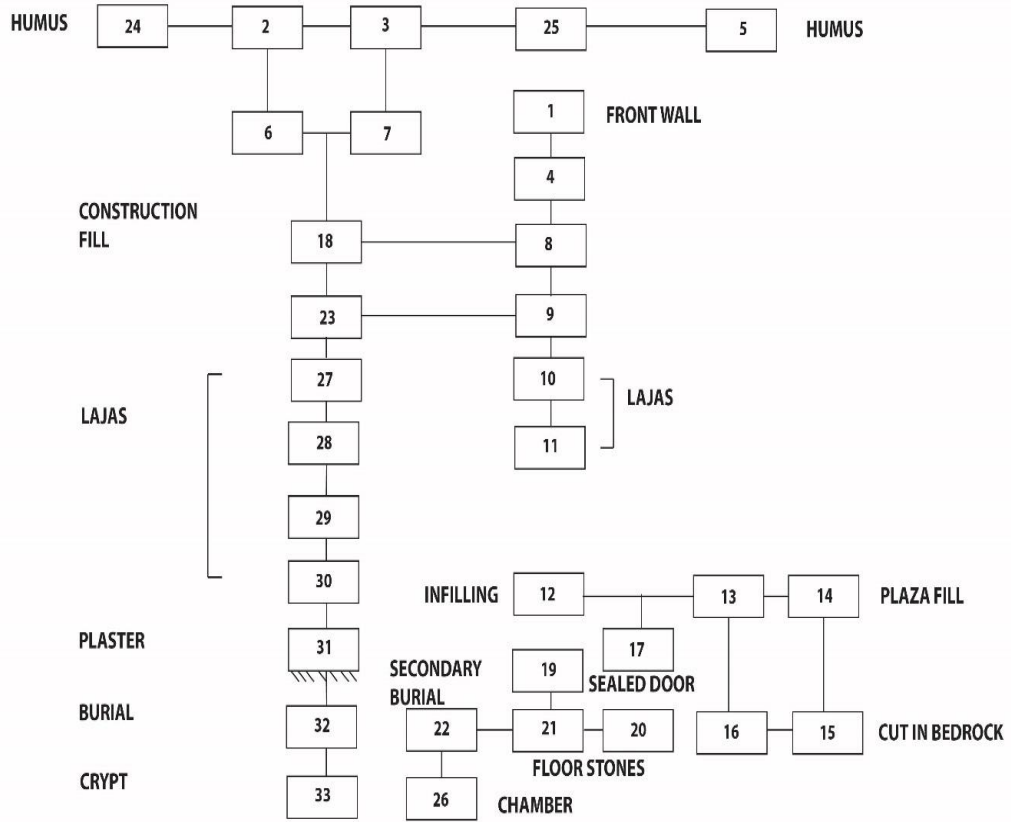
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Appendix 1: Harris Matrices Group IV



OPERATION 419 HARRIS MATRIX

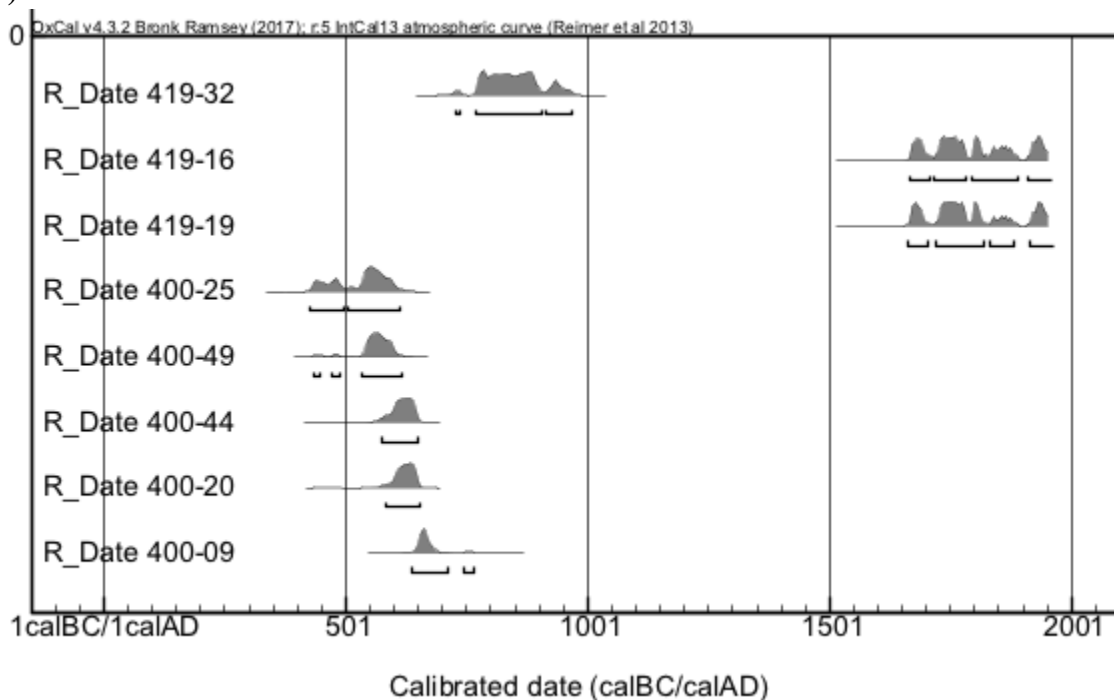


Appendix 2: Carbon Dates

2.1 Table of Carbon Dates submitted to DirectAMS

DIRECT AMS CODE	SAMPLE	STR	CONTEXT	C14	CALIBRATED DATE IN CALENDAR YEARS
D-AMS-018568	400-47	J7	Just above bedrock	1505 ± 22 BP	AD 534 – 616 (90.5 % probability)
D-AMS-018567	400-44	J7	Burial in crypt	1441 ± 24 BP	AD 576 - 651 (95.4% probability)
D-AMS-025887	400-25	J7	Base of the altar	1519 ± 31 BP	AD 505 – 611 (66.0% probability)
D-AMS-018566	400-20	J7	Altar surface	1433 ± 23 BP	AD 583 – 654 (95.4% probability)
D-AMS-018565	400-09	J7	Burning in construction fill	1353 ± 27 BP	AD 636 – 710 (91.6% probability)
D-AMS-025889	419-16	J6	Outside of sealed chamber	153 ± 29 BP	AD 1718 – 1784 (33.2% probability)
D-AMS-025888	419-19	J6	Inside front chamber on stone floor	161 ± 28 BP	AD 1720 - 1819 (49.1% probability)
D-AMS-025890	419-32	J6	Burial inside main structure	1176 ± 35 BP	AD 768 – 905 (80.8% probability)

2.2: Calibrated AMS carbon dates, listed by operation and locus (Figure generated by OxCal)



Appendix 4: Micromorphology Data

4.1 Components identified in thin section from micromorphological samples from Group IV

COMPONENT	DESCRIPTION	REPRESENTATIVE THIN SECTIONS
VERY FINE SAND	Quartz mineral grains, subrounded	All
FINE SAND	Dominantly quartz, tabular subangular, other individual grains of minerals from bedrock also observed included elongated, angular mica	All
SILT AGGREGATES	Subrounded homogenous silt aggregate	400-02; 400-05; 400-06; 402C-09
LIMESTONE FRAGMENTS	Subrounded	400-01; 400-02; 402C-10
CLAY AGGREGATES	Orange/Yellow clay	All
INTERCALATIONS OF CLAY	Orange/Yellow clay	All
PLASTER FRAGMENTS	Medium – gravel size fragments	400-01; 400-02
WEATHERED PLASTER	Highly degraded, crystal growth, gravel-size	400-01; 400-04; 400-05; 402C-11
CHARCOAL	Most occur as medium – fine sand size fragments	400-01; 400-02; 400-04; 400-05
PLANT TISSUE	Thin fibrous fragments oriented parallel to the surface	400-01
PHYTOLITHS	Occur as long, linear shapes and in one case, as “haircell” – randomly oriented and distributed. Are rare.	400-02; 400-04; 400-05; 400-06
EXCREMENT	Occurs as subrounded organic aggregates with mineral inclusions, and as long spiral, mitoids	400-02; 400-05; 402C-9; 402C-10; 402C-11
CERAMIC ARTIFACTS	Most are oriented parallel to the surface and have quartz inclusions	400-02; 400-04; 400-06
OBSIDIAN ARTIFACTS	Only occurs in one sample, oriented parallel to the surface	400-04
BONE	Most occur as fine – medium gravel size fragments	400-01; 400-04; 400-06; 402C-11
SHELL	Most are gastropod, in one case a possible bi-valve fragment	400-03; 400-04; 402C-10

4.2: Description of Microfacies:

Microfacies type 1, weathered plaster surface – this microfacies is dense with weakly separated peds, moderately accommodated zig zag and planar voids throughout, carbonate rich. It is made up of weathered plaster fragments, some oriented parallel to the ground surface, clay coatings and aggregates from high levels of moisture and moving water. There are sparite crystal intergrowths in the limestone components. Quartz is frequent throughout and randomly oriented. Few plant tissue fragments spatially associated with plaster fragments.

Microfacies type 2, construction “fill” – this microfacies is crumbly sand rich ground mass with silt aggregates oriented in a linear pattern, parallel to the ground surface. Includes ceramic artifacts, limestone fragments, phytoliths and organic components. Moderately separated sandy peds.


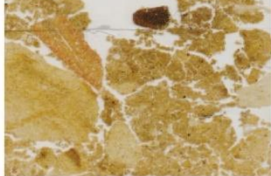
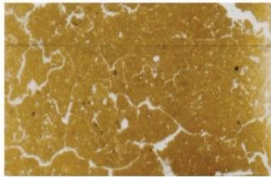
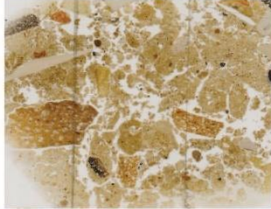
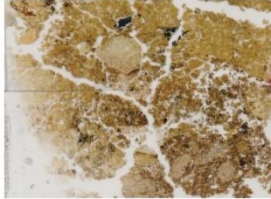

Microfacies type 3, surface “foundation” – this microfacies is a massive sandy clay microstructure with mostly very – fine sand size quartz (60 – 120 um) throughout, very little void space (some zig zag planar voids from shrinking of heavily clay matrix). There are no micro artifacts. Clay nodules and some crystal growth due to high levels of moisture.

Microfacies type 4, anthropogenic components, occupation surface – this microfacies is a dense sandy matrix with planar and vugh voids throughout. Microfacies is composed of ceramic sherds, lithics, bone, phytoliths. The largest components are oriented parallel to the ground surface. Striated b-fabric and crystal growth indicate high levels of moisture.

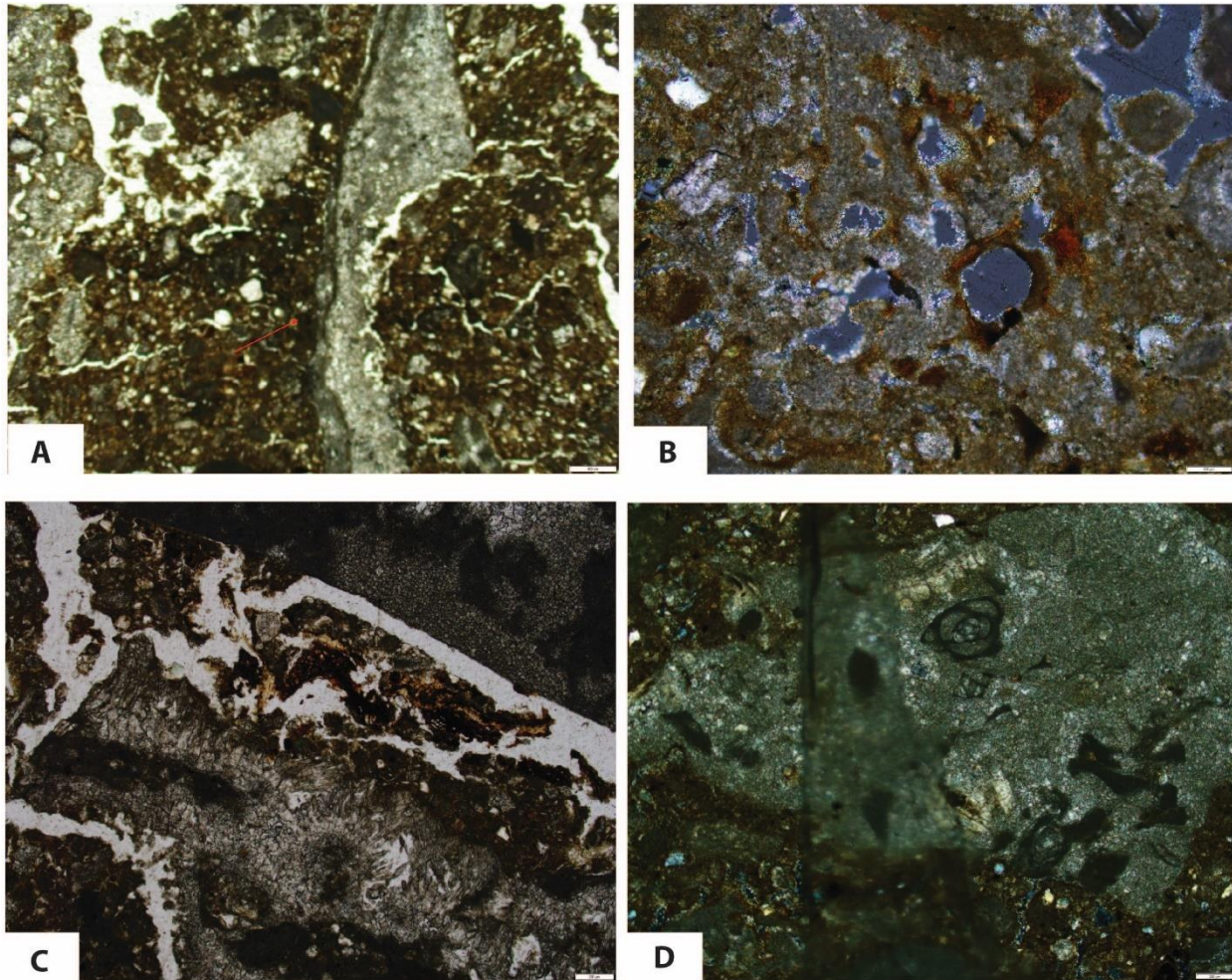
Microfacies type 5, first occupation layer complex pedogenic – this microfacies is a crumbly sandy clay matrix with aggregated crystal formation, broken up charcoal, phytoliths, random striated b-fabric and streaks of coarse angular sand.

Microfacies type 6, clean plaza “fill” - this microfacies shares features with microfacies type 3 in that it is a sandy clay microstructure with few artifacts. There are clay nodules and intercalations of clay throughout due to high levels of moisture. This microfacies is different from type 3 in that there are more planar and vugh voids, with some separated peds, and excrement is present throughout.

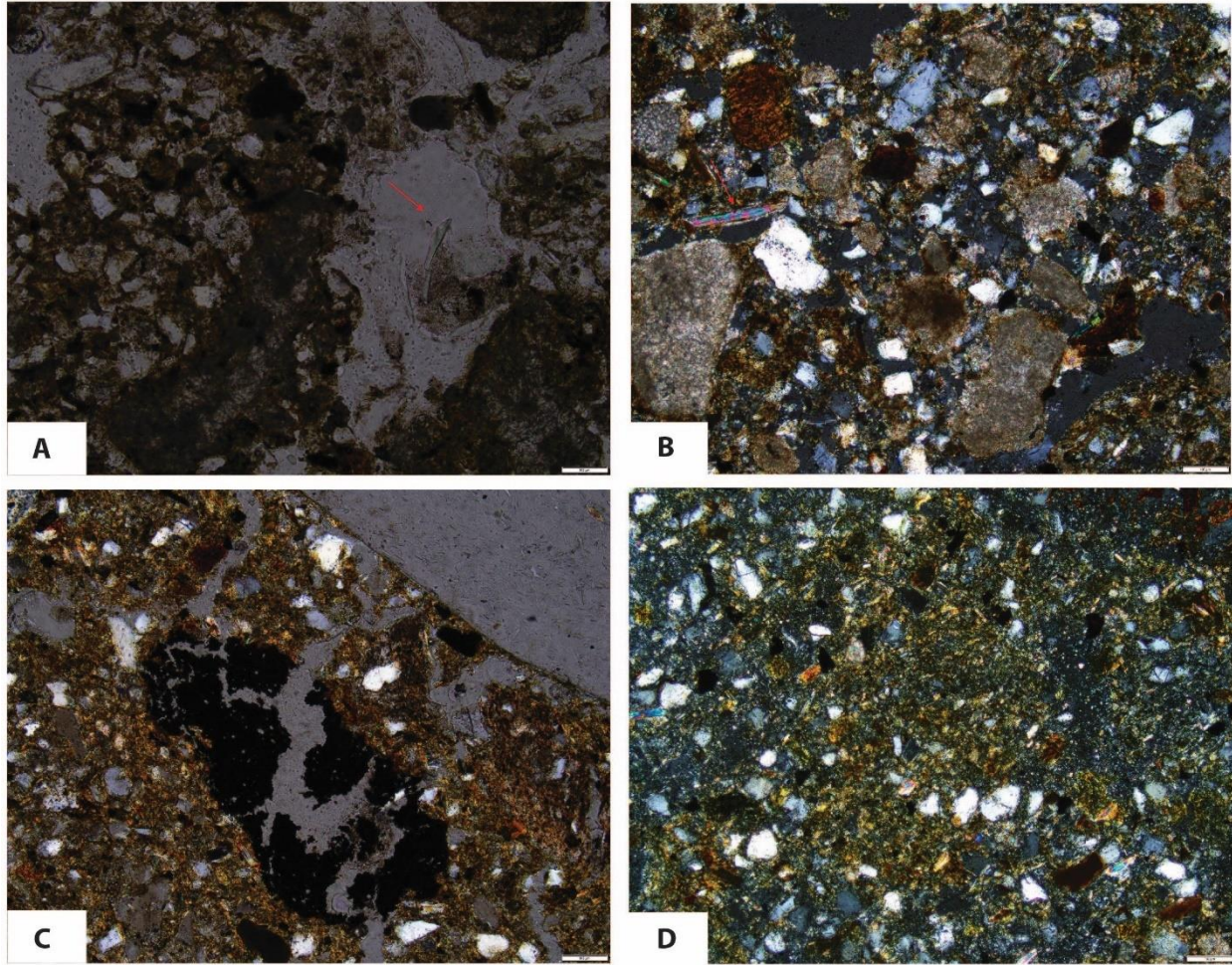
4.3: Images of microfacies and interpretations

MICROFACIES	PHOTO	SAMPLE	INTERPRETATION
TYPE 1		400-01	WEATHERED PLASTER SURFACE OF ALTAR
TYPE 2		400-02	TRAMPLING FOUNDATION PRIOR TO ALTAR CONSTRUCTION
TYPE 3		400-03	DENSE SANDY-CLAY "FOUNDATION" TO STABILIZE CONSTRUCTION OF ALTAR
TYPE 4		400-04	CRUMBLY - PEDS, SANDY WITH HIGH QUANTITY OF FLAT-LYING ARTIFACTS FROM FEASTING EVENT ABOVE THE BURIAL
TYPE 5		400-05 , 400-06	COMPLEX PEDOGENIC FABRIC - OLDEST LAYERS DISPLAYING SOIL FORMATION AND WEATHERED PLASTER, EARLIEST OCCUPATION
TYPE 6		402C-9, 402C-10, 402C-11	SANDY-CLAY PLAZA WITH TRAMPLING HIGHER QUANTITIES OF EXCREMENT BUT CLEAN OF ARTIFACTS

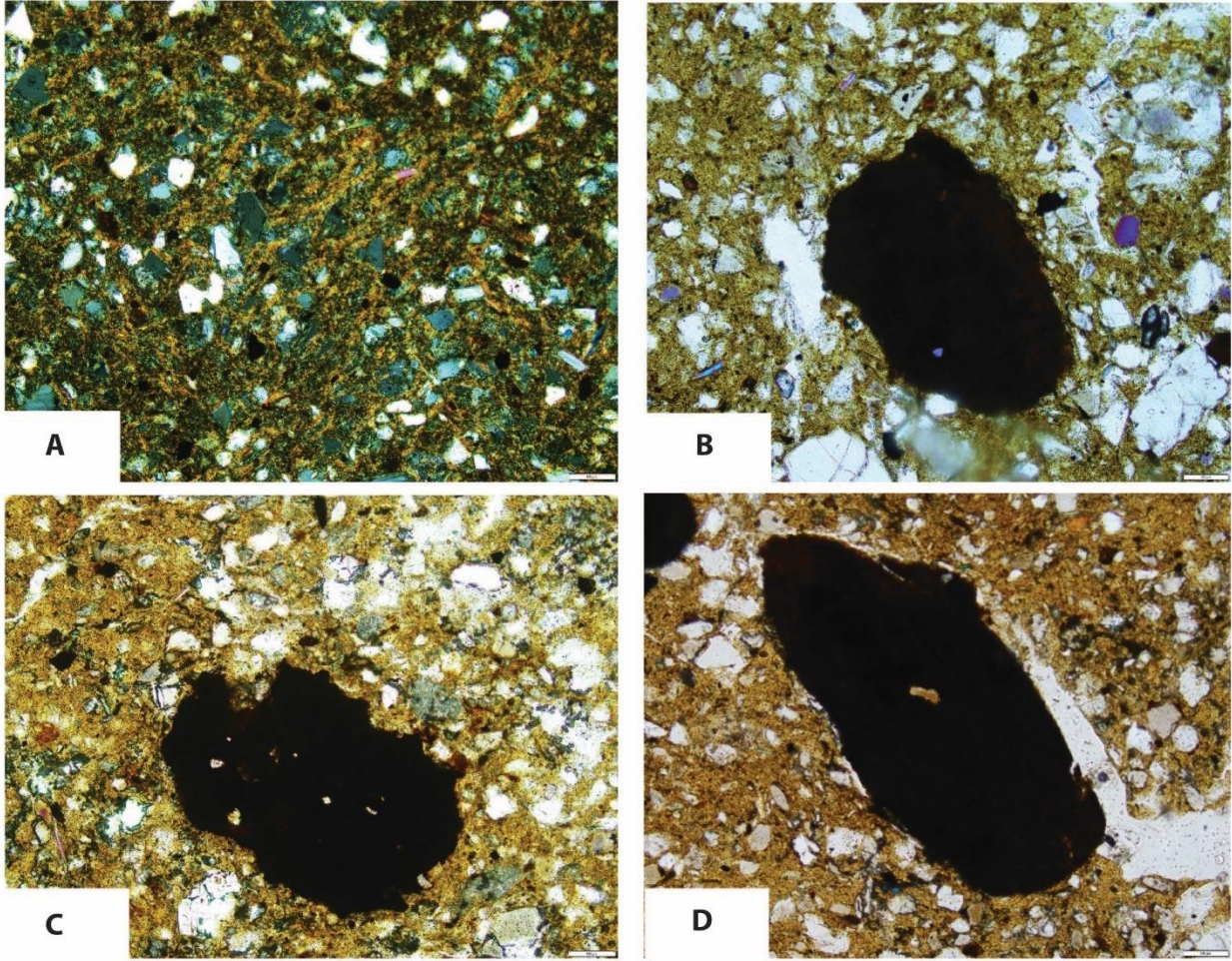
4.4 Additional Micromorphology Images



4.4-1: Observed components from altar surface (Structure J7): A) Dislodged plaster fragment with distinct layering of plaster indicating a re-plastering event B) Heavily weathered plaster with clay coatings, resulting from high levels of moisture, rain C) Burnt fibrous plant fragment oriented parallel to surface D) Unfired limestone fragment with fossil inclusions, typical of Palenque region.



4.4-2: Observed components from burning/feasting event at the base of the altar (Locus 25) A) Phytoliths B) Weathered and fragmented plaster embedded in a fabric of sandy clay with mica inclusions C) Wood charcoal fragments oriented parallel to the surface D) Striated b-fabric, intercalations of clay (orange/yellow streaks) indicating heavy water movement



4.4-3D: Observed components from the plaza: A) Sandy-clay fabric with cross striated b-fabric (orange/yellow) from water movement B, C, and D) Excrement found throughout all plaza samples.

4.5: Scanned Micromorphology Analysis Forms

ANTHRO126M Micromorphological Recording Forms	Slide Description
<p>Sample Identification: PREP400-01a Site: Palenque Context and deposit type: <u>Altar Surface</u> 3D Provenience (profile #, horizon, unit, coordinates): <u>3.02 m below datum</u> Description (overall structure, boundaries, stratigraphy, etc.): <i>one possible faint boundary - slightly more dense fabric in the upper boundary?</i></p>	<p>Date: 3/3/2018 Sample ID: PREP400-01a</p>
Notes	
	<p>4/5 A-B-C - plaster - cryptocrystalline calcite iron-stained limpid clay - parallel to calcite formations</p> <p>4F - iron stained aggregate</p> <p>4I - carbonate growth - in situ - w/ crystal growth?</p> <p>4G - weathered plaster (calcium carbonate)</p> <p>4H - micaceous sandstone fragment - subrounded</p> <p>4I - weathered calcium carbonate with clay coating - non-staining</p> <p>5I - concentration?</p> <p>5I - plaster</p> <p>4B</p> <p>5D - plant tissue ></p> <p>7I - weathered plaster</p> <p>7G/H - silty clay aggregate</p> <p>11B - limestone fragment - fossil remnant external coatings of limpid</p> <p>9G/H - clay - formation of calcite (or gibbsite?) around vugs coatings</p> <p>12C - plaster frag-</p> <p>11E - organic - mineral? from plant tissue?</p> <p>13E - burnt limestone - soil mat site</p> <p>12 E - plaster frags - mineral layer</p>
<p>Scale (slide size or magnification):</p>	

Sample Identification: PREP400-01 **Date:** 3/3/18

Site: Palenque
 Context: altar surface
 Deposit type:

Summary

Homogeneity: heterogeneous
 Sorting: moderately sorted
 Texture:
 c/f ratio: 1/4
 Related distribution: Single Space Porphyric (closed, single spaced porphyric typical of mortar/plaster
 Stops et al. "calcareous mortars, plasters, floors")
 2017, p. 195
 Void space (%): 30%
 Void type: Planar, High
 Zig Zag and straight planar - voids interconnected, degree of accommodation moderate/good

Coarse Fraction

General
 % of total slide: 30%
 Average size: 120um fine sand - coarse sand
 Shape: tabular subrounded
 Sphericity: subrounded
 Alteration/weathering: weathered - calcium carbonate (mortar)
 Orientation patterns: random
 Distribution patterns: random

Dominant coarse component: calcium-carbonate-limestone plaster
 Sorting: moderately sorted, primarily very fine → fine sand size
 Roundness: subrounded
 Internal characteristics:

Single mineral grains (e.g., calcite, quartz, glauconite, feldspar): quartz 20%, avg. size 120um - fine sand
 mica 2% avg. size - 120um - fine sand - rod-shape subangular random xpl - closed pcc
 tabular subangular

Compound grain/rock fragments (e.g., limestone, chert, phosphorite, chalk, tufa, clay aggregates):
 limestone, micaceous sandstone fragment - < 2% 600um - coarse sand

Residues of Biological Origin (type, %, size)
 Bone/teeth:
 Shell/forams:
 Phytoliths:
 Ash:
 Coprolites/Spherulites:
 Charcoal: poss. charcoal fragments or burnt plant tissue (1%) medium sand size 380um

Organic Matter (type, size, color, structure)
 Tissue:
 Other plant remains:

Artifacts (type, %, orientation, distribution, size)
 Chert:
 Ceramics:
 Mudbrick:
 Plaster: plaster fragments, 30% random distribution, poorly sorted, medium sand - fine gravel size
 Other: parallel, mid-range orientation lower left of slide

<p>Sample Identification: PREP400-01a lower boundary Site: Palenque Context: altar surface Deposit type:</p>	<p>Date:</p>
<p>Fine Fraction</p> <p>Dominant particle size: clay-silt Birefringence fabric: mono-striated b- fabric Color: yellow brown Other:</p>	
<p>Microstructure</p> <p>Dominant microstructure type: weakly separated, dense microstructure, planar voids, vugs w/ rough surface % of total slide: 35% Other microstructure types:</p>	
<p>Secondary Features For each describe abundance, distribution, size, color, composition (i.e., calcitic), form (i.e., massive, laminated)</p> <p>Coatings: clay coatings</p> <p>Hypo-coatings:</p> <p>Infillings:</p> <p>Intercalations:</p> <p>Nodules: clay aggregates</p> <p>Crystal growths: - sparite intergrowth - - crystal growths - in limestone -</p> <p>Juxtaposed features:</p> <p>Superimposed features:</p> <p>Excrements/coprolites:</p> <p>microfossils - carbonate rich - dense -</p>	

Interpretation	
Sample Identification: PREP400-01	Date:
Context: Altar Surface	
Deposit Type:	
Origin and pre-depositional histories of components:	
Limestone - turned quick lime - plaster	
Deposition (anthropogenic & natural):	
<p>lower boundary - fragments of plaster and limestone - randomly oriented more than 50% of plaster and limestone -</p> <p>- one plaster fragment has evidence of a replastering event -</p>	
Post-depositional alterations (anthropogenic & natural):	
<p>heavily weathered altar surface - the largest components are oriented parallel to ground surface - many of the smaller components are dislodged and randomly oriented -</p> <p>lower boundary - clay aggregates with ^{silt and} very fine sand size quartz grains - limpid clay coatings with parallel gibbsite coatings</p> <p>a lot of water moving through and sitting causing crystal growth</p>	
Overall interpretation of activities/processes/events: and linear/aggregate limpid clay -	
Plastered altar surface - heavily weathered - degraded from high levels of moisture some burnt plant tissue oriented parallel to surface	
Comparisons & relationships to other samples (note if same or different contexts)	
more plaster than other samples	

ANTHRO126M Micromorphological Recording Forms

Slide Description

Sample Identification: 400-02

Date:

Site: Patenque

Sample ID: PREP 400-02 A

Context and deposit type: Base of altar

3D Provenience (profile #, horizon, unit, coordinates):

3.18 m below datum

Description (overall structure, boundaries, stratigraphy, etc.):

loc 24

Notes

	A	B	C	D	E	F	G	H	I	J	K	
↑ UP												4D - limestone frag subrounded
↑ UP												5F - clay rich boundary
												5C-D - crystal intersrowth - equigranular hypidiotopic
												5H - weathered plaster clay coated/crystal growth
												5H - weathered limestone component w/crystal growth
												5I - phytolith ? coarse sand size
												5I - 3 - crystal growth
												7C - mitrid excrement
												6G - plaster fragment - subrounded
												7G - red-shape phytolith ?
												6H - phytolith red-shaped
												6H - rounded excrement - quartz melanos
												7I - rounded clay aggregates
												Boundary?
												10E-F - clay aggregates
												10E - embedded
												Boundary?
												organic sandy pedofauna
												9-10 f - silt aggregate
												9H - circular - red - component
												could be root or seed cross-section
												red iron burning - trampled in
												lower boundary -
												primary clay - dense groundmass
												very fine sand size quartz
												13b - mitrid excrement in voids -
												10 - clay aggregate

Scale (slide size or magnification):

<p>Sample Identification: 48-02</p> <p>Site: Palenque Context: below Altar Deposit type:</p>		<p>Date:</p>		
<p>Summary</p> <p>Homogeneity: complex Sorting: moderately sorted Texture: sandy clay c/f ratio: 1/4 Related distribution: close porphyric Void space (%): 25% Void type: planar - moderately accommodated, rough -</p>				
<p>Coarse Fraction</p> <table border="0"> <tr> <td> <p>General</p> <p>% of total slide: 35% Average size: fine sand Shape: spherical Sphericity: Alteration/weathering: crystal growth Orientation patterns: Distribution patterns: weakly expressed, parallel orientation of microartifacts and aggregates</p> </td> <td> <p>Dominant coarse component: quartz Sorting: well sorted Roundness: subrounded Internal characteristics:</p> </td> </tr> </table> <p>Single mineral grains (e.g., calcite, quartz, glauconite, feldspar): Quartz [frequent, fine sand size - subrounded 35%] mica [few - 15% throughout] calcite [rare - fine sand - coarse sand size]</p> <p>Compound grain/rock fragments (e.g., limestone, chert, phosphorite, chalk, tufa, clay aggregates): subangular plaster frag - >2% coarse sand size, subrounded tabular - weathered w/ crystal growth limestone - subrounded - <2% rare 594um coarse sand</p> <p>Residues of Biological Origin (type, %, size) Bone/teeth: Shell/forams: Phytoliths: rod-shaped phytolith, 1F - 275um medium sand size - Ash: Coprolites/Spherulites: coprolites, mitioid - <2% very few medium sand Charcoal: charcoal - <2% rare rounded quartz, mica inclusions - medium sand medium sand size</p> <p>Organic Matter (type, size, color, structure) Tissue: Other plant remains:</p> <p>Artifacts (type, %, orientation, distribution, size) Chert: Ceramics: quartz/calcite tempered shard >2% very few -> both parallel (somewhat flat-tips) Mudbrick: micaceous shard Plaster: plaster fragment >2% rare - subrounded - medium sand size - Other:</p>			<p>General</p> <p>% of total slide: 35% Average size: fine sand Shape: spherical Sphericity: Alteration/weathering: crystal growth Orientation patterns: Distribution patterns: weakly expressed, parallel orientation of microartifacts and aggregates</p>	<p>Dominant coarse component: quartz Sorting: well sorted Roundness: subrounded Internal characteristics:</p>
<p>General</p> <p>% of total slide: 35% Average size: fine sand Shape: spherical Sphericity: Alteration/weathering: crystal growth Orientation patterns: Distribution patterns: weakly expressed, parallel orientation of microartifacts and aggregates</p>	<p>Dominant coarse component: quartz Sorting: well sorted Roundness: subrounded Internal characteristics:</p>			

<p>Sample Identification: 400-02 Site: Palenque Context: below altar Deposit type:</p>	<p>Date:</p>
<p>Fine Fraction</p> <p>Dominant particle size: fine silt, clay Birefringence fabric: striated Color: yellow orange Other:</p>	
<p>Microstructure</p> <p>Dominant microstructure type: silty clay - complex - % of total slide: 35% Other microstructure types: massive microstructure, weakly separated peels microstructure</p>	
<p>Secondary Features For each describe abundance, distribution, size, color, composition (i.e., calcitic), form (i.e., massive, laminated)</p> <p>Coatings:</p> <p>Hypo-coatings:</p> <p>Infillings:</p> <p>Intercalations:</p> <p>Nodules: clay aggregates - silt aggregates linear pattern - parallel to ground surface (trampling)</p> <p>Crystal growths: crystalline pedofeatures,</p> <p>Juxtaposed features:</p> <p>Superimposed features:</p> <p>Excrements/coprolites: rodent mounds excrement into channel voids</p>	

<p>Sample Identification: 468-02 Site: Palenque Context: Below altar Deposit type:</p>	<p>Date:</p>
<p>Summary</p>	
<p>Boundary (upper): blocky pads Thickness: Particle sizes: Fine material: clay, silt Color: yellowish brown Related distribution: close porphyric Structure: upper boundary - moderately separated - subangular blocky microstructure Bedding:</p>	<p>Boundary (lower): dense clay rich homogeneous c/f (coarse: fine) ratio: 1/4 Sorting: moderately accommodated</p>
<p>Inclusions</p>	
<p>Inclusions orientation: Inclusions distribution:</p> <p>For inclusions record (where appropriate): type, %, size, color, form, preservation Plant remains: Impressions of plants: Charred remains: Calcitic ashes:</p> <p>Other organic remains (e.g., coprolites/dung, amorphous organic material, other): subrounded coprolite, w/ quartz 503 um, coarse sand, < 2% very few</p> <p>Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): phytoliths, > 2% - coarse sand size, long linear, serrated, Micro-artifacts (e.g., lithics, pottery, metal, glass, other): micaceous sherd sherd w/ quartz and calcite</p> <p>Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): weathered plaster components, w/ clay coating and crystal growth Sediment aggregates: fine silt aggregate w/ coating</p> <p>Rock fragments: limestone < 2% rare - subrounded - parallel to ground surface gravel size</p> <p>Minerals: quartz mica</p> <p>Other inclusions:</p>	
<p>Post-depositional features</p>	
<p>Dessicated: intercalations of clay - parallel orientation in groundmass rounded clay aggregates Water-Logged: Clay Coatings: clay coated aggregate Other:</p>	
<p>Void Spaces/Pores</p>	
<p>Void Shape: planar, moderately accommodated Density: channel Distribution:</p>	

Interpretation
Sample Identification: 400-02 Context: below altar Deposit Type: Date:
Origin and pre-depositional histories of components: [lower boundary has components of parent material - (mica) Very fine sand size quartz subrounded lower boundary
Deposition (anthropogenic & natural): subrounded silt aggregates oriented linearly - between upper/lower boundary (trampling?)
Post-depositional alterations (anthropogenic & natural): rounded very fine sand - sand size clay aggregates/streaking throughout excrement in voids of upper boundary crystalline pedofeatures - skinned (Stoops p. 121) clay coatings - continuous limpid clay striations
Overall interpretation of activities/processes/events: upper boundary - mixed matrix while building altar - some trampling lower boundary - a relatively "clean" foundation of bedrock material for leveling the ground - to build an altar -
Comparisons & relationships to other samples (note if same or different contexts)

ANTHRO126M Micromorphological Recording Forms	Slide Description																																						
Sample Identification: 400-03 Site: Palenque Context and deposit type: below altar 3D Provenience (profile #, horizon, unit, coordinates): 3.30 m below datum Description (overall structure, boundaries, stratigraphy, etc.): dense, clay-rich groundmass - no boundaries	Date: 3/19/18 Sample ID: PREP400-03a																																						
Notes																																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">A</td> <td style="width: 20px; text-align: center;">B</td> <td style="width: 20px; text-align: center;">C</td> <td style="width: 20px; text-align: center;">D</td> <td style="width: 20px; text-align: center;">E</td> <td style="width: 20px; text-align: center;">F</td> <td style="width: 20px; text-align: center;">G</td> <td style="width: 20px; text-align: center;">H</td> <td style="width: 20px; text-align: center;">I</td> <td style="width: 20px; text-align: center;">J</td> <td style="width: 20px; text-align: center;">K</td> <td style="width: 20px; text-align: center;">↑ UP</td> </tr> <tr> <td style="text-align: center;">1</td> <td colspan="10" rowspan="15" style="text-align: center; vertical-align: middle;"> </td> <td style="text-align: center;">UP</td> </tr> <tr><td style="text-align: center;">2</td></tr> <tr><td style="text-align: center;">3</td></tr> <tr><td style="text-align: center;">4</td></tr> <tr><td style="text-align: center;">5</td></tr> <tr><td style="text-align: center;">6</td></tr> <tr><td style="text-align: center;">7</td></tr> <tr><td style="text-align: center;">8</td></tr> <tr><td style="text-align: center;">9</td></tr> <tr><td style="text-align: center;">10</td></tr> <tr><td style="text-align: center;">11</td></tr> <tr><td style="text-align: center;">12</td></tr> <tr><td style="text-align: center;">13</td></tr> <tr><td style="text-align: center;">14</td></tr> <tr><td style="text-align: center;">15</td></tr> </table>	A	B	C	D	E	F	G	H	I	J	K	↑ UP	1											UP	2	3	4	5	6	7	8	9	10	11	12	13	14	15	<p>14 - Crustal growth</p> <p>45 - ?? remnants of organic components in void? or by-product of making the slide</p> <p>B13 - B14 - gastropod shell</p>
A	B	C	D	E	F	G	H	I	J	K	↑ UP																												
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Scale (slide size or magnification):																																							

Sample Identification: 400-03 **Date:**

Site: Palenque
 Context: below altar
 Deposit type:

Summary

Homogeneity: fairly homogenous
 Sorting: well sorted
 Texture: sandy clay
 c/f ratio: 1/8
 Related distribution: double space - porphyric
 Void space (%): 25%
 Void type: zig zag planar - moderate accommodation
 vughs

Coarse Fraction

General

% of total slide: 30% Dominant coarse component: quartz
 Average size: very fine sand 60-120 um Sorting: well sorted
 Shape: sub-angular Roundness: subangular
 Sphericity: 4- Internal characteristics:
 Alteration/weathering:
 Orientation patterns: random
 Distribution patterns: random

Single mineral grains (e.g., calcite, quartz, glauconite, feldspar): mica - 2% very few - random
 quartz - 25% - common - white/brown - subangular - random - fine sand - very fine sand - to 100 um
 Compound grain/rock fragments (e.g., limestone, chert, phosphorite, chalk, tufa, clay aggregates):
 Limestone - 27% - 2% rare - subangular - gray - 70-100 um - fine sand -

Residues of Biological Origin (type, %, size)

Bone/teeth:
 Shell/forams: gastropod
 shell < 2% few rare - fine gravel size 3780 um
 Phytoliths:
 Ash:
 Coprolites/Spherulites:
 Charcoal:

Organic Matter (type, size, color, structure)

Tissue:
 Other plant remains:

Artifacts (type, %, orientation, distribution, size)

Chert:
 Ceramics:
 Mudbrick:
 Plaster:
 Other:

<p>Sample Identification: 400-03 Site: Palenque Context: Below Altar Deposit type:</p>	<p>Date: 3/19/18</p>
<p>Fine Fraction</p> <p>Dominant particle size: clay Birefringence fabric: striated Color: orange/yellow Other:</p>	
<p>Microstructure</p> <p>Dominant microstructure type: massive % of total slide: 55% Other microstructure types:</p>	
<p>Secondary Features For each describe abundance, distribution, size, color, composition (i.e., calcitic), form (i.e., massive, laminated)</p> <p>Coatings:</p> <p>Hypo-coatings:</p> <p>Infillings:</p> <p>Intercalations: interbedded intercalations of clay - orange/red -</p> <p>Nodules: clay nodules - 5% random - 40-60 um very fine sand size - orange/red rounded/subrounded</p> <p>Crystal growths:</p> <p>Juxtaposed features:</p> <p>Superimposed features:</p> <p>Excrements/coprolites:</p>	

Sample Identification: 400-03 Site: Palenque Context: Below altar Deposit type:	Date:
Summary Boundary (upper): no boundary Thickness: Particle sizes: clay - fine sand size Fine material: clay Color: orange/yellow Related distribution: double space porphyric Structure: massive microstructure - Bedding: Boundary (lower): c/f (coarse: fine) ratio: 1/8 Sorting: well-sorted	
Inclusions Inclusions orientation: random Inclusions distribution: random For inclusions record (where appropriate): type, %, size, color, form, preservation Plant remains: Impressions of plants: Charred remains: Calclitic ashes: Other organic remains (e.g., coprolites/dung, amorphous organic material, other): Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): Micro-artifacts (e.g., lithics, pottery, metal, glass, other): Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): Sediment aggregates: Rock fragments: Minerals: quartz, mica Other inclusions:	
Post-depositional features - cross striated b-fabric Dessicated: Water-Logged: Clay Coatings - clay aggregates Other:	
Void Spaces/Pores Void Shape: planar, zig-zag - moderately accommodated Density: 15% (?) Distribution: major planar voids are parallel to ground level - vughs random	

Interpretation	
Sample Identification: 400-03 Context: below altar Deposit Type:	Date:
Origin and pre-depositional histories of components: Sandy clay- quartz- mica from parent material	
Deposition (anthropogenic & natural): transported (deposited above occupation surface)	
Post-depositional alterations (anthropogenic & natural): intercalations of clay- movement of water	
Overall interpretation of activities/processes/events: massive ^{sandy} clay groundmass - primarily quartz, some mica - elements of parent material no anthropogenic components - a clean, homogeneous "foundation" layer to construct altar -	
Comparisons & relationships to other samples (note if same or different contexts) Sample above - JREP400-02 - has a lower boundary that is the same kind of fabric - (dense sandy clay- no artifacts)	

ANTHRO126M Micromorphological Recording Forms	Slide Description																																																																																																																																																																																																
<p>Sample Identification: Site: Palenque, PREP 400-04a Context and deposit type: Below altar feature 3D Provenience (profile #, horizon, unit, coordinates): 3.84 below datum Description (overall structure, boundaries, stratigraphy, etc.):</p>	<p>Date: Sample ID: PREP 400-04a</p>																																																																																																																																																																																																
<p style="text-align: right;">Notes</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p style="text-align: center;">UP →</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td></td> <td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td> </tr> <tr> <td>1</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>2</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>3</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>4</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>5</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>6</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>7</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>8</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>9</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>10</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>11</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>12</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>13</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>14</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>15</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table> <p style="text-align: center;">→</p> </div> <div style="width: 50%;"> <p> ◆ = shard ● = lithic </p> <p>FG 3-4 - obsidian</p> <p>I6-I7</p> <p>G8-10 - shell</p> <p>G12 - phytolith "haircell" phytolith G13 - phytolith H12 - unknown mineral??</p> <p>J10-J11 - clay b-fabric</p> <p>A8-10-11 - clay b-fabric intercalated</p> <p>C12 - bone - spherical phytolith (bromide)? Piperno p. 193 Fig 28b</p> <p>D12 - bone? (ask)</p> <p>lots of degraded plaster</p> <p>plaster</p> <p>F1 - giacosa</p> <p>Carbonate aggregates in situ</p> </div> </div>			A	B	C	D	E	F	G	H	I	J	K	1												2												3												4												5												6												7												8												9												10												11												12												13												14												15											
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<p>Sample Identification: 400-04</p> <p>Site: Palenque</p> <p>Context: below altar (plaza surface?)</p> <p>Deposit type:</p>	<p>Date:</p>
<p>Summary</p> <p>Crumbly peds - Sandy clay -</p> <p>Homogeneity:</p> <p>Sorting: poorly sorted</p> <p>Texture: Sandy clay</p> <p>c/f ratio: 1/4</p> <p>Related distribution: single space porphyric</p> <p>Void space (%): 30%</p> <p>Void type: planar, vugh -</p>	
<p>Coarse Fraction</p> <p>General</p> <p>% of total slide: 50</p> <p>Average size: 80 um - very fine sand</p> <p>Shape: subangular</p> <p>Sphericity: subangular</p> <p>Alteration/weathering:</p> <p>Orientation patterns: minerals random</p> <p>Distribution patterns: random - larger artifacts oriented parallel to surface</p> <p>Dominant coarse component: quartz</p> <p>Sorting: moderately sorted</p> <p>Roundness: tabular</p> <p>Internal characteristics:</p> <p>Single mineral grains (e.g., calcite, quartz, glauconite, feldspar):</p> <p>Mica, 50-250 um - very fine - fine sand</p> <p>quartz 25% common - very fine - fine sand</p> <p>50-200 um subrounded</p> <p>Compound grain/rock fragments (e.g., limestone, chert, phosphorite, chalk, tufa, clay aggregates):</p> <p>limestone components, poorly sorted, subrounded</p> <p>Residues of Biological Origin (type, %, size)</p> <p>Bone/teeth: bone - 20-200 um fine gravel size, < 2% rare, parallel to ground surface</p> <p>Shell/forams: shell - long linear - 20 to 40 um - parallel to ground surface rare</p> <p>Phytoliths: phytolith < 2% rare - 4-19 um medium sand - "hair cell" phytolith? piperno 194 tropical tree?</p> <p>Ash:</p> <p>Coprolites/Spherulites:</p> <p>Charcoal: charcoal - subrounded - very coarse sand size / wood charcoal - < 2% rare</p> <p>1% - very few - moderately sorted, rare 1100 um 844 um - coarse sand -</p> <p>Organic Matter (type, size, color, structure)</p> <p>Tissue:</p> <p>Other plant remains:</p> <p>Artifacts (type, %, orientation, distribution, size)</p> <p>Chert:</p> <p>Ceramics: sherds - 10% - parallel to ground surface, moderately sorted - > gravel size</p> <p>Mudbrick:</p> <p>Plaster:</p> <p>Other: 3000+ um</p> <p>Obsidian: - 2% - parallel to ground surface -</p>	

Sample Identification: 400-64 Site: Palenque Context: below altar Deposit type:	Date:
Fine Fraction Dominant particle size: clay Birefringence fabric: cross-striated b-fabric Color: orange Other:	
Microstructure moderately separated peds, randomly arranged, partially accumulated Dominant microstructure type: % of total slide: 30% Other microstructure types: crumb microstructure	
Secondary Features For each describe abundance, distribution, size, color, composition (i.e., calcitic), form (i.e., massive, laminated) Coatings: Hypo-coatings: Infillings: Intercalations: Intercalations of clay Nodules: clay nodules Crystal growths: Juxtaposed features: Superimposed features: Excrements/coprolites:	

Sample Identification: 400-af Site: Palenque Context: Below altar Deposit type:	Date:
Summary Boundary (upper): no boundary Thickness: Particle sizes: fine - coarse sand Fine material: silt Color: orange - yellow Related distribution: Single space porphyric Structure: Bedding:	
Inclusions Inclusions orientation: Inclusions distribution: For inclusions record (where appropriate): type, %, size, color, form, preservation Plant remains: phytoliths Impressions of plants: Charred remains: charcoal Calcitic ashes: Other organic remains (e.g., coprolites/dung, amorphous organic material, other): Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): Micro-artifacts (e.g., lithics, pottery, metal, glass, other): lithics, pottery, Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): Sediment aggregates: Rock fragments: limestone Minerals: quartz, mica Other inclusions:	
Post-depositional features Dessicated: Water-Logged: Clay Coatings: clay nodules/intercalations Other: weathered limestone fragments	
Void Spaces/Pores Void Shape: planar, rughe Density: 20% Distribution:	

ANTHRO126M Micromorphological Recording Forms

Slide Description

Sample Identification: 400-05

Date:

Site: Palenque

Sample ID: PREP400-05a

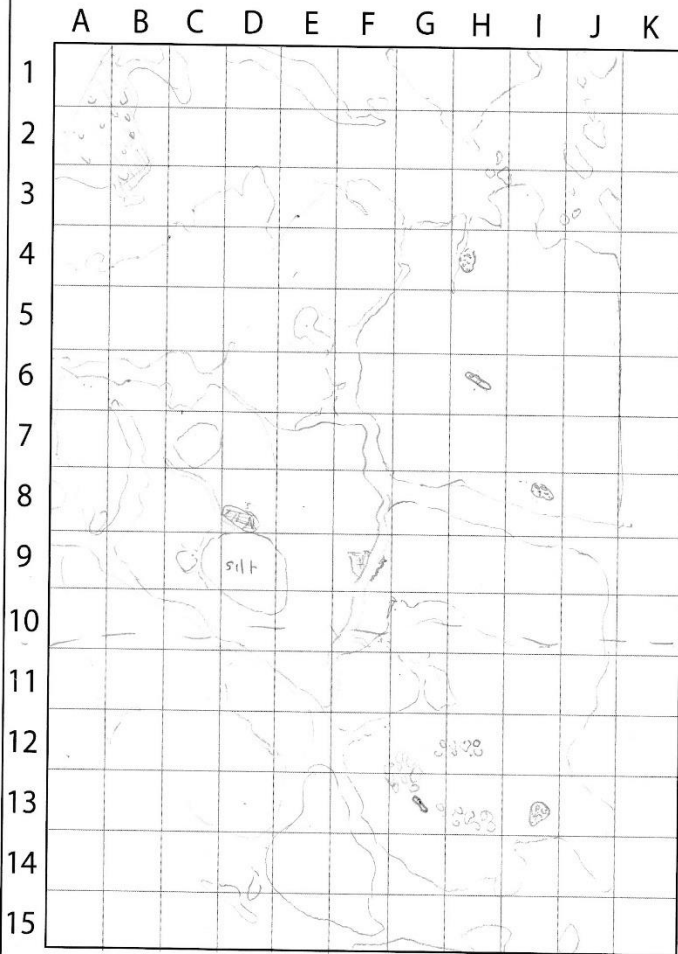
Context and deposit type: Below altar - Inside J7

3D Provenience (profile #, horizon, unit, coordinates):

4.82m below datum

Description (overall structure, boundaries, stratigraphy, etc.):

Notes



cross striated b-fabric
in-situ burning inburnt area
2 AB - burnt (fine/medium sand) quartz
4H - crystal growth
6H - crystal component? (ask about this)
- shell partially crystallization

8D - wood charcoal
8I - wood charcoal
9D - silt aggregate
phytolith in aggregate - leaf of maize? see piperine

- lower boundary - darker - more weathered

12G - aggregate angular quartz sand
13G - phytolith - elongated -
12G - weathered plaster (crystal growth)
13H - organic aggregate - quartz/mica inclusions
13I - weathered crystal growth throughout groundmass
13I - sub rounded excrement - w/quartz mineral inclusions
highly fragmented charcoal

Scale (slide size or magnification):

Sample Identification: 400-05 **Date:**

Site: Palenque
 Context: ~~above~~ above bedrock
 Deposit type: (plaza)

Summary

Homogeneity: heterogeneous
 Sorting: ~~well sorted~~ moderately sorted - very fine → fine sand (60 - 200 um)
 Texture: dense sandy clay - upper boundary - calcitic - crumbly like - lower boundary -
 c/f ratio: 1/4
 Related distribution: single-space porphyric
 Void space (%): 25%
 Void type: planar - 21% / 20% - 20% < 5% vughs

Coarse Fraction

General

% of total slide: 60% Dominant coarse component: quartz
 Average size: very fine → fine sand Sorting: moderately sorted
 Shape: tabular Roundness: subrounded
 Sphericity: Internal characteristics:
 Alteration/weathering: crystal growth / clay intercalations
 Orientation patterns: random
 Distribution patterns: random

Single mineral grains (e.g., calcite, quartz, glauconite, feldspar):
 quartz, 30%, very fine → medium sand (40 - 300 um) tabular, subrounded, random - throughout
 mica 10% few
 Red shape - fine sand 100
 medium 280 um

Compound grain/rock fragments (e.g., limestone, chert, phosphorite, chalk, tufa, clay aggregates):

Residues of Biological Origin (type, %, size)

Bone/teeth:
 Shell/forams:
 Phytoliths: elongated phytolith - with pores (maize leaf?) in silt aggregate / elongated phytolith -
 Ash:
 Coprolites/Spherulites: subrounded excrement w/ mineral quartz inclusions, mica, very coarse sand size
 Charcoal: wood charcoal 5% few - very coarse sand size 900 um - 1123 um
 fine gravel - 3265 um

Organic Matter (type, size, color, structure)

Tissue:
 Other plant remains:

Artifacts (type, %, orientation, distribution, size)

Chert:
 Ceramics:
 Mudbrick:
 Plaster:
 Other:

<p>Sample Identification: 400-05</p> <p>Site: Palenque Context: Belovaltar Str. 37 Deposit type:</p>	<p>Date:</p>
<p>Fine Fraction</p> <p>Dominant particle size: clay-silt Birefringence fabric: random striated B-fabric Color: orange/yellow Other:</p>	
<p>Microstructure</p> <p>Dominant microstructure type: weakly separated pods / upper boundary % of total slide: porous crumbs - crystalline to fabric lower boundary Other microstructure types:</p>	
<p>Secondary Features For each describe abundance, distribution, size, color, composition (i.e., calcitic), form (i.e., massive, laminated)</p> <p>Coatings:</p> <p>Hypo-coatings:</p> <p>Infillings:</p> <p>Intercalations: clay intercalations</p> <p>Nodules: clay nodules - rounded/subrounded - fine sand - medium sand size - orange 100 → 338 um</p> <p>Crystal growths: lower boundary - crystalline ground mass (framboid crystal inclusions)</p> <p>Juxtaposed features:</p> <p>Superimposed features:</p> <p>Excrements/coprolites:</p> <p>Silt aggregate < 5% rare - cylindrical - subrounded - gravel size 5937 um</p>	

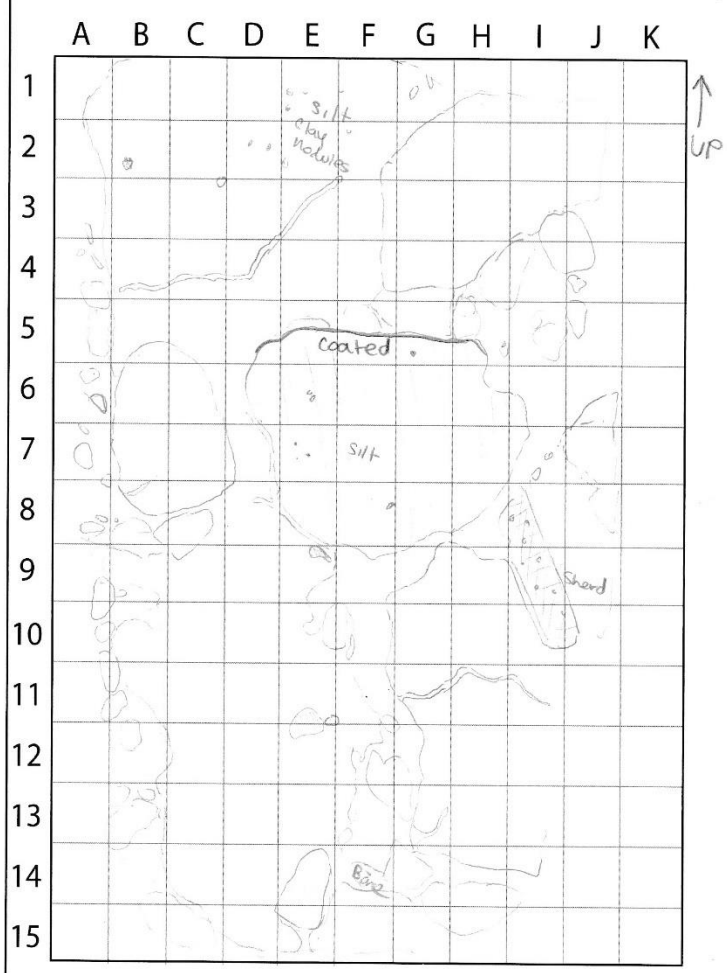
Interpretation	
Sample Identification: 450-05 Context: below altar - Str. 37 Deposit Type:	Date:
Origin and pre-depositional histories of components: quartz/mica, parent material	
Deposition (anthropogenic & natural):	
Post-depositional alterations (anthropogenic & natural):	
<p>differential weathering in quartz-lower boundary complex soil formation - lower boundary - water highly fragmented charcoal - quartz - both crystal growth - precipitation</p> <p>because of amount of weathered plaster (coming from layer above) crystal growth -</p> <p>dull limestone shiny is plaster</p>	
Overall interpretation of activities/processes/events:	
Soil formation - close to bedrock - components washing down from above	
Comparisons & relationships to other samples (note if same or different contexts)	

ANTHRO126M Micromorphological Recording Forms **Slide Description**

Sample Identification: 400-06
Site: Palenque
Context and deposit type: above bedrock '57
3D Provenience (profile #, horizon, unit, coordinates):
5.08 m below datum
Description (overall structure, boundaries, stratigraphy, etc.):

Date:
Sample ID: PREP40006a

Notes



Scale (slide size or magnification):

Sample Identification: 400-06 Site: Palenque Context: Above bedrock - Inside 57 Deposit type:	Date:		
Summary Homogeneity: homogeneous silty clay groundmass Sorting: well sorted Texture: silty clay c/f ratio: 1/4 Related distribution: close porphyric Void space (%): 15% Void type: planar voids			
Coarse Fraction <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> General % of total slide: 40% Average size: 50-90um Very fine sand Shape: subangular Sphericity: Alteration/weathering: Orientation patterns: random Distribution patterns: random </td> <td style="width: 50%; vertical-align: top;"> Dominant coarse component: quartz Sorting: well sorted Roundness: Internal characteristics: </td> </tr> </table> <p>Single mineral grains (e.g., calcite, quartz, glauconite, feldspar): Quartz, 35% frequent, very fine sand - 50-90um, subangular, mica, rod-like, 10% 200um, med. sand</p> <p>Compound grain/rock fragments (e.g., limestone, chert, phosphorite, chalk, tufa, clay aggregates):</p> <p>Residues of Biological Origin (type, %, size) Bone/teeth: bone < 2% rare, weathered, 1186 um, tubular, subrounded Shell/forams: very coarse sand Phytoliths: "scutiform" phytolith - piperno - P3S, conical shaped, - sarsier shaped w/ conical apex Ash: 194 um (fine sand) 2006 "occur in bracts, rather than leaves" of grasses - Coprolites/Spherulites: Charcoal:</p> <p>Organic Matter (type, size, color, structure) Tissue: Other plant remains:</p> <p>Artifacts (type, %, orientation, distribution, size) Chert: Ceramics: 1 sherd, < 2% rare, perpendicular to ground surface Mudbrick: Plaster: Other:</p>		General % of total slide: 40% Average size: 50-90um Very fine sand Shape: subangular Sphericity: Alteration/weathering: Orientation patterns: random Distribution patterns: random	Dominant coarse component: quartz Sorting: well sorted Roundness: Internal characteristics:
General % of total slide: 40% Average size: 50-90um Very fine sand Shape: subangular Sphericity: Alteration/weathering: Orientation patterns: random Distribution patterns: random	Dominant coarse component: quartz Sorting: well sorted Roundness: Internal characteristics:		

Sample Identification: 408-06 Site: Palenque Context: above Bedrock - inside J7 Deposit type:	Date:
Fine Fraction Dominant particle size: random striated and Birefringence fabric: speckled b fabric - clay aggregates Color: orange-red Other:	
Microstructure Dominant microstructure type: massive microstructure % of total slide: 30% Other microstructure types: moderately sorted crumb microstructure	
Secondary Features For each describe abundance, distribution, size, color, composition (i.e., calcitic), form (i.e., massive, laminated) Coatings: Hypo-coatings: Infillings: Intercalations: clay- Nodules: clay nodules Crystal growths: crystallization - plaster weathered Juxtaposed features: Superimposed features: Excrements/coprolites:	

Sample Identification: 400-06 Site: Palenque Context: Above bedrock inside Str J7 Deposit type:	Date:
Summary Boundary (upper): Thickness: Particle sizes: 40-90um, Fine sand - silt Fine material: clay - Color: orange yellow Related distribution: Structure: massive Bedding:	
Boundary (lower): c/f (coarse: fine) ratio: 1/4 Sorting: random	
Inclusions Inclusions orientation: random Inclusions distribution: random For inclusions record (where appropriate): type, %, size, color, form, preservation Plant remains: Impressions of plants: Charred remains: Calcitic ashes: Other organic remains (e.g., coprolites/dung, amorphous organic material, other): Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): bone Micro-artifacts (e.g., lithics, pottery, metal, glass, other): one sherd Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other): Sediment aggregates: silt aggregates - upper boundary Rock fragments: Minerals: quartz, mica Other inclusions:	
Post-depositional features Dessicated: Water-Logged: Clay Coatings - Other: clay nodules, striations of clay	
Void Spaces/Pores Void Shape: planar, zig zag Density: few - Distribution: random	

• Interpretation	
Sample Identification: 400-06 Context: above bedrock - str. J7 Deposit Type:	Date:
Origin and pre-depositional histories of components: quartz, mica - parent material	
Deposition (anthropogenic & natural): ^{coated} silt aggregates - trampling	
Post-depositional alterations (anthropogenic & natural): clay nodules, intercalations clay - movement of water	
Overall interpretation of activities/processes/events: near bedrock - high levels of clay, differential clay incalations - complex soil formation typical of older soils -	
Comparisons & relationships to other samples (note if same or different contexts)	

ANTHRO126M Micromorphological Recording Forms

Slide Description

Sample Identification: 402C-9a

Date:

Site: Palenque

Sample ID: PRP402C-9a

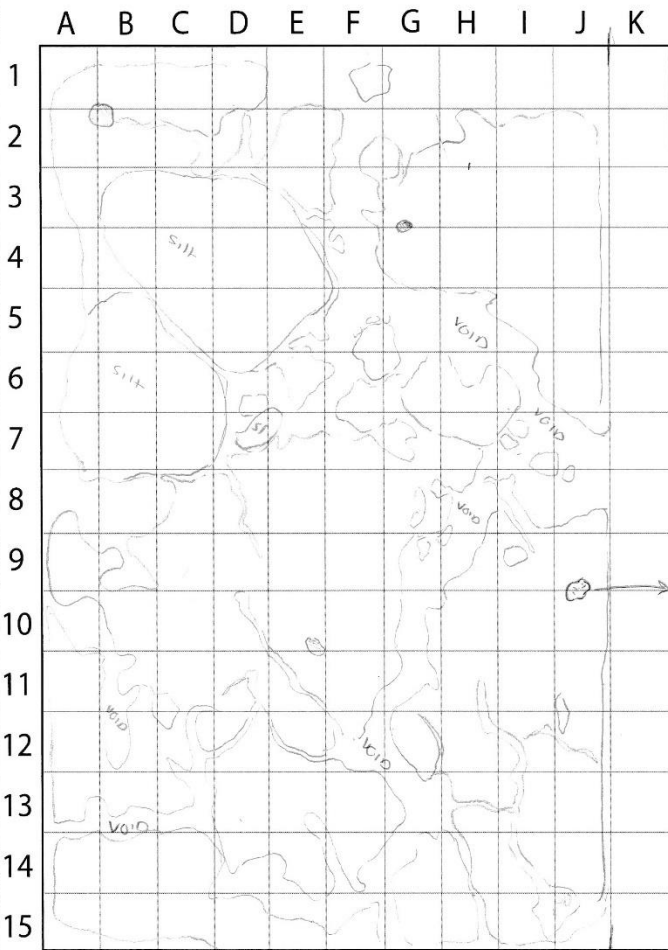
Context and deposit type: Plaza

3D Provenience (profile #, horizon, unit, coordinates):

Description (overall structure, boundaries, stratigraphy, etc.):

Complex

Notes



1-2 NB- organic aggregate

3-4G - organic aggregate

9-10 T- highly weathered basalt? or porphyroblast? (megacryst) - from igneous magma-

10e - amorphous organic aggregate - coprolite?

Scale (slide size or magnification):

Sample Identification: 402C-9

Date:

Site: Palenque

Context: Plaza

Deposit type:

Summary

Homogeneity:

Sorting: moderately sorted

Texture: sandy clay

c/f ratio: 1/4

Related distribution: single spaced porphyric

Void space (%): 15%

Void type: planar/channels

Coarse Fraction

General

% of total slide: 40%

Average size: 600um - very fine sand

Shape: tabular

Sphericity: subangular

Alteration/weathering: some weathering of minerals

Orientation patterns: random

Distribution patterns: random

Dominant coarse component: quartz (30%)

Sorting: moderately sorted

Roundness:

Internal characteristics:

Single mineral grains (e.g., calcite, quartz, glauconite, feldspar):

quartz - dominant - very fine sand size (30%) tabular subangular

16% few
red-like - random
fine sand
mica - 90-120um

Compound grain/rock fragments (e.g., limestone, chert, phosphorite, chalk, tufa, clay aggregates):

Residues of Biological Origin (type, %, size)

Bone/teeth:

Shell/forams:

Phytoliths: spherical phytolith - 120um - fine sand - very few -

Ash:

Coprolites/Spherulites: poss. coprolites - organic aggregates - very few < 5% - fine gravel size

Charcoal:

subrounded

> 2000 um

Organic Matter (type, size, color, structure)

Tissue:

Other plant remains:

Artifacts (type, %, orientation, distribution, size)

Chert:

Ceramics:

Mudbrick:

Plaster:

Other:

<p>Sample Identification: 402c-9</p> <p>Site: Palenque</p> <p>Context:</p> <p>Deposit type:</p>	<p>Date:</p>
<p>Fine Fraction</p> <p>Dominant particle size: clay-</p> <p>Birefringence fabric: cross-striated b-fabric</p> <p>Color: yellow-orange</p> <p>Other:</p>	
<p>Microstructure</p> <p>Dominant microstructure type: channel microstructure</p> <p>% of total slide: 60%</p> <p>Other microstructure types: massive</p>	
<p>Secondary Features</p> <p>For each describe abundance, distribution, size, color, composition (i.e., calcitic), form (i.e., massive, laminated)</p> <p>Coatings: ^{parallel} laminated clay-coating</p> <p>Hypo-coatings:</p> <p>Infillings: loose discontinuous channel infilling - clay nodules.</p> <p>Intercalations:</p> <p>Nodules: clay nodules -</p> <p>Crystal growths:</p> <p>Juxtaposed features:</p> <p>Superimposed features:</p> <p>Excrements/coprolites: coprolites?</p>	

<p>Sample Identification: 402C-9</p> <p>Site: Palenque</p> <p>Context: Plaza</p> <p>Deposit type:</p>	<p>Date:</p>
<p>Summary</p> <p>Boundary (upper):</p> <p>Thickness:</p> <p>Particle sizes: fine sand</p> <p>Fine material: clay -</p> <p>Color: orange/yellow</p> <p>Related distribution: close porphyric</p> <p>Structure: massive</p> <p>Bedding:</p> <p>Boundary (lower):</p> <p>c/f (coarse: fine) ratio: 1/4</p> <p>Sorting: moderately sorted</p>	
<p>Inclusions</p> <p>Inclusions orientation:</p> <p>Inclusions distribution:</p> <p>For inclusions record (where appropriate): type, %, size, color, form, preservation</p> <p>Plant remains:</p> <p>Impressions of plants:</p> <p>Charred remains:</p> <p>Calclitic ashes:</p> <p>Other organic remains (e.g., coprolites/dung, amorphous organic material, other):</p> <p>coprolites</p> <p>Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other):</p> <p>Phytolith - spherical</p> <p>Micro-artifacts (e.g., lithics, pottery, metal, glass, other):</p> <p>Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):</p> <p>Sediment aggregates: silt aggregates</p> <p>Rock fragments:</p> <p>Minerals: quartz, mica</p> <p>Other inclusions:</p>	
<p>Post-depositional features</p> <p>Dessicated:</p> <p>Water-Logged:</p> <p>Clay Coatings</p> <p>Other: striated clay b-fabric</p>	
<p>Void Spaces/Pores</p> <p>Void Shape: mostly planar - some channels</p> <p>Density:</p> <p>Distribution:</p>	

Interpretation	
Sample Identification: 462c-9 Context: Plaza Deposit Type:	Date:
Origin and pre-depositional histories of components: Quartz/mica - parent material	
Deposition (anthropogenic & natural): Silt aggregates - trampling - anthropogenic excrement - micro fauna	
Post-depositional alterations (anthropogenic & natural): clay nodules/intercalations - water movement	
Overall interpretation of activities/processes/events: relatively sterile soil - no evidence of plaster, artifacts - some silt aggregates in upper boundary, may be trampling - lots of water movement -	
Comparisons & relationships to other samples (note if same or different contexts)	

ANTHRO126M Micromorphological Recording Forms	Slide Description																																																																																																																																																																																																
<p>Sample Identification: 402c-10 Site: Palenque Context and deposit type: Plaza 3D Provenience (profile #, horizon, unit, coordinates): Description (overall structure, boundaries, stratigraphy, etc.):</p>	<p>Date: Sample ID: 402c-10a</p>																																																																																																																																																																																																
<p style="text-align: center;">Notes</p> <table border="1"><tr><td></td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>12</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>13</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>14</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>15</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>SF-organic-Coprolite? aggregate SF-twinning-? poss. bivalve shell frag.</p> <p>7-9 F.G. (or rodent excrement)</p> <p>Scale (slide size or magnification):</p>			A	B	C	D	E	F	G	H	I	J	K	1												2												3												4												5												6												7												8												9												10												11												12												13												14												15											
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Sample Identification: 462c-10 Site: Palenque Context: Plaza Deposit type:	Date:		
Summary Homogeneity: Sorting: moderately sorted - Texture: sandy clay c/f ratio: 1/4 Related distribution: close porphyric Void space (%): 50% Void type: planar - channel -			
Coarse Fraction <table border="0"> <tr> <td> General % of total slide: 40% Average size: fine sand 100-200 um Shape: tabular-subangular Sphericity: Alteration/weathering: Orientation patterns: random Distribution patterns: random </td> <td> Dominant coarse component: quartz Sorting: mod sorted Roundness: Internal characteristics: </td> </tr> </table> <p>Single mineral grains (e.g., calcite, quartz, glauconite, feldspar): very fine sand - 80-100 um quartz - 30% fine sand size - frequent - mica few - rod shape - rainbow</p> <p>Compound grain/rock fragments (e.g., limestone, chert, phosphorite, chalk, tufa, clay aggregates): limestone - few</p> <p>Residues of Biological Origin (type, %, size) Bone/teeth: Shell/forams: jute shell - few (1) Phytoliths: Ash: Coprolites/Spherulites: Charcoal:</p> <p>Organic Matter (type, size, color, structure) Tissue: Other plant remains:</p> <p>Artifacts (type, %, orientation, distribution, size) Chert: Ceramics: Mudbrick: Plaster: Other:</p>		General % of total slide: 40% Average size: fine sand 100-200 um Shape: tabular-subangular Sphericity: Alteration/weathering: Orientation patterns: random Distribution patterns: random	Dominant coarse component: quartz Sorting: mod sorted Roundness: Internal characteristics:
General % of total slide: 40% Average size: fine sand 100-200 um Shape: tabular-subangular Sphericity: Alteration/weathering: Orientation patterns: random Distribution patterns: random	Dominant coarse component: quartz Sorting: mod sorted Roundness: Internal characteristics:		

<p>Sample Identification: 402C-10</p> <p>Site: Palenque Context: Plaza Deposit type:</p>	<p>Date:</p>
<p>Fine Fraction</p> <p>Dominant particle size: clay Birefringence fabric: cross striated, striated b-fabric Color: yellow-orange Other:</p>	
<p>Microstructure</p> <p>Dominant microstructure type: highly separated subangular-block % of total slide: 30% Other microstructure types:</p>	
<p>Secondary Features For each describe abundance, distribution, size, color, composition (i.e., calcitic), form (i.e., massive, laminated)</p> <p>Coatings:</p> <p>Hypo-coatings:</p> <p>Infillings:</p> <p>Intercalations:</p> <p>Nodules: spherical Clay nodules - few - throughout</p> <p>Crystal growths: framboid crystal growth</p> <p>Juxtaposed features:</p> <p>Superimposed features:</p> <p>Excrements/coprolites: excrement</p>	

<p>Sample Identification: 402c-10 Site: Palenque Context: Plaza Deposit type:</p>	<p>Date:</p>
<p>Summary</p> <p>Boundary (upper): no boundary Thickness: Particle sizes: Fine material: fine sand/silt Color: orange/yellow Related distribution: close porphyric Structure: Bedding:</p> <p>Boundary (lower): c/f (coarse: fine) ratio: 1/4 Sorting: moderately sorted</p>	
<p>Inclusions</p> <p>Inclusions orientation: large artifacts oriented parallel to surface - the rest is random Inclusions distribution: random</p> <p>For inclusions record (where appropriate): type, %, size, color, form, preservation Plant remains: Impressions of plants: Charred remains: Calclitic ashes:</p> <p>Other organic remains (e.g., coprolites/dung, amorphous organic material, other): excrement Inorganic remains of biological origin (e.g., bone, shell, phytoliths, other): Shell - few - large gravel size - white Micro-artifacts (e.g., lithics, pottery, metal, glass, other):</p> <p>Anthropogenic aggregates (e.g., building materials, mudbrick, plaster, burnt aggregates, other):</p> <p>Sediment aggregates:</p> <p>Rock fragments: limestone, rare - large gravel size - white Minerals: quartz, mica (see pg. 1)</p> <p>Other inclusions:</p>	
<p>Post-depositional features</p> <p>Dessicated: Water-Logged: Clay Coatings - Other: intercalations of clay</p>	
<p>Void Spaces/Pores</p> <p>Void Shape: Density: Distribution:</p>	

ANTHRO126M Micromorphological Recording Forms	Slide Description																																						
<p>Sample Identification: 402C-11 Site: Palenque Context and deposit type: Plaza 3D Provenience (profile #, horizon, unit, coordinates):</p>	<p>Date: Sample ID: 402C-11b</p>																																						
<p>Description (overall structure, boundaries, stratigraphy, etc.):</p>																																							
<p>Notes</p>																																							
<p>disturbance</p> <table border="1"><thead><tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th><th>H</th><th>I</th><th>J</th><th>K</th></tr></thead><tbody><tr><th>1</th><td colspan="11" rowspan="15"></td></tr><tr><th>2</th></tr><tr><th>3</th></tr><tr><th>4</th></tr><tr><th>5</th></tr><tr><th>6</th></tr><tr><th>7</th></tr><tr><th>8</th></tr><tr><th>9</th></tr><tr><th>10</th></tr><tr><th>11</th></tr><tr><th>12</th></tr><tr><th>13</th></tr><tr><th>14</th></tr><tr><th>15</th></tr></tbody></table>		A	B	C	D	E	F	G	H	I	J	K	1												2	3	4	5	6	7	8	9	10	11	12	13	14	15	<p>1D-E - excrement-</p> <p>3E - crystal formation</p> <p>5E - lg. excrement - organic - amorphous</p> <p>5G - organic aggregate - excrement w/ qtz and mica inclusions</p> <p>8D - excrement - organic aggregate</p> <p>13-14 G - organic aggregates</p>
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<p>Scale (slide size or magnification):</p>																																							

Sample Identification: 402c-11

Date:

Site: Palenque

Context: Plaza

Deposit type:

Summary

Homogeneity: moderate

Sorting: moderately sorted

Texture: sandy clay

c/f ratio: 1/4

Related distribution: close porphyric

Void space (%): 10%

Void type: planar

Coarse Fraction

General

% of total slide: 40%

Average size: 60-90um (very fine sand)

Shape: tabular

Sphericity: subangular

Alteration/weathering:

Orientation patterns: random

Distribution patterns: random

Dominant coarse component: quartz

Sorting: moderately sorted

Roundness:

Internal characteristics:

Single mineral grains (e.g., calcite, quartz, glauconite, feldspar):

quartz - 30% - frequent - avg. 60-90 (very fine sand) / mica - rod-shap 150-um - fine sand /
tabular - subangular / very few < 5%

Compound grain/rock fragments (e.g., limestone, chert, phosphorite, chalk, tufa, clay aggregates):

Residues of Biological Origin (type, %, size)

Bone/teeth: burnt bone

Shell/forams:

Phytoliths:

Ash:

Coprolites/Spherulites: mitoid - excrement in channel -

Charcoal:

long-linear
larger excrement - dense, brown, amorphous -
fine grained organic material
with some linear streaky features

Organic Matter (type, size, color, structure)

Tissue:

Other plant remains:

Artifacts (type, %, orientation, distribution, size)

Chert:

Ceramics:

Mudbrick:

Plaster: poss. weathered plaster

Other:

<p>Sample Identification: 402c-11</p> <p>Site: Palenque</p> <p>Context: Plaza</p> <p>Deposit type:</p>	<p>Date:</p>
<p>Fine Fraction</p> <p>Dominant particle size: fine sand - clay</p> <p>Birefringence fabric: cross-striated b-fabric</p> <p>Color: yellow-orange</p> <p>Other:</p>	
<p>Microstructure</p> <p>Dominant microstructure type: massive microstructure</p> <p>% of total slide: 30%</p> <p>Other microstructure types: highly separated crumb microstructure - (microfauna disturbed)</p>	
<p>Secondary Features</p> <p>For each describe abundance, distribution, size, color, composition (i.e., calcitic), form (i.e., massive, laminated)</p> <p>Coatings:</p> <p>Hypo-coatings:</p> <p>Infillings: infillings - microfauna</p> <p>Intercalations: clay -</p> <p>Nodules: clay nodules - oval -</p> <p>Crystal growths: in-situ crystal growth -</p> <p>Juxtaposed features:</p> <p>Superimposed features:</p> <p>Excrements/coprolites: excrement embedded - and microfauna</p>	

Interpretation	
Sample Identification: 402C-11 Context: Plaza Deposit Type:	Date:
Origin and pre-depositional histories of components: quartz, mica - parent material	
Deposition (anthropogenic & natural): trampled - excrement frog -	
Post-depositional alterations (anthropogenic & natural): water - clay - cross-stratified crystal growth rodent/microfauna disturbance	
Overall interpretation of activities/processes/events: fairly sterile - plaza area - no artifacts - more excrement than usual	
Comparisons & relationships to other samples (note if same or different contexts)	

Appendix 5: PEB Identification (Trabanino 2016)

NUMBER	OPERATION/LOCUS/SAMPLE#	MICROSCOPIC OBSERVATION	POSSIBLE ID
PREP 2016 STRUCTURE J7 2016 - PEB SAMPLE INVENTORY			
1	PREP 400-09-10	MAS DE 10 CARBONES, INCIENSO COPAL MANILKARA, 4 CARBONES CON VASOS PEQUEÑOS 23 MICRAS CELULAS CUADRADAS EN RADIAL PUNTEADURAS PEQUEÑAS 4 SERIADO 10 A 15 DE ALTO, 1 CARBÓN TIPO LEGUMINOSAE CON VASOS 3 ACOLADOS PARENQUIMA ALIFORME 80 MICRAS DE DIAMETRO RADIOS BISERIADOS	COPAL, MANILKARA, LEGUM
2	PREP 400-09-12	1 CARBON HETEROGENEO UNISERIADO Y BISERIADO PARENQUIMA, 1 CARBON 4 SERIADO	INDET
3	PREP 400-09-13	20 CARBONES DE BUEN TAMAÑO, BISERIADO 15 DE ALTO DIAMETRO VASO 46 MICRAS FIBRAS MUY GRANDES CON PAREDES FINAS TIPO MALVACEAE	MALVACEAE
4	PREP 400-09-57	1 CARBON VASOS GRANDES PARENQUIMA EN BANDAS 100 A 140 MICRAS PUNTEADURAS OPUESTAS ALTERNAS CELULAS DE RADIO RECTANGULARES ACOSTADAS RADIOS BISERIADOS 7 DE ALTO, 1 CARBON PINO	INDET, PINE
5	PREP 400-25-60	PINO	PINE
6	PREP 400-25-61	PINO	PINE
7	PREP 400-25-62	VERTEBRA DE PESCADO, PINO	PINE
8	PREP 400-25-63	INDET	INDET
9	PREP 400-20-14	PINO	PINE
10	PREP 400-20-18	INDET	INDET

11	PREP 400-24-57	VASOS ACOLADOS TIPO MANILKARA RADIOS CORTOS BISERIADOS PARENQUIMA EN BANDAS O LINEAS	INDET
12	PREP 400-24-58	VASOS SOLITARIOS 30 A 50 MICRAS DE DIAMETRO, PARENQUIMA EN BANDAS	TIPO PIMIENTA MYRTACEAE
13	PREP 400-24-59	VASOS SOLITARIOS TIPO CEDRO, 40 MICRAS DE DIAM HETEROGENEO BISERIADO 6 DE ALTO	CEDRO MELIACEAE
14	PREP 400-27-15	10 CARBONES VASOS SOLITARIOS, 60 MICRAS DE DIAMETRO, RADIOS CORTOS CELULAS ALTERNAS BISERIADO 10 DE ALTO	CEDRO MELIACEAE
15	PREP 400-27-16	VASOS SOLITARIOS TIPO CEDRO, ALINEADOS EN DIAGONAL	CEDRO MELIACEAE
16	PREP 400-08-06	CARBON JUNTO A ESTUCO, VASOS GRANDES DE 120 A 200 MICRAS, CON INCLUSIONES GOMAS, RADIOS 3 A 4 SERIADOS 15 DE ALTO, BANDAS DE PARENQUIMA DE 2 A 4 CELULAS DE ALTO, PUNTEADURAS ALTERNAS GRANDES CON DOBLE MEMBRANA, RADIOS PSEUDOSTRATIFICADOS CON 4 CELULAS DE PARENQUIMA DE ALTO PARA CADA RADIO, PARENQUIMA VASICENTRICO, MADERA BUENA PARA CONSTRUCCION POSTE COLUMNA	LEGUM
17	PREP 400-35-67	10 CARBONES DE GRAN TAMAÑO DE 3 A 2 CM CON TIERRA ADOBE, VASOS GRANDES DE 120 MICRAS, PARENQUIMA VASICENTRICO	LEGUM
18	PREP 400-30-66	10 CARBONES PINO	PINE
19	PREP 400-07-05	1 CARBON VASO MEDIANO 80 MICRAS RADIO 4 SERIADO 12 DE ALTO	INDET

20	PREP 400-47-69	10 CARBONES CON TIERRA VASOS ACOLADOS EN DOS 80 MICRAS DE DIAMETRO, PARENQUIMA EN BANDAS, BISERIADO 7 DE ALTO, CRISTALIZADO TIPO PIMIENTA	PIMIENTA
21	PREP 400-25-64	20 CARBONES PINO	PINE
22	PREP 400-29-17	VASOS ACOLADOS CON PARENQUIMA ALIFORME DE 5 CELULAS DE ALTO, 100 MICRAS DE DIAMETRO, PUNTEADURAS MINIATURAS, RADIOS 3 SERIADOS 10 DE ALTO, 4 CELULAS DE PARENQUIMA DE ALTO POR RADIO	LEGUM
23	PREP 400-22-65	CARBONES EN INCENSARIO	PINE
24	PREP 400-44-15-LF	3 CARBONES DE 2 A 4 MM PINO	PINE
25	PREP 400-46-68-LF	CARBON DE VASOS PEQUEÑOS 60 MICRAS PARENQUIMA VASICENTRICO 3 SERIADO 15 DE ALTO PARENQUIMA PALISADICO EN RADIAL, CARBON DE PINO, CARBON TIPO PIMIENTA 40 MICRAS DE DIAM BISERIADO	INDET, PINE, PIMIENTA
26	PREP 400-25-02-LF	CARBON PINO, SEMILLA TIPO FRIJOL,	PINE, BEAN SEED?
27	PREP 400-27-03-LF	2 CARBONES, VASOS ACOLADOS 60 MICRAS DIAM 3 SERIADO SIN PARENQUIMA FIBRAS ABUNDANTES PUNTEADURAS DIMINUTAS	INDET
28	PREP 400-44-13-LF	1 CARBON 1 MM	INDET
29	PREP 400-08-LF	10 CARBONES PINO	PINE
30	PREP 400-27-001-LF	5 CARBONES VASOS ACOLADOS DE A 3 60 A 70 MICRAS DIAM BISERIADO	INDET
31	PREP 400-44-09-LF	CARBONES MUY PEQUEÑOS, 1 SEMILLA INDET	INDET, SEED INDET
32	PREP 400-20-005-LF	FIBRAS VEGETALES, 5 CARBONES MUY PEQUEÑOS	CEIBA FIBERS?, INDET
33	PREP 400-20-07-LF	5 CARBONES VASOS PEQUEÑOS 60 A 70 MICRAS, BISERIADO, FIBRAS PRESENTES, VASOS ALINEADOS HORIZONTALMENTE	INDET

34	PREP 400-20-003-LF	1 HOJA CONTAMINACION ACTUAL	CONTAMINATION
35	PREP 400-20-01-LF	1 CARBON INDET	INDET
36	PREP 400-25-04-LF	20 A 40 CARBONES PINO MADERA DE 2 AÑO	PINE
37	PREP 400-25-006-LF	2 HUESOS CARBONIZADOS, 40 A 50 CARBONES DE PINO	CARBONIZED BONES, PINE
38	PREP 400-44-33-LF-S-SIDE	2 CARBONES VASOS PEQUEÑOS 40 A 50 MICRAS DIAM PUNTEADURAS DIMINUTAS OPUESTAS RADIOS 3 SERIADOS HETEROGENEOS 15 DE ALTO	INDET
39	PREP 400-08-05-LF	10 CARBONES PINO	PINE
40	PREP 400-44-25-W-NICHE-LF	1 CARBON DE 1 MM PINO	PINE
41	PREP 400-44-23-E-NICHE-LF	1 CARBON 1 MM INDET	INDET
42	PREP 400-44-29-S-SIDE-LF	2 CONTAMINACION	CONTAMINATION
43	PREP 400-08-07-LF	10 CARBONES TIPO PIMIENTA 40 MICRAS DIAM, 2 SEMILLAS INDET 4 MM	PIMIENTA, INDET SEEDS
44	PREP 400-08-03-LF	10 CARBONES PEQUEÑOS	INDET
45	PREP 400-25-01-LF	10 CARBONES	INDET

Appendix 6: Osteological Analysis PREP400-44 (Granades 2016)

SEX: Masculine				
Cranium				
Arco supraorbitario (Supraorbital Arc)	3	Buikstra and Ubelaker 1994		
Glabella	4			
Apofisis matoides (Mastoid Process)	3			
Forma de las orbitas (Orbit Shape)	cuadradas (Square)			
Forma de la mandíbula (Mandible Form)	V			
Ángulo de la rama (Angle of the ramus)	More than 90°			
Prominencia del Menton (Prominence of Mental Protuberance)	3			
Ilíaco (Iliac)		Asímetrica (asymmetrical)	cresta en forma de S (Crest in the form of "S")	Surco preauricular ligeramente marcado (Slightly Marked preauricular groove)
Escotadura (Notch)	Abierta (Open)			
Sacro (Sacrum)	alas cortas (Short Alae "wings")			

Edad (Age)	32-35		
		Note: heterogeneous characteristics are observed on the atrial plate of both ilium. In the apex portion the texture and morphology have characteristics of a younger individual, despite the absence of undulations, the striae predominate and the texture is still grainy. In the lower and upper portion, porosity is observed, but this porosity gives it an appearance of greater age, it could be tissue destruction as a reaction to pathological factors.	Nota: En la carilla auricular de ambos íliacos se observan características heterogéneas. En la porción del ápice la textura y morfología presenta características de un individuo más joven, a pesar de la ausencia de ondulaciones, las estrías predominan y la textura sigue siendo granulada. En la porción inferior y superior se observa porosidad, pero esta porosidad le da una apariencia de mayor edad, podría tratarse de la destrucción del tejido como una reacción ante factores patológicos.
Carilla auricular		(Bolsen, 2002)	
	Topografía superior	plano a irregular	
	Topografía inferior	plano a irregular	
	Morfología superior	líneas <1/3	
	Morfología apical	líneas 1/3 a 2/3	
	Morfología inferior	líneas <1/3	
	textura inferior	microporosidad	
	exostosis superior	exostosis redondeada	
	exostosis inferior	exostosis redondeada	
	exostosis posterior	exostosis redondeada	
Costillas	fase 5 (33-42)	Se presenta un margen plano, irregular, sin bordes filosos, pero con irregularidades en el margen, no hay ondulaciones, porosidad moderada y pérdida de densidad.	

Particularidades (Particulars)			
Rasgos particulares (Particular Features)			
Estatura (Stature)			
Longitud máxima de húmero (Maximum Femur Length)		313	
Longitud máxima de tibia (Maximum Tibia Length)		366	
Longitud máxima de cúbito (Maximum Ulna Length)		272	
Robusticidad (Robusticity)			
diámetro antero-posterior femur (Diameter Anterior/Posterior of Femur)		28.64	
diámetro lateral fémur (Lateral Diameter of Femur)		25.64	
circunferencia de la diáfisi del húmero (Circumference of the humerus diaphysis)		66	
Indicadores de estrés (Indicators of Stress)		total diente	línea
Líneas de hipoplasia incisivo der (Hipoplasia Lines on Incisors)	1 línea	9.83	6.45
Líneas de hipoplasia canino der (Hipoplasia Line son Canines)	1 línea	8.71	4.17
Criba orbitaria	Presencia ligera en 1/4 de la orbita		
Hiperostosis porótica	ligera-inactiva		
Características patológicas y observaciones (Pathologies)			
<p>En el hueso frontal se observa una depresión, al centro de esta depresión hay un agujero con bordes cortantes. Podría tratarse de una fractura, provocada por un objeto contuso y cortante, para corroborar el diagnóstico se recomienda realizar radiografías o tomografía. (In the frontal bone a depression is observed, at the center of this depression there is a hole with sharp edges. It could be a fracture, caused by a blunt and sharp object, to corroborate the diagnosis it is recommended to take x-rays or tomography.)</p>			

No se observa modificación cefálica, ni dental (mutilación o deformación). (No dental or cranial modification)			
Presencia de porosidad irregular en la carilla auricular de ilíacos y saro, así como el cuerpo de la primera vértebra sacral, sólo la porción apical no se vio afectada. Por el momento no hay un diagnóstico al respecto.	Presence of porosity irregular atrial and saro iliac veneer and the body first sacral vertebra dela, only the apical portion was not affected. At the moment there is a diagnosis about it.		
Presencia de osteofitos moderada en las las vértebras lumbares (3ª,4ª y 5ª)			
Respecto al proceso tafonómico, se observó una copa de coloración blanca tanto en el húmero izquierdo como e las vértebras lumbarares. Mientras que en el húmero derecho y las vértebras cervicales la coloración es café. Algunos de los factores a considerar son: el material sobre se encontraba y la deposición de materiales sedimentarios.	Regarding the taphonomic process, a cup of white coloration was observed both in the left humerus and in the lumbar vertebrae. While in the right humerus and the cervical vertebrae the coloration is brown. Some of the factors to consider are: the material on it was and the deposition of sedimentary materials		
Revisar algunas de las costillas que presentan algunas formas irregulares, probablemente se relacione con actividad física; de ser posible se sugiere que se realicen algunas radiografías.	Review some of the ribs that have some irregular shapes, it probably relates to physical activity; if possible it is suggested that some x-rays are performed.		
Presencia de pigmento rojo en las orbitas. (Presence of red pigment in the orbits)			
Infección periodontal con presencia de proceso alveolar. (Periodontal infections)			