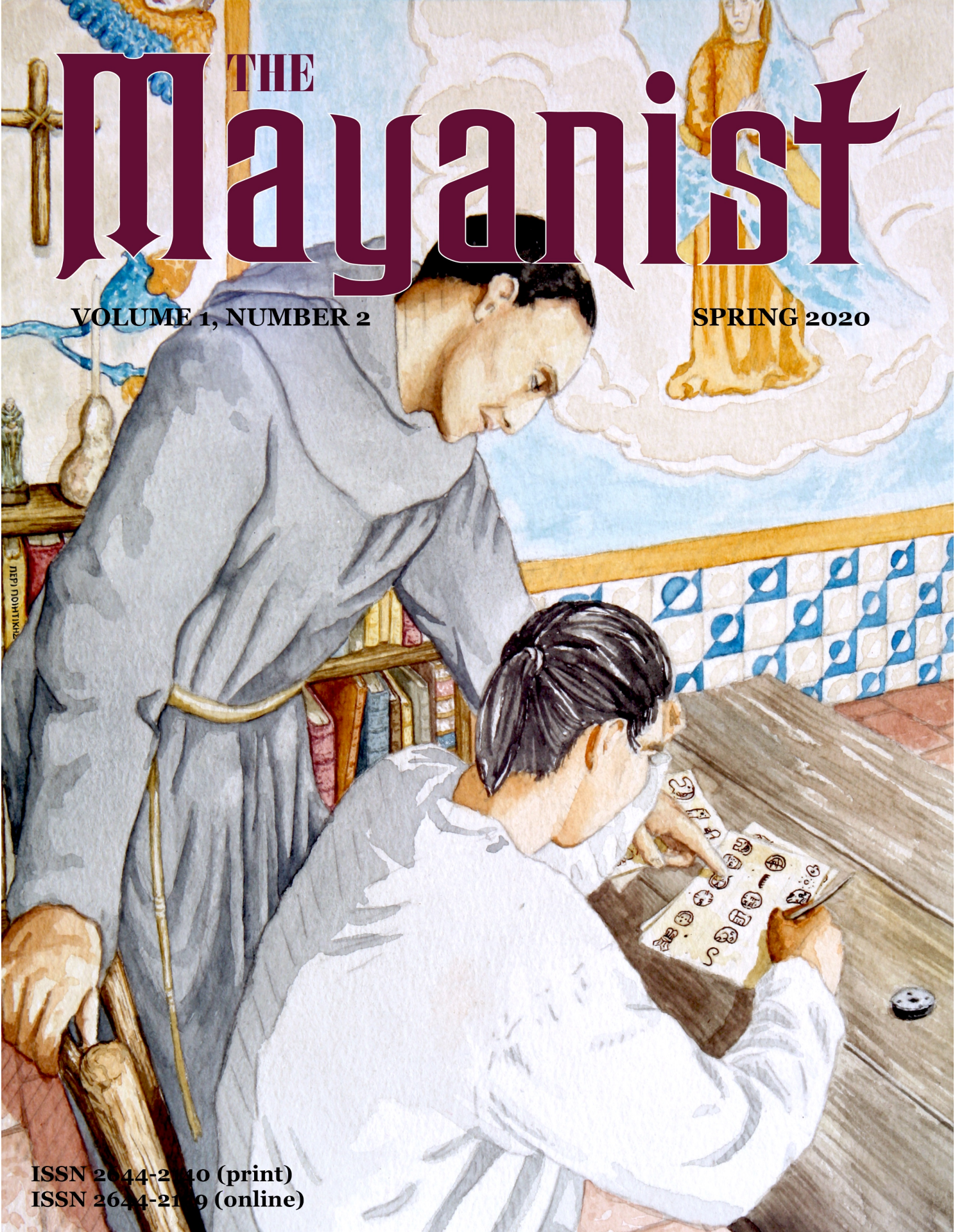


THE Mayanist

VOLUME 1, NUMBER 2

SPRING 2020



ISSN 2644-2140 (print)
ISSN 2644-2149 (online)

THE Mayanist

Volume 1, Number 2
April 2020

a biannual journal published by
American Foreign Academic Research (AFAR)

edited by

Maxime Lamoureux-St-Hilaire (Editor-in-Chief)
C. Mathew Saunders (Executive Editor)
and Harri Kettunen (Guest Editor)

American Foreign Academic Research, Inc.
AFAR is based in Davidson, North Carolina and operates as a 501(c)3 organization
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The Editorial

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Brainstorming about exciting projects, making plans, and dreaming of possibilities certainly are fun activities. This pretty much describes the process of how we came up with *The Mayanist*. Actually completing a project by following up on said plans is incredibly fulfilling, yet not always as fun. In this, we are extremely lucky, since rearing *The Mayanist* to production has so far been a truly enjoyable collaborative operation. Thus, we are truthfully both excited to deliver this second issue and looking forward to work on the third one with a new team of authors and so, despite the current SARS-2 health crisis.

Producing an illustrated academic journal with the very limited budget of a nonprofit organization can be challenging. Doing so on a tight timeline is even harder. Our success in accomplishing this is entirely due to the hard work of both our volunteers and our talented artist, Aaron Alfano. We are incredibly thankful for Harri Kettunen, our guest editor and photographer, and Joel Skidmore, our layout artist and publication expert, without whom officially making *The Mayanist* a biannual journal would be next-to-impossible.

Just like the first, this second issue of the first volume of *The Mayanist* stems out of one of American Foreign Academic Research's (AFAR) conferences: the 13th Annual Maya at the Playa Conference (M@P2020), held in Flagler Beach, FL, from September 26-29, 2020. Like most of our recent conferences, M@P2020 was unified under a research theme: *Comparative Approaches for Maya Studies*. Besides this topic being a very promising one for our speakers and attendees, it is one of academic value since analogical reasoning is of primary importance for students of the past, and this often means cross-cultural comparisons. Using comparative approaches reflexively is crucial since, to borrow from a recent paper on this topic, "the use of cross-cultural comparative approaches is so engrained in our analogical, archaeological thinking that it is sometimes applied uncritically [... and] despite their omnipresence, there is no shared academic procedure for using comparative approaches" (Lamoureux-St-Hilaire 2020:8). In fact, the desire to build on this theme stems from a forum Lamoureux-St-Hilaire organized for the 2019 Meeting of the Society for American Archaeology (held in Albuquerque in April 2019) which featured our editor C. Mathew Saunders and author Rachel A. Horowitz, along with M@P2020 presenter Arthur Demarest.

We were thrilled to receive five excellent contributions from M@P2020 presenters for this issue, which cover a diverse array of topics including lithic studies, the development of sociopolitical complexity, landscapes, settlements, agriculture, epigraphy, paleography, mythology, history, ethnohistory, and codicology. A novelty in this issue is the subdivision of contributions in two categories: *Articles* and *Research Reports*. Both categories are equally valuable, but their differences in tone and scope warranted this distinction.

Honoring Michael D. Coe (1929-2019)

As great as M@P2020 was, a shadow was soon cast on the conference as we mourned the loss of Michael D. Coe, who entered the road the day before opening night. As a group, we lost a mentor and a leader whose work and encouragements contributed to our vocation and passion for archaeology. We cannot exaggerate how big an impact Mike has had on Mesoamerican studies. Yet, as we toasted him at the closing dinner, it was apparent that – beyond academia – Mike had positively affected many in distinct facets of their life.

I (Saunders) was lucky to have Mike as a good friend for over 12 years, for which I am very grateful. He was always eager and willing to help out in any capacity, whether it dealt with the conferences or personal projects. It was always a great feeling to see Mike quickly respond to an email and an almost euphoric one when he would write me out of the blue. Mike, along with the late George Stuart (1935-2014) – as advocates for public outreach and community engagement – are in many ways responsible for the offerings I've been able to contribute to the field. Not only did they inspire me, but they also provided invaluable tips and directions. I sincerely hope to continue standing upon their shoulders to provide quality contributions to the field of Maya research for many more years.

The theme of comparative approaches was custom-fit for Mike, who engaged with cross-cultural research strategies long before most of us. In fact, nine years ago Mike delivered the keynote lecture, *Angkor and Maya: A Tale of Two Civilizations* at the fourth, M@P2010 Conference. It was then that I (Lamoureux-St-Hilaire) was fortunate enough to meet Dr. Coe – during my first foray into Mat's then newish conference. I had first learned of his work through my undergraduate advisor, the late Dr. Louise I. Paradis (1945-2017), who was one of Dr. Coe's Ph.D. advisee at Yale. As soon as I sheepishly introduced myself, he looked at me, smiled, and said "Just call me Mike" – words which still resonate in my mind. Mike Coe may have been famous, but he was incredibly humble and always kind with students. The following evening, I had the incredible privilege of sitting next to George Stuart to listen to Mike deliver his keynote address on *Angkor and the Maya*. This was a surreal and inspiring experience for a young M.A. student. I simply cannot imagine how different my academic life would have been had Mike not been Louise's advisor, and had I not been invited to present at M@P and met him, George, Mat, and even Harri – our guest editor – to whom we now give the table.



Mat and Sophie Saunders with Mike Coe at the residence of Kevin and Barbara Kennedy, Palm Coast, FL, on the opening night of M@P2010. Photo by Kevin Kennedy.

From our Guest Editor

The current issue of The Mayanist is dedicated to the memory of Mike Coe, a great scholar, friend, and an international man of mystery. My contribution to the current issue of The Mayanist, a research report on *Relación de las cosas de Yucatán*, has interesting ties to getting to know Mike. It all happened right after my visit to Saint Petersburg in 1998 to meet with Yuri Knorozov. A short “interview article” that followed the encounter (Kettunen 1998), caught Mike’s eye and we started corresponding via e-mail. However, it was not until M@P2010 that I finally got to meet Mike in person, and to discuss the other man of mystery, Yuri Knorozov (or, as Mike always referred to him, “our mutual friend”). Following this, I invited Mike to the European Maya Conference in Helsinki two years later, to receive the Wayeb Lifetime Award for his contributions in Mesoamerican studies, and to discuss his previous life as a spy.

Another enigmatic figure – and the character tying Mike to “our mutual friend” – is Diego de Landa. Echoing Erich von Stroheim, he’s “the man you love to hate.” Demonized by some and praised by others, he remains a controversial figure amongst Mayanists. Politics aside, I wanted to show Landa *wie es eigentlich gewesen* on this issue’s cover. Obviously, the result is an idealized image of the encounter of Landa and his Maya informant (be it Juan Cocom or Gaspar Antonio Chi), trying to figure out the obscurities of Maya writing. The rendering is by Aaron Alfano, and I would hereby like to thank Aaron for his amazing work both on the cover illustration and marginalia of the current issue – and his eternal patience during the long discussions on the details of these images. Both of us also thank John Chuchiak for his insights on all things Franciscan in the 16th century. The artistic license and all misinterpretations – deliberate and unintentional – are ours, not his.

Introducing the Contributions to this Issue

The articles and research reports in the current issue of The Mayanist are wide-ranging and give an excellent glimpse into the scholarly breadth of Maya studies. In her contribution, Rachel A. Horowitz explores how sedentism affects tool form and specialized tool production and how these are connected to economic exchange networks. Horowitz points out that although outwardly a topic of interest only to lithic specialists, tool production has broader economic implications, including understanding trade and exchange systems, marketplaces, and the accumulation of wealth in sedentary societies. She also observes that it was possible to achieve material wealth through lithic production and access to raw material sources. Furthermore, as in modern societies where most tools and devices are produced by specialists, a decrease in skill level among non-specialists can be observed among past sedentary societies, including the ancient Maya. Interestingly, as pointed out by Horowitz, this may have led some lithic producers in the Maya area to make bifaces purposefully thicker than one would expect them to be – with their reliability in mind. This practice is, of course, opposite to the *planned obsolescence* of utensils in the modern world.

Next, we turn from lithics to language: Emily Davis-Hale examines the past, present, and future of paleographic analyses in Maya epigraphy and explores the potential of cross-cultural comparisons within the study of world’s writing systems, particularly Sumerian and Chinese. Although the study of the formal evolution of signs is an integral part of Maya epigraphy, very few (and no exhaustive) studies have been published since the pivotal work of Alfonso Lacadena in 1995. In the aftermath of digital revolution, using artificial intelligence to analyze large corpora sounds rather uncomplicated. However, we still need the humans to tell computers what we want. Paleography has a lot of potential, especially if we are careful with our analyzes and are open to new ideas. Comparative studies are the key here, as has been the case in understanding ancient writing systems in general and Maya and Mesoamerican writing systems in particular. The prerequisite to a

successful paleographic analysis is a careful archaeological and art historical chronology, combined with reliable reproductions of texts. The corpus of texts from the Maya area is, fortunately, large enough – and the timespan of texts long enough (ca. 18 centuries) – to produce meaningful patterns. The situation is comparable to cuneiform and the Chinese script – both of which were, or have been in use over three millennia. Davis-Hale’s “comparative corpus paleography” is a much-needed but also challenging endeavor; one which requires expertise in epigraphic methods, in the study of the evolution of writing systems, and an open-mindedness to interdisciplinary coordination.

In the following article, Jayur Madhusudan Mehta and Haley Holt Mehta examine the cultural similarities and differences along the Gulf Coast of Mexico, extending their analyses from the Mesoamerican cultural sphere to the Southeastern United States. They discuss the shared cultural features of the area, pointing out to the fundamental mythological and cosmological similarities within the region. Yet, we can also see distinct cultural developments leading to different cultural manifestations, especially in the way rulership is manifested and depicted in the Southern Gulf during the Formative Period. In contrast, in the Northern Gulf, early monumental architecture and its driving forces are far more difficult to reconstruct, lacking the representational art so common in the south. Intriguingly, as Mehta and Mehta point out, monumental construction *precedes* sedentism and agriculture in the northern Gulf Coast, suggesting a very different sociopolitical development from the southern neighbors.

In the following contribution, Harri Kettunen reports his codicological research on *Relación de las cosas de Yucatán*, ascribed to Diego de Landa, pointing out that the manuscript is older than previously thought. Based on the use of transillumination photography, Kettunen has exposed several hitherto unidentified details of the manuscript, most importantly 36 watermarks that can be dated to the latter part of the 16th century. These watermarks, along with paleographic analyses, will help us date this multi-authored manuscript. Interestingly, although the paper and most of the text seem to date to the late 16th century, one section of the compilation was written during the latter part of the 17th century – on empty folios of the manuscript. Later, the manuscript was bound in a non-chronological order and the late handwriting was sandwiched between the older ones. These details, along with the stylistic features and contents of the manuscript, will help us better understand this important work.

Finally, Gyles Iannone presents the objectives, findings, and implications of the *Socio-ecological Entanglement in Tropical Societies project* (SETS). Rather than being confined in one cultural area, the project analyzes the developments and characteristics of pre-industrial state formations in the monsoonal tropics, concentrating on nine geopolitical areas, whereof one (Belize) is in the Maya area and the rest are in tropical South and Southeast Asia. The differences between these two areas are great – but similarities are also striking. Besides distinct cultural developments and historical processes, shared environmental factors shaped both areas. Consequently, an extensive and long-term interdisciplinary project with a comparative focus is crucial for better understanding both areas. Furthermore, an important – and timely – objective of the project is to link the past with the present in order to understand issues regarding both the vulnerability and resilience of tropical zones around the world.

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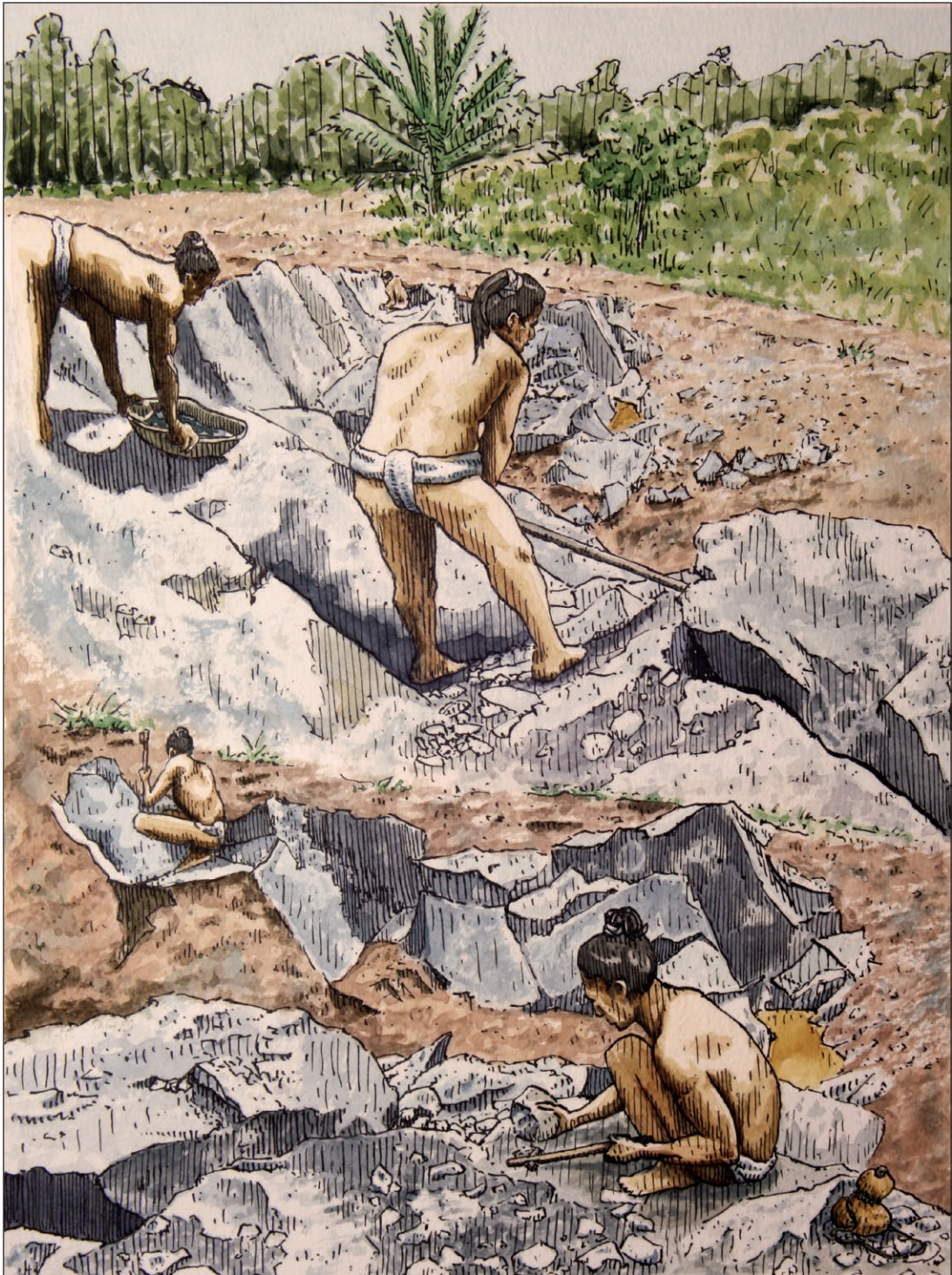
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Sedentism, Specialization, and Economic Activity among the Lowland Classic Period Maya

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Lithics are one of the most widely encountered archaeological materials in both mobile and sedentary societies. This paper addresses the ways in which lithics are impacted by sedentism and what that illustrates concerning their integration into broader economic systems. In many sedentary societies, including the Maya, both formal and informal lithic tools were produced. This dichotomy can be explained by the presence of specialized and non-specialized lithic producers. Drawing on examples from the upper Belize River valley, this paper focuses on three main topics: (1) the role of sedentism on tool form; (2) the role of specialization in tool production; and (3) the importance of exchange mechanisms because of specialization. In addition, this paper discusses lowland Maya lithic production in comparative perspectives to other sedentary societies which also have the specialized and non-specialized production of formal and informal tools. Using these comparisons, broad discussions of the impact of sedentism and specialization on lithic economies can be achieved.

Keywords: lithics, Maya, specialization, economies, sedentism



The role of sedentism and its impact on tool production is a topic of much archaeological discussion (e.g., Clark and Barton 2017; Horowitz and McCall 2019; McCall 2019; McCall and Horowitz 2014; McDonald 1991; Parry and Kelly 1987; Testler 1991). The impact of sedentism on tool production can be seen both in how tools are produced and the ways in which economic organization is used to mediate peoples' need to acquire tools. Here I address general considerations about the impact of sedentism on tool form as well as how sedentism impacts specialized tool production. Using examples from the Classic Period Maya lowlands, I discuss specialized production and its implications for economic exchange networks. Broadly, this discussion can be used in comparison with other sedentary societies to examine how sedentism impacts production and economic networks.



Although the impact of tool production on sedentary societies might be thought of as a specific topic of interest only to lithic specialists, it has implications for our understanding of broader economic frameworks. Specialization and specialized production, particularly of utilitarian goods, necessitates trade (Costin 2004). The necessity of exchange indicates that economic mechanisms must be used to obtain goods. The types of mechanisms used to obtain goods might also impact both tool form and the ways in which people make tools.

When discussing the impacts of sedentism on tool technology, a dichotomy is thought to have existed between tools in mobile and sedentary societies (Parry and Kelly 1987). As with many other classifications in anthropology, the distinction between mobile and sedentary societies is a spectrum, with degrees of mobility occurring (e.g. Binford 1980). However, the use of these terms can aid in discussions of the constraints that different levels of mobility may place on technologies. Scholars studying these issues have proposed that mobile societies focused on formal tool production: tools which are prepared in advance of use and require effort in their construction, such as bifaces (see Beck et al. 2002; Binford 1980; Kelly 1988; Parry and Kelly 1987). In contrast, sedentary societies are thought to have produced informal tool technologies: unstandardized tools that require minimal effort in construction (Andrefsky 2005; Nelson 1991). This difference was generally argued to relate to different organizational strategies based on differences in mobility (see Carr et al. 2012; Nelson 1991; Vaquero and Romagnoli 2018 for an overview of organization approaches). Mobile peoples prioritize minimizing the weight of materials they carry (see Beck et al. 2002), while in sedentary societies, this is not an issue. Instead, the emphasis on informal tools in sedentary societies has generally been seen as a result of the ability to stockpile raw materials, which reduces the need to conserve raw materials, and thus allows people to produce more informal tools (Parry and Kelly 1987). Some studies, in fact, used the formality and informality of tools as ways of examining levels of sedentism (i.e. McDonald 1991).

Recent studies (Testler 1991; McCall et al. 2019; Vaquero and Romagnoli 2018) have proposed alternative explanations for the focus on informal tools, including limited access to and small size of raw materials and a lack of regionally available raw material sources. That is, rather than the lack of need to conserve raw material, lack of access to raw material can also result in informal tools. In addition to access to raw material resources, raw material quality can also impact the production of different types of tools. High quality raw material is often utilized for formal tools, which may be

more difficult to knap into these forms than lower quality raw materials (Andrefsky 1994a,b). The trade and exchange of lithic materials can further complicate the relationship between sedentism and tool types, as materials are brought in from long distances (Stemp 2001; Stemp and Graham 2006). Thus, the discussion of the impacts of sedentism on tool technology requires more investigation and seems to be reacting to multiple issues (see Horowitz and McCall 2019). That is, rather than a result of a simple correlation with sedentism, tool form in sedentary societies is influenced by multiple constraints.

Perhaps most interesting is that despite the shifts between levels of mobility and formal and informal tool technologies, sedentary societies also rely on formal tools. In the Maya region, blades and bifaces are two of the most common lithic materials identified and their presence as formal tools leaves an avenue for the examination of the organizational principles which result in the presence of these tools (see Horowitz and McCall 2019 for an overview). In other sedentary societies, we see similar trends in the presence of formal tools and informal lithic production, and in some cases, metallurgy. Such tools include blades in the Near East and Mesoamerica and bifaces in many other areas (see Cobb 2000; Gaxiola and Clark 1989; Goodale et al. 2002; Hirth 2003, 2006; Hirth and Andrews 2002; Quintero and Wilke 1995).

The co-occurrence of formal and informal tools could be a result of different constraints operating in sedentary rather than in mobile societies. In sedentary societies, raw materials tend to be acquired from nearby locations (McCall and Horowitz 2014; McCall et al. 2019) or obtained via long distance trade routes, such as obsidian in Mesoamerica (see Gaxiola and Clark 1989; Hirth 2006; Hirth and Andrews 2002; Levine and Carballo 2014). This difference will influence the ways in which tools of those materials are made. Non-local raw materials have been associated with formal tools, particularly when locally available resources are in short supply or are of poor quality for knapping (Andrefsky 1994a). In the situation discussed here, however, raw material is locally available, abundant, and of varying quality, so the relationship between raw material quality, availability, and tool form will be more complex (see Andrefsky 1994a: Fig 2). Furthermore, requirements for tools used in agriculture differ from those in non-agricultural economies (see Whittaker, Kamp, and Yilmaz 2009). Many examples of formal tools in sedentary societies have agricultural uses (see Anderson et al. 2004; Kardulias 2008; Whittaker 2019; Whittaker et al. 2009; Yerkes 2000), thus the presence of these tools results from specific functional concerns. Among the Maya, formal tools, particularly bifaces, are used for a variety of functions including warfare/hunting (Aoyama 2009, 2011; Meissner 2017), ritual use (Kwoka et al. 2019), and quarrying, shaping blocks, and agricultural tasks (Clark and Woods 2014; Lewenstein 1987; Titmus and Woods 2003; Woods and Titmus 1996). Furthermore, as discussed below, specialists also might impact tool production mechanisms.

Specialization and Lithic Production

In both the Maya region and in other areas, formal tools are associated with the presence of specialized producers. Although specialization is a complicated term and one with much anthropological baggage, it is of use here as it allows a discussion of who is producing tools. Here I define specialization as the production of items in greater quantities than necessary for one's own

consumption (after Costin 1991:4), or production for items used exclusively outside the household/workshop context. The latter part of this definition may be particularly important in reference to items used in ritual activities, which may not be produced in large quantities. Further discussion of specialization and its ensuing debates are outside the scope of this paper.

Lithics provide a unique opportunity to examine specialization as lithic production is a reductive technology, and thus the remains of lithic production are (relatively) easy to identify. The reductive nature of lithic technology makes it easier to quantify the amount of materials which may have been produced in a region, allowing discussions of the production of materials beyond the need of a single individual.

In the lowland Maya region, lithic specialization is almost always associated with the site of Colha. Colha (Shafer and Hester 1983, 1991) illustrated site-level specialization, where the entire site was devoted to lithic production. This scale of lithic production is unprecedented in other areas of the Maya region, and Colha cannot serve as a model for this type of production. It is located in an area of particularly high-quality raw materials, not found in the surrounding region, thus allowing a producer-consumer exchange network to develop (King 2012; McAnany 1989). As site-level lithic specialization has not been identified elsewhere in the lowland Maya region, studies of lithic specialization should examine smaller-scale production areas.

Here I briefly present evidence for specialization among lithic producers in the Maya Lowlands, using evidence from the upper Belize River valley in western Belize. I focus on specialization in chert lithic materials, as although prismatic blades (of obsidian) are a common formal tool, the raw material for their production is only present in highland areas of Mesoamerica, and there is little evidence of their production in the upper Belize River valley. However, evidence from blade workshops close to obsidian sources indicates specialized blade production (see Braswell 2002; Parry 2001; Rice 1987). Instead, I focus here on evidence for specialized biface production, as this is something visible in western Belize. Multiple workshops exist in the valley including the Succotz Lithic Workshop (VandenBosch 1999), El Pilar (Whittaker et al. 2009) and others (Connell 2000; Hearth 2012; Sullivan et al. 2016). I will also briefly mention specialized production of informal lithic tools, which is less common, but an important component for understanding lithic production and exchange networks.

Bifaces are formal tools that are worked on two sides. Their production results in distinctive debitage which allows recognition of biface production areas. Bifaces are used for warfare and hunting (Aoyama 2009, 2011), ritual/ceremonial purposes (Aoyama 2009, 2011; Kwoka et al. 2019), and for a variety of utilitarian functions (Clark and Woods 2014; Horowitz et al. 2019; Lewenstein 1987; Titmus and Woods 2003).

Upper Belize River Valley and Lithic Production

The upper Belize River valley of western Belize is located in the eastern part of the Central Maya lowlands. The valley is defined by the Macal, Mopan, and Belize Rivers, and has been extensively investigated (see Chase and Garber 2004; Houk 2015 for an overview). Although occupation in the region spans a lengthy period, my discussion focuses on the Late to Terminal Classic period (AD 670-890; see LeCount et al. 2002), the period of major use of the workshops discussed.

Multiple chert sources exist in the region, indicating that raw material scarcity would not have



Figure 1. The Succotz lithic workshop debitage (photo by author).

been an issue for lithic producers nor for local residents. Within the valley, chert is found in *in situ* chert beds, as cobbles eroding out of the limestone bedrock, and in secondary alluvial deposits along floodplains and in the river (Horowitz 2017; VandenBosch 1999; Yaeger 2000). The raw material varies greatly in quality, with high- and low-quality materials found within a single cobble and within the same deposits (Horowitz 2017). The variable chert quality probably impacted the production aims of knappers when using different sources. In this discussion of specialized production areas, I first relate evidence for biface production specialization, followed by a discussion of the specialized production of non-formal tools, or at least of the early stages of their production.

The Succotz Lithic Workshop consists of quarry areas with adjacent workshops (VandenBosch 1999). The analysis of the debitage from these areas indicated biface production as the predominant activity (Figure 1). Excavations revealed densities of between 900,000 and 2 million flakes per cubic meter (VandenBosch 1999; VandenBosch et al. 2010), indicative of intensive production. Analyses of the lithic materials suggest an exclusive focus on formal tool production, with the goal of producing General Utility Bifaces (GUB's). The workshop is located within a household group, indicating the residents of this household group were lithic producers (VandenBosch 1999; VandenBosch et al. 2010). The density of debitage indicates that the occupants were specialized biface producers. They were probably not full-time specialists, but rather part-time specialists who also participated in other activities (see also Horowitz 2019).

Other investigations of biface workshops in western Belize include excavations at El Pilar



Figure 2. Visible surface of the El Pilar workshop area (photo by author)

(Whittaker et al. 2009). This example differs from Succotz, as it is in the site core of a major center, rather than in a household group. Evidence from the workshop again suggests almost exclusive biface production (Figure 2). A platform for lithic production and associated disposal area had evidence for GUB production as well as some evidence for thinned bifaces. The density estimates resemble those found at Colha, and Whittaker and colleagues (2009) suggest that between 66,000 and 250,000 axes could have been produced in the workshop. This is much greater than any household would require, thus indicating specialized production.

In addition to these two large workshops, some investigations of other biface production areas have been performed (Sullivan et al. 2016). The investigation of these workshops suggests that these rural biface production areas resemble those at the Succotz Lithic Workshop. Smaller scale workshops are also found at households around the upper Belize River valley, such as at Chan (Hearth 2012) and Chaa Creek (Connell 2000). These households produced chert bifaces in small quantities, but as only a single household in each community produced bifaces, these producers were specialized biface creators, only on a small scale intended for exchange within the broader community.

Biface production has also been identified in the Buenavista and Xunantunich marketplaces (Cap 2011, 2015, 2019). The debitage from the marketplaces shows that final stage finishing and retouching of lithics was performed in these locations (Cap 2011, 2015, 2019). The presence of

production debris in the marketplaces suggests that bifaces were distributed through markets, although they may also have been distributed through other mechanisms. The distribution of these materials through markets by the producers indicates close connections between producers and consumers (Yaeger 2010).

In addition to biface production specialization, we see some instances of specialized production of generalized tools, or the preparation of cores, such as at Callar Creek Quarry (Horowitz 2017, 2018, 2019). The quarry is an area for the extraction and production of generalized cores and blanks which were transported away from the quarry (Horowitz 2017; Figure 3). The adjacent households were involved in production activities, and were probably part-time lithic specialists, who were also involved in farming and other activities (Horowitz 2017, 2018, 2019). The density of materials suggests production beyond that which would be necessary for the households (Figure 4). The fact that this non-formal tool production area also has specialized production is interesting, as it indicates more variety in the types of activities that people were performing as lithic producers. The evidence from Callar Creek Quarry points to a diversity of production activities performed by knowledgeable lithic producers.

Non-specialized Production Activities

In contrast to the specialized production activities, the materials found in non-lithic producing



Figure 3. Quarrying activities at Callar Creek Quarry (photo by author)



Figure 4. Density of lithic production at Callar Creek Quarry (photo by author)

households are indicative of non-specialized production. Extensive excavations of households in the region (e.g. Connell 2000; Robin 1999; VandenBosch 1999; Yaeger 2000), illustrate that lithic debitage was present in most households. However, the production of materials within these households was generalized. Specifically, people engaged in the production and use of informal tools within households (Horowitz 2019). These informal tools include unmodified flakes, minimally retouched flakes, and other minimally altered flake tools. The presence of retouch on the edges of the flakes indicates their use as informal tools – the retouch was all macroscopically visible and distinguishable from post-depositional wear. The presence of lithic debitage in household contexts illustrates that non-specialists had the skills to make and use some tools, particularly flake tools including retouched flakes, drills, and scrapers. However, there is little evidence of biface production activity outside of the specialized biface areas. The lack of biface material, combined with the presence of biface finishing and retouching at the Buenavista and Xunantunich markets (Cap 2011, 2015, 2019), indicates that non-specialists did not make bifaces and other formal tools. Furthermore, Cap’s (2011, 2015, 2019) research in marketplaces highlighted that specialists were also repairing bifaces, as evidence by biface retouching flakes with polish on them. These data indicate that biface producers were also retouching bifaces to order, and suggest that householders were not repairing their bifaces. Thus, we have a similar dichotomy in western Belize to that seen in other sedentary societies, where specialists made specific types of tools and non-specialists made

more generalized tools used for a variety of functions.

Discussion

From this overview of lithic production in western Belize, we can draw the conclusion that in the lowland Maya region, specialists made mostly formal tools and non-specialist householders produced informal tools. This pattern indicates the presence of multiple production and exchange networks operating within the lithic economy.

From this dichotomy, we can draw comparisons with other regions to address the relative skill of the producers. While studies of the skill of specialist and non-specialist producers in the Maya area have not been performed, in studies of other sedentary societies Manclossi and Rosen (2019) propose that with increased specialization of tool producers, the skill level of non-specialized producers decreases. This pattern makes sense as non-specialists would no longer be performing the complex activities necessary to make more complicated tools, and thus would not possess those skills.

Another arena of interest to discussions of specialization, which is comparable across sedentary societies, is that given these specialized production systems for formal tools, there must be exchange systems in place; otherwise people would not be able to obtain the materials they require to perform daily tasks. In the upper Belize River valley, excavations at marketplaces (Cap 2015, 2019) indicate that at least some of this trade was conducted via market exchange, although other mechanisms of exchange could also have been utilized. In terms of the exchange of non-biface material, Cap's investigations illustrated only biface production in marketplaces. This does not indicate that other types of materials were not distributed through such means, only that they were not reduced in marketplaces. Other means of exchange could have also occurred, such as exchange with neighboring groups, gifting, and other activities. As such, multiple exchange mechanisms were probably operating for lithic raw materials.



For lithic producers, their engagement in lithic economies provides opportunities to accumulate wealth and to integrate within broader economic and political communities. Although craft producers are often associated with poor agricultural land and thus low economic status, this case study indicates that material wealth was gained through lithic production, or perhaps more likely, access to raw material sources. As craft specialists, lithic producers exchanged materials with other individuals which facilitated their integration in broader political communities. At Callar Creek Quarry, ceramics from the surrounding households point to connections with the neighboring political community of Buenavista (Horowitz 2017, 2019). These materials reflect the relationships between these communities and the economic wealth that was brought about through lithic production and exchanges.

Conclusions

In general, we can see several broad trends resulting from the impacts of sedentism on tool

technologies. One is that there are informal tools in sedentary societies, as proposed by Parry and Kelly (1987), but these informal tools are found in conjunction with formal tools produced by specialists. Alongside the increase in specialized production, non-specialists see a decrease in skill level, as they are not practicing the skills necessary to make these tool types (Manclossi and Rosen 2019). And, presumably, they spend less time working on lithic materials, which would also lead to a decrease in skill. Access to non-local formal tools, such as obsidian, may also impact these activities, due to variability in the reliance on different types of materials.

The presence of specialization implies that exchange networks were integral parts of daily life. The role of acquisition networks becomes vital to obtaining utilitarian tools, among other types of material. As such, these tools may have different constraints than tools that were made by non-specialists, as they must function when they were intended to function, as the non-specialists could not make their own. For example, colleagues and I (Horowitz et al. 2019) illustrated that some bifaces in the Maya area were purposefully thicker than we expect bifaces to be, which might result from functional requirements. These functional requirements probably resulted in part from the acquisition of the bifaces from specialists, as that would increase the requirement of the tools that they function when necessary, as users were not making their own tools. As most people were not producing or retouching bifaces (Cap 2015), they would have had limited options were a biface to break during use, particularly during important or time restricted activities. Thus, producers may have designed the tools with their reliability in mind, hence the tool thickness. This is just one example of the ways in which tool functionality can change due to sedentism and the reliance on specialized production, illustrating the connection between tool form and sedentism.

As discussed above, economic exchange has implications for our understandings of the wealth of producers. The use of various exchange mechanisms for the circulation of lithic materials indicates that materials are used as methods of economic integration (Horowitz 2019). Thus, we see that the role of specialists has important implications for our understanding of the ways that economies functioned and of the constraints on stone tool form.

Acknowledgements

Research at Callar Creek Quarry was conducted under the permit of the Mopan Valley Archaeological Project (MVAP) under the direction of Jason Yaeger and funded by National Geographic, the National Science Foundation, and the School of Liberal Arts at Tulane University. Testing of the Succotz Lithic Workshop was conducted under the permit of the Mopan Valley Preclassic Project (MVPP) directed by M. Kathryn Brown. Thanks to the Belize Institute of Archaeology for their support and permission for these projects. Thanks to the MVAP/MVPP staff and crew, Jason Yaeger, Kat Brown, and Bernadette Cap for their assistance and good spirits concerning all the lithics that resulted from these excavations. Thanks to Maxime Lamoureux St-Hilaire, Harri Kettunen, and James Stemp for their comments which improved the quality of the manuscript.

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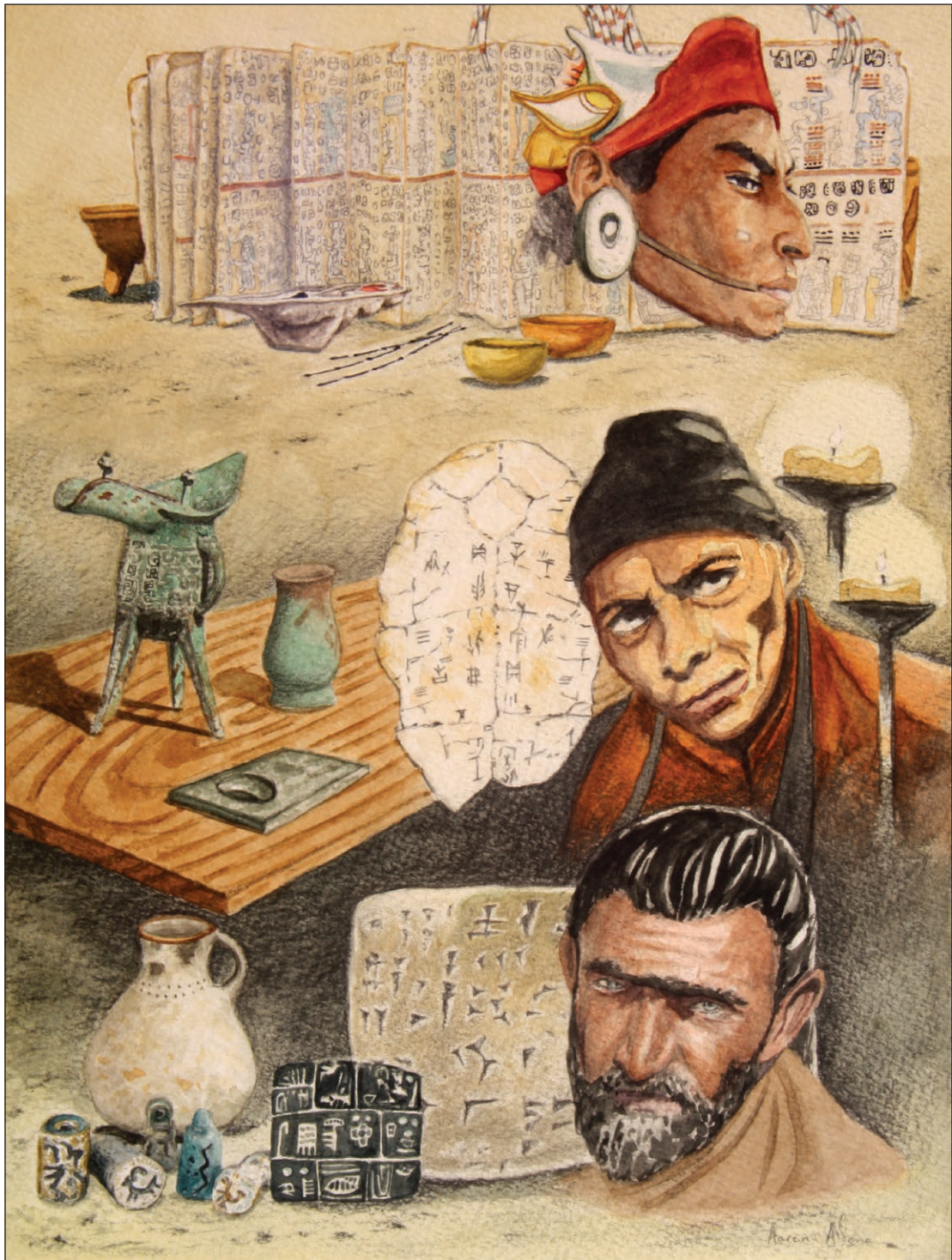
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Reading (Between) the Lines: Cultural Insight through Palaeographic Analysis

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Despite the central role of cross-cultural comparison in Knorozov's 1952 breakthrough decipherment, the approach fell out of favor in the ensuing decades of Mayan epigraphy. A burgeoning interest in palaeography stemming from Lacadena's work in the 1990's presents an excellent opportunity to reunite with other world areas. The inherent interdisciplinarity of palaeography is well attuned to Maya studies on the whole, as no subfield in this area is autonomous. This paper surveys palaeographic work on the ancient scripts of Sumer and China to illustrate how palaeographic analysis contributes to myriad fields from epigraphy and linguistics to archaeology and cultural anthropology. In both of these cases, palaeography has provided evidence for increasing social complexity and stratification, including the emergence of specialized scribal classes. Writing especially affected those societies' approaches to economic and legal administration. A thorough palaeographic analysis of Maya hieroglyphic script now rests on the success of decipherment and the construction of a text corpus. With new information from palaeographic sources, the canon of knowledge regarding ancient Maya culture could expand exponentially, especially as archaeological investigation continues to produce new texts to supplement the existing corpus.

Keywords: epigraphy, script development, palaeography, social stratification, cross-cultural comparison



Writing has been invented by at least three independent civilizations – ancient China, Sumer, and the Maya – in the past 5,000 years. Innumerable scripts representing innumerable languages have flourished throughout the millennia in both the Old World and the New; writing has been subject to virtually every whim of human creativity, from wooden styli in clay to endlessly manipulatable digital texts. Centuries of scholars have built careers on studying the various aspects of writing, including the topic at hand: the physical process of creating a text. As I will argue later, the materials, knowledge, and stylistic latitude of writers around the world may reveal even more about their originating cultures than their writing itself can.



This article begins with a brief discussion of theories of the development of writing, how these theories pertain to Maya writing, and how they relate to the fields of archaeology and linguistics. The discussion is followed by a closer examination of the methods and insights associated with palaeographic analysis of Sumerian and Chinese writing to accord with the cross-cultural theme of this issue. Finally, I connect the current state of Maya palaeographic analysis to corresponding stages in the analysis of Sumerian and Chinese, extrapolating from those comparisons to outline possible future directions of investigation.

Development

For decades, contention has surrounded the question of why humans developed writing systems – a seemingly simple concept which however warrants a clear definition. In contrast to iconography or pictography, which are explicitly bound to visual representation of subjects, writing must be linked to a particular language and cannot be fully understood outside the context of said language. This definition concurs with that of other epigraphic scholars (Justeson 1989; Justeson et al. 1985; Robinson 2007, 2009), although it is narrower in scope than the definition preferred by some Mesoamericanists (Boone and Mignolo 1994; Boone 2000). Additionally, writing systems display a level of developed abstraction that distances them from purely pictographic representation (with notable exceptions like full-figured Maya hieroglyphs; Robinson 2007). It should be noted that prominent twentieth century scholars including Gelb (1952:v) privilege the concept of symbolic “human intercommunication” without requisite linguistic value. Those hypotheses divert focus from the need for writing to be understood “without the intervention of the utterer” (Daniels 2018:132).

Where does writing begin?

Even when “writing” is limited in the ways described above, its foundations are disputed. Some scholars, such as Nissen and colleagues (1993), argue for an economic origin of Mesopotamian writing in which increasingly complex bookkeeping practices spurred the development of language-linked symbols from earlier pictography. “[T]he great majority of the 5,000 or so written documents from [the Late Uruk period] deal exclusively with administrative procedures,” they write, and “it is certainly no coincidence that not one of them is clearly related to religious, narrative,

or historical topics” (Nissen et al. 1993:21).

Another hypothesis that Nissen and colleagues (1993) acknowledge is based upon early “name tags,” short texts that contain no discernible numerical information nor any recognizable iconic representation. In theory, symbols representing sound emerge in this context in order to accurately write foreign names — that is, names with no inherent meaning in the language of the writer. This theory does not preclude earlier stages involving pictography, and in fact, one proposed developmental path begins with iconographic writing that is later used in a rebus capacity wherein the written sign refers only to a specific sound in the name of the original referent; an acrophonic hypothesis is similar, but requires the sign to represent the *first* sound of the referent (Cooper 2004; Mora-Marín 2003; Robertson 2004; Robinson 2007). Robertson (2004:26) provides a succinct description of the process that moves writing from pictography to phoneticism as scripts evolve: “the association [of a referent with a symbol] [becomes] habitual, no longer based on [visual] similarity.”

Reading culture in writing

The heart of my argument rests not so much in strict identification of what motivates writing as it does in considering the cultural implications of the origins and evolution of writing systems. Several authors (Algaze 2005; Law 2015; Nissen et al. 1993) consider the potential roles of writing in cultural change, particularly in contexts where the emergence of writing occurs concurrently with increasing social complexity. Crucially, the importance of writing is not lessened when this technology is borrowed rather than independently innovated. This strikes me as a particularly salient point when the Maya system is under discussion precisely because of our uncertainty concerning origins of Mesoamerican writing.

What does writing make possible when it is first introduced? The previous section mentioned several proposed motivations for the development of writing, including economic and administrative recordkeeping and individual name identification. Progression of writing systems beyond pictography, as Robertson (2004) suggests, allows for the recording of concepts without explicit visual form because written symbols no longer refer directly to an object, but to an abstract element of language (a syllable, morpheme, word, etc.). Once writing has reached this stage, no longer restricted to visually identifiable forms, it becomes possible to put virtually anything to text.

Even the earliest writing takes full advantage of this inherent flexibility. In Sumer, tablets preserve records of merchandise and palace inventories. In China, diviners wrote their prophecies on the very materials they used to read the future (Figure 1). In Mesoamerica, histories of gods and kings are inscribed in stone. Writing provides a unique opportunity to save grand narratives or banal minutiae for posterity, but the *who* and *how* of writing are just as important as the contents of a text.

Social organization and hierarchy are among the foundational investigations of anthropology (Trigger 2006). Where writing exists, it acts as a crucial avenue of insight into these topics. Access to literacy is, historically, controlled by the socially dominant; studying the classes of people who were literate reveals a great deal about social stratification, distributions of power, and the socio-political role of writing itself in any given group (Robinson 2007). It is also informative to study developmental trajectories in order to tease out the patterns of when, where, and how elements of



Figure 1. Inscribed ox scapula, ca. 1200 B.C. (photograph © Andrew West, licensed under CC BY-SA 2.0).

stylization and standardization occur (Robertson 2004; Bricker 2007; Robinson 2007). In these areas, correspondence with other areas of anthropological study becomes both more evident and more complex.

Palaeography across Disciplines

At this point, *palaeography* as a discipline must be differentiated from its scholarly relatives. Palaeography does not deal with the content of texts. In this sense it aligns more with archaeology and art history than with linguistics. However, palaeographic study holds significant implications

for all of these fields. Palaeography communicates closely with key aspects of archaeological and art historical study in that it is concerned with physical artifacts and technologies in addition to the abovementioned social dimensions (Houston 1989). Because of the inextricable link between writing and language, palaeography is necessarily connected to linguistic processes as well (Justeson 1989; Lounsbury 1989; Robinson 2007).

From an archaeological perspective, writing is a technology and a tool of social complexity (Houston 1989; Trigger 2006; Gu 2009; Law 2015). Texts hold a unique position within the artifactual canon. Unlike many of the materials that archaeologists interpret to learn about the past, writing has the ability to preserve the actual statements of ancient people, leaving a rare firsthand account of history. Beyond the words themselves, though, texts – especially in palaeographic view – provide clues to courses of social interaction and change.

The key factor in this branch of analysis is physical form. Not only does palaeography concern long-term development of writing as discussed in previous sections of this paper, but it also gives insight on synchronic variation within a society. Like other components of stratified society such as prestige language, architecture, and fashion, writing style exhibits a pattern of centrifugal diffusion (Algaze 2005; Houston and Martin 2016; Justeson et al. 1985; Lacadena 1995; Law 2015). Among the Maya, for instance, scholars favor the model of scribal workshops wherein specialists were trained in a particular style, often associated with a patron site; from those foci of creation emerged identifiable elements that moved farther afield according to sociopolitical influences (Houston et al. 2014). A similar workshop system in Sumer is evidenced by the composition of a scribe describing a trainee’s daily routine at the “tablet-house” (Figure 2; Kramer 1949; Robinson 2007). In these cases, because of the necessary structure of a centralized education, writing style must be a “top down” feature of material culture.

Where a writing system has been sufficiently deciphered, linguistic and palaeographic analysis

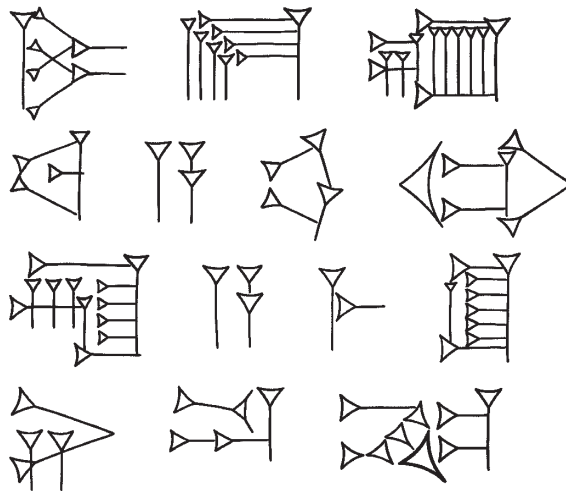


Figure 2. Excerpt from “tablet-house” cuneiform composition (drawing by author).

can inform one another as well. Recent investigations into the language of Maya hieroglyphs exemplifies this synthesis, where linguistic reconstruction, stylistic analysis, and distribution patterns of both language and visual style all contribute to hypotheses of the system's origins (Houston et al. 2000; Houston and Martin 2016; Law and Stuart 2017; Lounsbury 1989). Reliably dated writing also provides a check for historical reconstruction and a timeline, both relative and absolute, for the development of the language in question (Campbell 1988; Kaufman 1962, 2017; Lacadena 2005).

Although there is no comprehensive scholarly guide to palaeographic analysis, I observe three assumptions that underlie existing studies:

1. *The palaeographic record is incomplete.* Preservation of texts depends on myriad factors, both historical and modern, the vast majority of which are outside the control of modern scholars.
2. *Missing data could potentially be older than existing data, created on perishable material, or both.* The first part of this assumption is a practical consideration. Because of the tendency in many areas to build continuously on the same sites, the most ancient artifacts can be difficult if not impossible to recover. The second part of the assumption is related to the aforementioned preservation issue and is especially relevant for areas such as Mesoamerica where perishable materials are prone to complete disintegration.
3. *Even where it has been recovered, the very first evidence of writing may not be identified as such.* Regardless of the motivation for their invention, very few nascent writing systems emerge fully formed. Slow and irregular development of a system that is recognizable as writing makes the identification of the very beginning of that system virtually impossible. By the time modern scholars can confidently label a system as “writing,” it may have already undergone extensive change that cannot be reliably connected to later stages. Once again, this assumption connects to the others, taking account of the likelihood that older data are likely to be left out of the palaeographic record.

With these assumptions in mind, analysis begins with the straightforward collection of a corpus of individual signs, each associated with a linguistic value and date thanks to work in related disciplines. Organizing signs into a valid comparative framework forms a great bulk of palaeographic analysis. The criteria for organization may include linguistic value, creation date, location, medium, and diagnostic sign elements. Depending on the number of criteria being addressed and the number of texts involved, a palaeographic database can become staggeringly complex.

In contrast to the potential complexity of a palaeographic corpus, analysis itself can be relatively simple. A set of signs that have been aligned according to certain shared criteria present, through their other attributes, a broad view of stylistic development. As an example, consider Lacadena's (1995:133) “Evolución gráfica del signo T173.” Lacadena first gathers a variety of examples of the sign under consideration, T173, with associated dates and sites. He then demonstrates the diagnostic visual characteristics of T173 (a trilobe with two elements between lobes, surrounding a central component) and tracks stylistic variation of T173 signs, defining multiple “graphic types” for each diagnostic element. Finally, Lacadena proposes a timeline and geographic diffusion model for the sign's visual development (Figure 3).



Figure 3. T173 graphic variants (drawing by author, after Lacadena 1995).

Palaeography across Cultures

With the relevance and methods of palaeography now established, I now turn to palaeographic contexts with a broader foundation of decipherment and larger corpus of texts than the Maya world presently enjoys. I begin with an overview of Sumerian and Chinese writing, connecting their palaeographic study to cultural insights. Finally, I draw comparisons between the methods used in studying those writing systems and the ongoing work on Maya hieroglyphs with the aim of defining trajectories for future study in this field.

Sumer

Sumerian cuneiform, the world’s oldest known script, is ideal to begin a cross-cultural investigation of palaeographic analysis. The first evidence of the cuneiform system dates to ca. 3100 B.C., preserved in the clay used as writing medium (Nissen et al. 1993). In its early stages, cuneiform retains visual elements that connect its symbols to their original referents, but throughout development the signs display increasing abstraction as proposed by Robertson (2004) and illustrated in Table 1. Nissen and colleagues (1993:19), however, note that “within each of the identified script

	3100 BC	3000 BC	2400 BC	1000 BC
head				
water				
go/stand/bring				
mountains				

Table 1. Cuneiform signs at various stages of development.



Figure 4. Sumerian cylinder seal (photograph © Steve Harris, licensed under CC BY-SA 2.0).

phases [at Uruk] there were hardly any notable differences in the execution of the signs. In fact, the script of the earliest tablets revealed such a relatively great conformity that doubts were raised that they indeed represented the earliest form of literacy.”

If the earliest *evidence* of Sumerian writing is not in fact the earliest *writing*, there may be a significant amount of palaeographic development that remains invisible to modern scholars. Regardless, an incomplete record does not negate the importance of the information available from extant texts. That incompleteness itself suggests further insights into the cultural development of writing in Sumer, hypotheses which remain to be confirmed or rejected if additional evidence comes to light through ongoing archaeological work.

From the known record, a great deal can be hypothesized about the ancient Sumerian culture that gave rise to and sustained the cuneiform system. One of the most basic pieces of information available concerns the medium of writing. Cuneiform texts are produced by pressing a triangular stylus into clay tablets using a variety of strokes (Nissen et al. 1993:18–19). Experimental archaeology provides even more detail about the physical production of tablets through testing of clay formulations and techniques of stylus use (Algaze 2005). Archaeologically, it is possible to confirm relative quality of tablet materials; palaeographically, as mentioned above, the quality of writing and education are clear. A high level of conformity such as Nissen and colleagues (1993) note is typically an indicator of educational standards for the writing class, whether that class is populated by exclusively specialized scribes or by a broader segment of society. Given the thousands of tablets extant from Sumer, their stylistic conformity, and the formulaic nature of their contents, a system of scribal education is almost certain. That hypothesis is explicitly confirmed by the earlier illustrated “tablet-house” composition (Figure 2).

Aside from the existence of standardized training, what information does the palaeographic

record provide about the culture of ancient Sumer? The visual forms of some signs indicate the physical environment of the script's originators, particularly the broad categories of flora and fauna to which they were accustomed. Cylinder seals are an excellent example of that visual consistency. Where the seals display both writing and pictures, correspondence between pictorial elements becomes clearer (Figure 4).

Consideration of the creators of cuneiform returns this discussion to a previous point: a potential lacuna in the palaeographic record prior to the earliest extant evidence. The existence of such a gap is not ideal when analyzing long-term development of a script, but neither is it completely detrimental. Reconstructions (whether palaeographic, linguistic, or archaeological) are not predicated on the assumption that the record is complete, and therefore they are not entirely invalidated upon the mere appearance of additional evidence. Working from the foundational assumptions given previously and with knowledge of the extant palaeographic record, we can form several hypotheses about why extant cuneiform texts display such regularity. The first is that earlier texts may have shown significantly less standardization while the writing system underwent typical changes to better represent the language. The second is that extensive codification took place at some point prior to the beginning of the extant record, although this process may have occurred either before or in tandem with the creation of scribal schools.

China

The earliest evidence of writing in China occurs during the Xia dynasty, circa 2200 – 1600 B.C. Because of this timeline, it is unclear whether Chinese writing represents an independent innovation of the technology or cultural diffusion from Mesopotamia (Bagley 2004). Gu (2009:103) describes these earliest inscriptions made on tortoise shells and animal bones as being used primarily in a divinatory capacity, hence the name “oracle bones.” Interestingly, the inscriptions are made directly onto the materials that were used for divination; some even venture into historical record by providing verification of prophesied events (Gu 2009:108).

Although graphic symbols appear on some Neolithic pottery in China well before the advent of Xia oracle bone inscriptions, no writing-like symbol prior to the Xia period is confirmed as having linguistic value (Bottéro 2004; Gu 2009). The characteristics of “a complete system of the Chinese script” must include six particular criteria (Gu 2009:108): (1) hieroglyphics; (2) self-explanatory characters; (3) associative compounds; (4) phonetic loan characters; (5) pictophonetics; and (6) mutually explanatory or synonymous characters. All six of these are present in the oracle bone inscriptions, but there is no earlier evidence of a Chinese script that complies.

Approximately 4,500 distinct characters have been identified across more than 100,000 fragments, providing a broad base for palaeographic analysis. This sizable corpus of ancient texts allows for confirmation that the sign catalog is both diverse enough to sufficiently represent language and standardized enough to effectively serve a literate class (Bagley 2004). Because this corpus constitutes the earliest evidence of Chinese writing, however, these characteristics raise the same concerns about the completeness of the record that were discussed for the context of Sumerian cuneiform. Bagley (2004:222–225) explicitly addresses those concerns and speculates on the kinds

of texts that may have been lost.

The large number of distinct characters in early Chinese script immediately sets it apart from cuneiform as a writing system and signals a legitimate precursor to modern Chinese, which boasts more than 100,000 characters by some estimates (Gu 2009). The nature of the system itself tends toward inventiveness, much like the Maya hieroglyphic script, because of the visual versatility of sign combination. Despite such versatility, tracing the stylistic development of Chinese from oracle bone inscriptions through administrative texts in bronze and on paper to modern digitized forms is shockingly simple. The highly pictographic signs evident in early divinatory texts undergo abstraction and standardization as the technology spreads into more cultural domains. By the later Shang period, around 1000 B.C., a clearly codified script and identifiable scribal signatures indicate a comparable system of specialization to that of the Sumerians (Bagley 2004; Giele 2005; Nissen et al. 1993).

Such specialization, as Trigger (2006) discusses, is often correlated with greater social stratification. The leaders of both Sumer and China kept detailed administrative records that were managed by trained scribes, but Law (2015:162) makes the argument that “writing needs complex society more than complex societies need writing.” In essence, the very existence of writing — especially codified script and trained scribes — is itself an indicator of a society with some level of stratification and specialization.

The Maya Case

In certain respects, the Maya system itself is more closely comparable to Chinese than to Sumerian writing. The script displays an incredible flexibility of stylistic and linguistic expression that the cuneiform record lacks. On the other hand, visual similarity between Maya art and script recalls that of Sumer. Maya society does echo the structural organization relevant to writing in both Sumer and China. While we currently lack more than fragmentary archaeological evidence of ancient Maya scribal schools, the conformity in areal styles heavily implies centralized training, and Zender’s (2004) investigation of the priestly class may provide a comparable framework for reconstructing such a system (Houston 2000; Houston and Martin 2016; Lacadena et al. 2017).

Despite these immediate comparisons, the field of palaeography is a recent addition to the canon of Maya studies. Lacadena’s (1995) doctoral dissertation represents the first explicit foray into Maya palaeography a mere 25 years ago. Since then, the scholarly community has pursued multiple avenues of investigation on the topic. Corpus epigraphy, so named by Kettunen (2014:38), takes advantage of ongoing projects that since the late 1960’s have amassed significant databases of hieroglyphs: the Corpus of Maya Hieroglyphic Inscriptions at the Peabody Museum of Harvard University (Fash 2016); the Maya Hieroglyphic Database Project at the University of California–Davis (Macri 2017); Kettunen’s (2014) corpus; and the Textdatenbank und Wörterbuch des Klassischen Maya at the University of Bonn (Prager 2014). Thousands of hieroglyphs and millions of data points are available through these databases, which altogether build a significant foundation of raw data for continued study.

Improving access to a large corpus of data is vital to decipherment. The same complexity that makes palaeographic study of the hieroglyphs so compelling also hinders decipherment, but

ample materials increase the chances that scholars will identify textual relationships and expand our knowledge pool (Englehardt 2011; Houston et al. 2014; Lacadena 1995; Lacadena et al. 2017; Law 2015; Lounsbury 1989). Greater understanding of the languages underlying hieroglyphic inscriptions also eases remaining obstacles to decipherment wherein complex linguistic constructions may be recognized in the writing (Houston 2000; Houston et al. 2000; Law 2014:20; Law and Stuart 2017; Mora-Marín 2009; Wichmann 2004; Zender 2017). Even in the absence of a decipherment, however, the corpus supports the advancement of palaeography through analysis of traits such as scribal hand and of wider distributional patterns (Englehardt 2011; Giele 2005; Gronemeyer 2014; Lacadena 1995).



The basic methods of palaeography, being purely analytical and unbound from a specific cultural context, have already been and will continue to be applied to writing systems around the world. Previous scholarly examples from Sumer and China, among others beyond the scope of this article, laid the groundwork for cultural interpretation through palaeographic analysis. I am confident that continued attention to Maya script will be similarly fruitful in aiding interdisciplinary inquiry. Archaeological investigation and corpus building, both indispensable to the project of palaeography, also enable linguistic and cultural studies that contribute to a more complete picture of the Maya world: its structures, connections, and external influences.

In both the Old and New Worlds, the ultimate origin of writing remains in question. Evidence of Olmec, Zapotec, and Isthmian scripts predating that of the Maya — undeciphered but with apparent structural similarities — makes clear that the technology and perhaps the forms themselves were diffuse throughout central Mesoamerica, yet the precarity of material preservation complicates attempts to reconstruct a developmental trajectory across cultures. On this front, comparative corpus palaeography (to modify Kettunen’s expression) between multiple writing systems seems a logical course of action; as discussed above, however, the groundwork of corpus formation is complex and ongoing.

The success of Maya palaeography, like its Old World cousins in China and Sumer, rests on interdisciplinary coordination and scholarly willingness to adapt methodologies that have borne results elsewhere. In the spirit of cross-cultural comparison, let us use the common starting point of a script to trace the veins of change through these disparate civilizations.

Acknowledgments

My gratitude to Maxime Lamoureux St-Hilaire, Harri Kettunen, and Carlos Pallan for their invaluable comments; and to my family for their patient enthusiasm.

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Comparing Archaeological Cultures along the Northern and Southern Gulf Coasts of Mexico

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The Gulf Coast of Mexico unites two distinct culture-historical regions: the Southeastern United States and Mesoamerica. In the Southeast United States, precocious earthen and shell monument construction dates to as early as 4500 BC and precedes agriculture by millennia. In Mesoamerica, the first public architecture dates to the early-middle Formative period, at around 1500 BC, after the development of corn agriculture. Other than differences in agriculture, what else divides these two regions? What unites these two regions? Most notably, we conclude that complexity precedes in fits and starts along the northern Gulf Coast of Mexico, whereas once monument building begins along Gulf Coastal Mesoamerica, social and cultural development continues unabated. We hypothesize differences in these two regions may be tied to early developments in horticulture, maize cultivation, and a writing system in the southern Gulf region. We should not and do not intend to make general evolutionary comments using the comparative approach – rather, these two regions have unique histories and sequences of social and cultural development. This paper strives to abandon a culture-historical perspective and consider an “Archaeology of the Americas” united by the Gulf of Mexico and related regions.

Keywords: Archaic mounds, hunter-gatherer monumentality, cultural complexity, Mesoamerica, Southeast USA



Introduction

Maurice Merleau-Ponty once wrote that “the world is not an object such that I have in my possession the law of its making; it is the natural setting of, and the field for, all my thoughts and all my explicit perceptions” (2012 [1945]:xxiv). As Americanists who have worked in both the Southeastern United States and in Mesoamerica, our experiences in the field and visiting sites have set the stage for writing this comparative article. It is perhaps natural to seek to compare both the Northern and Southern Gulf Coasts, connected as they are by a shared body of water, and knowing that both ancient and modern watercrafts have made the journey between these two regions (White and Weinstein 2008:230). Experience links our work here – visits to La Venta bringing to mind the earthen mound complexes of Louisiana and Mississippi – yet, knowing that very little material culture exists to link these two places together (see White 2005), we strive to understand basic structural similarities and differences. Bearing this in mind, we consider two study areas, the Northern and Southern Gulf Coasts of Mexico, and social and cultural events revolving around monumentality and environment.

Along the northern Gulf Coast, itinerant and sedentary indigenous communities constructed monumental settlements and frequently returned to them, rebuilding and resettling over multiple



generations. In flat, marshy river deltas, the foothills of the Ouachita and Appalachian Mountains, along Florida’s St. Johns River Valley, and in the Mississippi River valley, the ancestors of Muskogean, Caddoan, and Siouan communities built monuments out of earth, sediment, and shell, along with seasonally occupied villages. Their stories about how the world was made described mythical and natural creatures diving into primordial waters, mining mud, and bringing it to the surface to build land (Judson 1914). It is this process that Native peoples of the northern Gulf recreated in building their earthen and shell mounds. Indigenous oral traditions from the Gulf Coast compare natural land-building processes to the actions of real

and mythological animals, in particular crawfish-as-earth divers (Erdoes and Ortiz 1984:105-107; Judson 1914). Early 20th century anthropologists recorded oral histories from coastal Louisiana indigenous communities that described a mythical creature called the Earth Diver, who in the form of a crawfish, descended into the waters, when the Earth was only water, to form the land they built their villages on (Judson 1914:5-7; Kidder 2012; Rodning and Mehta 2016). Given that many coastal communities and other Southeastern United States Native American societies share this oral tradition, it is likely rooted in prehistory and perhaps influenced native decision-making to live in these dynamic deltaic landscapes. Relationships to landscapes and landforms would necessarily have been informed by both oral histories and human-made landmarks, including earthen and shell mounds, a practice with deep antiquity in Louisiana and Florida, where the earliest earthen and shell monuments in North America can be found. For indigenous societies of the wet and water landscapes across the river valleys of the Southeastern United States, land formation and earthen construction was mythically, ritually, and ideologically important (J. Brown 1997; Blitz and Livingood 2004; Knight 1986; Sherwood and Kidder 2011).

Along the southern Gulf Coast, where maize had already existed for millennia, monumental stone sculpture such as the massive basalt heads carved by the Olmec, earthen pyramids, and ostentatious displays of wealth and power first begin at around 1500 BC, in contexts that were both

agricultural and heavily dependent on wetland resources (Arnold 2012:194). The earliest monument construction begins in the Valley of Oaxaca at San Jose Mogote and in the Olmec heartlands of Tabasco and Veracruz. Public buildings are first made at San Jose Mogote but truly monumental complexes appear at San Lorenzo and La Venta between 1400 and 1100 BC (Rosenswig 2016:182). Here, urbanism, monumental heads, and monumental construction coincide with the development of complex social organization, leadership, and ostentatious displays of wealth (Pool 2007). The myths of the Olmec are largely unknown, but Maya origin stories, as told in the Popul Vuh and the Dresden Codex, describe the many different births of humanity, finally arising from corn after a battle in the underworld by mythic hero twins Hunapu and Xbalanque (Christenson 2007). Unlike oral-historical societies of the Northern Gulf Coast, middle and late Formative period writing systems, however challenging to interpret (see Carrasco and Englehardt 2015), allow scholars to decipher and postulate the significance of specific concepts and ideas, like maize and thrones, during the Olmec Era (Pohl et al. 2002; Taube 1996). In contrast to the Northern Gulf Coast, we derive particular importance from the presence of early motifs depicting maize and the development of agriculture in Mesoamerica well before the development of monumentality. For the Olmec, the Formative culture of Mexico before the Maya, Mexica, and Toltecs (cf. Diehl and Coe 1996; Flannery and Marcus 2000), maize was part of a complex system of belief and ritual, and it created the integrating mechanisms by which complex social arrangements developed. Herein, Formative is meant to describe the development of an early and complex culture that, while certainly notable, did have contemporaries who were also engaged in similarly complex phenomena (like at San Jose Mogote or Paso de la Amada, for example; Clark 2004, Flannery and Marcus 2015). While it is possible that full-scale agriculture was not the norm among the Olmec, it was certainly important, and its domestication is attested in the region as early as 5300 BC (Pohl et al. 2007).

Indigenous peoples of the Southeastern United States and the Northern Gulf Coast spoke a variety of languages at the time of European contact; Muskogean languages were the most dominant, however, larger groupings including Siouan languages like Biloxi/Ofo, and isolates like Mabilian, Atakapa, Natchez, and Chitimacha (Hopkins n.d.; Scancarelli and Hardy 2005). Most interestingly, historical linguists have proposed, based on a comparison of 91 lexical sets from the Chitimacha language to words from Southern Gulf Coast languages (Proto-Totozoquean) that both Chitimacha and Mixe-Zoquean speakers shared a common ancestral language (Brown et al. 2014). What is most compelling is that speakers of both languages shared roots for words pertaining to maize agriculture, including terms related to maize, shelled and leached corn, lime, and cornfield (Brown et al. 2014:465). We find this particularly compelling because of the importance attributed to corn in Mesoamerica, especially as it was an important domesticate well before the rise of complex cities, towns, and monuments. Meanwhile, monumental towns along the Northern Gulf Coast were almost all exclusively built by hunting/gathering/foraging societies until about AD 1200. Nevertheless, corn did become a significant component of Mississippian diets after the rise of large-scale permanent settlements like Cahokia (Pauketat 2004). Some have even suggested that *nixtamalization*, how corn is cooked in lye, was also part of indigenous cultural foodways in the American Southeast (Briggs 2015). Brown and colleagues (2014) suggest that Chitimacha speakers and Totozoquean speakers shared an ancestral Mesoamerican homeland at some point at least 1200 to 1500 years ago – this would need to be demonstrated genetically or archaeologically, but their hypothesis does

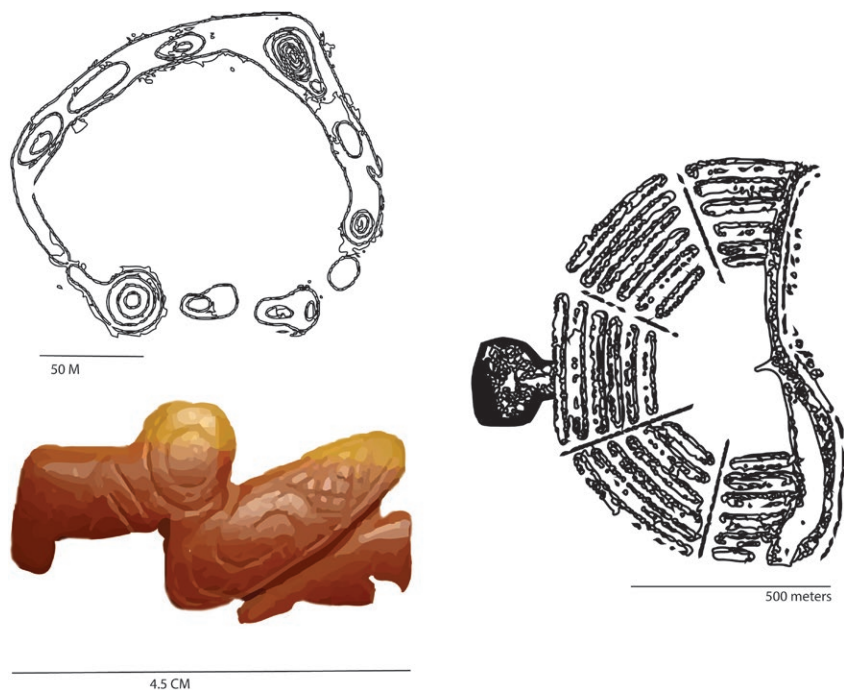


Figure 1. Monumental Architecture Along the Northern Gulf Coast of Mexico. Top left, Watson Brake. Bottom left, Poverty Point Culture Spoonbill bird effigy bead. Right, the UNESCO World Heritage Poverty Point site.

present some interesting linguistic similarities between two largely disparate and distant regions. This is not to fuel any pseudo-archaeological claims that the Maya or their ancestors/descendants founded Southeastern United States Mississippian mound building cultures. Instead, we aim to show basic similarities between regions and to posit why and how human societies seek solutions to fundamental environmental and cultural challenges.

Herein, we first review culture history along the Northern Gulf Coast, with particular attention to the Lower Mississippi Valley and the Mississippi River Delta, and then we review culture history along the Southern Gulf Coast, focusing on the Olmec heartlands. After this review, we present a synthesis describing commonalities and differences between the two regions, concluding with some thoughts on cross-cultural comparison and what novel data can be deciphered from the study of these two regions. Our experiences in these two regions, the phenomenology of travelling through ancient lands linked by a body of water, set the stage for this analysis and interpretation. Our experiences preclude our investigation; what is clear is that streams, floods, and bodies of water, as well as unique physical geographies, and oral traditions played a significant role in how indigenous communities interacted with their world. Recognizing the disparate histories and traditions of the northern and southern Gulf, we employ phenomenology and our experience of place as a tool to interpret similarities and differences between these two regions.

Northern Gulf Coast of Mexico

The earliest known monuments in North America were built by hunter-gatherers in coastal and central Louisiana and along the St. Johns in northeastern Florida – both regions were crucibles of complexity in North America and figure significantly in long-term histories of indigenous landscape modification (Figure 1 and Figure 2). In these wet and watery places, they constructed land out of earth and shell and created novel environments for biodiverse ecological communities. First, we review this history in Louisiana and then in northeastern Florida.

Louisiana

Nowhere is this more evident than at the recently categorized UNESCO World Heritage site of Poverty Point, located today in Epps, Louisiana (Gibson 2007; Greenlee 2015). The Poverty Point

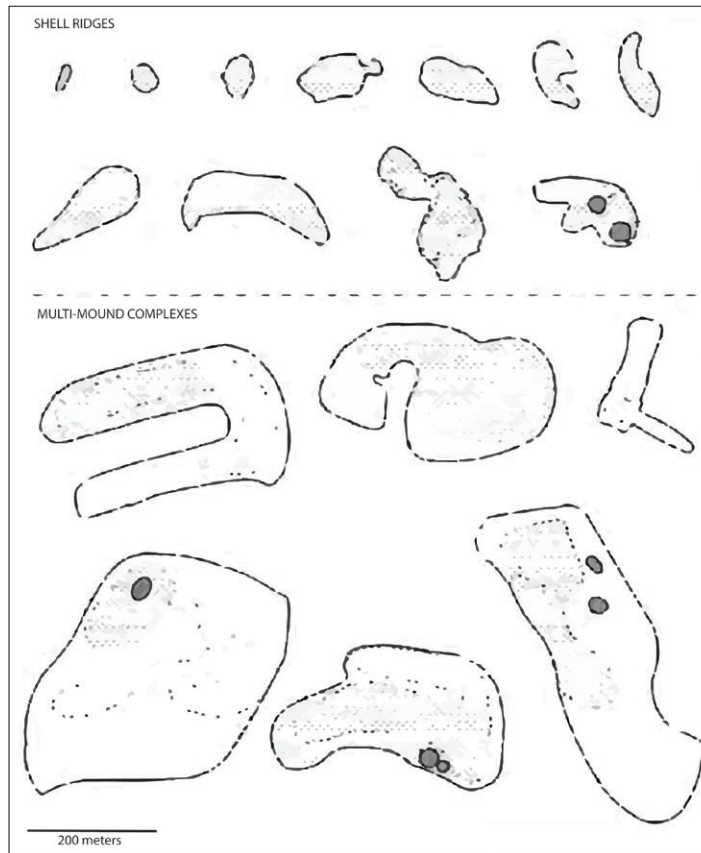


Figure 2. Morphology of Archaic Mounds in the St Johns River Valley (adapted from Randall 2013).

site, constructed between 1600 and 700 BC, has evidence of a large 30 m tall mound, several small mounds, and six arcuate-shaped rings that span 1.2 km. It is not the earliest monumental site in the region. That honor belongs to the Watson Brake site, a circular ring of earthen mounds dating to around 3500 BC (Saunders et al. 1994; Saunders et al. 2005), but Poverty Point is certainly one of the most impressive. Over a span of 5500 years, monument construction in the form of earthen and shell mounds remained a salient component of lifeways in the Lower Mississippi Valley and coastal Louisiana. By the time that agriculture and the monument building tradition gained prominence in the Central Mississippi Valley, ca. AD 1000, Coles Creek and Plaquemine cultures were still engaged in hunter-gatherer-fisher lifeways along the Gulf Coast and deltaic lobes of the Mississippi River (Rees 2010). Plaquemine cultures are most clearly identified by earthen mounds, grog-tempered ceramics, bone tools, and occasional stemmed lithic projectile points (Brain 1989; Kidder 1998; Neuman 1984; Rees 2010; Rees and Livingood 2007). Unlike Mississippian cultures to the north at Cahokia, to the east at Moundville, and elsewhere (Knight and Steponaitis 1998; Pauketat 2004), scholars suggest Plaquemine societies may not have exhibited strong social hierarchies and were largely independent and insular without extensive trading networks, and that by the beginning of the historic period, Mississippians and Plaquemine people had sufficiently mixed and hybridized (Rees 2010:190-192). In the most recently formed regions of the river delta, the Lafourche subdelta and the Plaquemines subdelta, the culture histories of Coles Creek, Plaquemine, and Mississippian societies is most relevant in this paper, as they flourished over the past two millennia (see Frazier 1967; McIntire 1958; Mehta and Chamberlain 2019; Törnqvist et al. 1996:1694).

Settlement pattern studies indicate that complex societies inhabited the Mississippi River Delta region for thousands of years (Gibson and Carr 2004; Kidder 1998; Rodning and Mehta 2016, 2019), and while scholars have focused on social hierarchies, site size relationships, ceramic chronologies, and cultural models of these coastal peoples (Davis 1984; Giardino 1984; Quimby 1951, 1957; Schilling 2004), few have directly emphasized the sustainability and resilience of indigenous lifeways in the region (see Rodning and Mehta 2016) and the moments in time when ecological tipping points were reached and settlement became unsustainable.

Let us consider the Chitimacha story published by Katharine Judson about how the world was made. Judson was a professor of history at the University of Washington and compiled several collections of Native American stories early in the 20th century. Her re-telling of the world building story as told to her by indigenous informants is as follows:

When the Earth was first made, the Creator of All Things placed it under water. The fish were first created. But when the Creator wanted to make men, there was no dry land. Therefore, Crawfish was sent down to bring up a little earth. He brought up mud in his claws. Immediately it spread out and the earth appeared above the waters. Then the Great Mystery made men. He made the Chitimachas... The mounds in the Chitimacha country are the camping places of the spirit sent down by the Creator to visit the Indians (Judson 1914:5-7).

Salient points from the Chitimacha creation story are numbered below:

- 1) Animals exist before humanity.
- 2) Water exists before humanity.
- 3) Land is made before humanity, from mud pulled out of primordial waters.
- 4) Only after land is made by a member of the animal world (earth diver), does the Great Mystery make humans (in the form of Chitimachas).
- 5) Land is made in the form of mounds, which are spiritual places (camping places of the Spirit).

Florida

One key point in the cosmogonic myth presented above is that wet conditions and water environments are key components to early monument building in the southeastern United States. The Chitimacha myth is simply a local version of a much more prevalent and significant Earth Diver mythology permeating the many nations and communities of the Southeast. Descendant communities like the Apalachee, Miccosukee, and Timucua shared stories about Earth Diver, and archaeologists have invoked elements of Native cosmology to hypothesize and explain how world renewal and construction was structured by both mythical and real animals at mound and monumental sites in northern Florida, the homeland of these descendant groups (Goodwin et al. 2019; Sassaman and Heckenberger 2004).

In northeastern Florida, and in particular along the St. Johns River valley, shell mound and shell ring building cultures constructed anthropogenic landscapes that date to as early as 5300 BC (Randall et al. 2014:25). Often referred to as Mount Taylor and/or Orange-period cultures, these societies extensively harvested riverine shell-fish, imported oceanic shell-fish, and mined older mounds and middens to reuse shell for newer construction efforts (Randall et al. 2014:21). At the Shell Mound site in Levy County, Florida, located along the Gulf Coast, archaeologists have hypothesized that ritual bird bone paraphernalia found in the mound constituted the remains of a ritual offering representing world renewal (Goodwin et al. 2019:14). This site is just one among many, most often found in wet and watery environment where water birds, shellfish, and crawfish can be found in abundance. Ken Sassaman and colleagues (2020) have proposed that monumental sites and ritual infrastructure is often constructed in places of ritual and cosmological significance, and we think this is a compelling point supported by the widespread use of, and commonalities in, Earth Diver mytho-praxis across the Southeastern United States (see Lankford 2011). In Florida, as in Louisiana, the building of earthen and shell monuments is a practice tied to wet and watery places by societies who did not practice agriculture.

Southern Gulf Coast of Mexico

The starting point for Formative complexity along the Southern Gulf Coast is the beginning of maize cultivation during the preceding Archaic period (Piperno and Smith 2012). Unlike the northern Gulf, cultivation and reliance on maize precedes village life and monumentality by thousands of years. In Mesoamerica, maize (along with squash, beans, and chili peppers) is domesticated first

at around 6700 BC in the Balsas River lowlands (Piperno et al. 2009; Piperno and Smith 2012:154), but monumental sites do not come online until ca. 1500 BC at San Jose Mogote in the Valley of Oaxaca and at San Lorenzo, La Venta, and Tres Zapotes (Pool 2012:173). These villages arise in alluvial, swampy floodplains near volcanic and mountainous ecosystems abutting gulf mangroves and marshes. While San Lorenzo is characterized by an enormous earthen platform, residential buildings, ceremonial complexes, and massive sculptural heads depicting leaders, the subsequently occupied site of La Venta has the first monumental earthen pyramid in Mesoamerica. Perhaps (and most likely) it is a coincidence that the pyramid at La Venta is 34 m tall, which is approximately the same height as the big earthen pyramid/mound at Poverty Point – yet one cannot help but wonder about some greater superorganic similarities between distant cultures. Novel and exciting discoveries by Takeshi Inomata and colleagues working in the southern Maya Lowlands have discovered contemporaneous monumental sites with La Venta, along with enormous earthen platforms almost as old as San Lorenzo (Inomata et al. 2018; Zorich 2019). Future publications will soon shed light on these issues, most importantly, the issue of Formative period monumental architecture and complexity in southern Mesoamerica world. Nevertheless, at this point we recognize La Venta for its characteristic features, including notable, spectacular, and ostentatious displays of wealth in the form of caches of jade celts, figurines, and hematite mirrors, as well as expansive mosaics of serpentine blocks that were purposely buried after they were made. Four monumental heads and seven basalt altars have also been found at La Venta, suggesting the importance of individual rulers, power, and leadership more broadly.

Tres Zapotes is the third and final major Olmec center and is located in an ecotone between the Tuxtla Mountains and swampy lowlands near the Papaloapan River Delta. Unlike processes of abandonment at La Venta and San Lorenzo, Tres Zapotes remained occupied past the Olmec decline, and was later occupied by post-Olmec cultures (Pool and Loughlin 2015). Two monumental heads were found at the site and they are smaller and less elaborate than the monumental heads at San Lorenzo. Recently, scholars have started to question direct relationships between agriculture and Olmec social and political development (Arnold 2012:193). As Chris Pool (2012) stipulated, societies with varying levels of commitment to agriculture first developed inequalities and hierarchical relationships along the southern Gulf through their own increasingly unequal social arrangements, that slowly became codified as competition for resources, land, and access to waterways became increasingly delimited (Cyphers 1996; Grove 1994; Pool 2012).

Since we considered indigenous mythology and world formation for the Northern Gulf, we also address it for the Southern Gulf. In this case, the colonial era document commonly known as the Popol Vuh is particularly relevant. Given that much of Mesoamerican textual history was destroyed as a consequence of the Spanish invasion, scholars have had to rely upon epigraphic and pictorial evidence from Mesoamerican societies to recover worldviews and belief systems. Yet, some of these stories survived over centuries and were recorded in the Popol Vuh, a sixteenth century colonial K'iche' document. The Popol Vuh is valuable here because it describes the world formation and the structuring of the cosmos, much like the oral histories from the Southeastern United States. A full retelling of the cosmogenesis section of the Popol Vuh is too long to recount here (Christenson 2007; Tedlock 1996) but salient points from the Popol Vuh creation story are enumerated below:

- 1) Animals exist before humanity.
- 2) Water exists before humanity and humanity is first made from mud and then wood.
- 3) Hero twins, Hunahpu and Xbalanque, undergo an epic quest, ultimately becoming the sun and moon.
- 4) Only after the world exists with both sun and moon are Men finally made from maize. Women are made second.
- 5) The primary goal is to reincarnate their Father, thus bringing maize cultivation to humankind.
- 6) There are four creation cycles.

Discussion and Conclusion

From early Boasian culture area approaches on the distributions of mythic forms (Boas 1916) to later structuralist and semiotic approaches (Barthes 2013 [1957]; Lévi-Strauss 1955; Turner 1995), anthropologists have identified ways in which myths have impacted societies across the world. Recently, scholars have identified the ways in which myths and oral histories embed ecological knowledge (Kimmerer 2013). Following Jeffrey Quilter's "Pre-Columbian world perspective" (2006:12), we first look to elements from published accounts of earth diver stories and the Popol Vuh to draw broad generalizations on monumental societies in both regions and then look to monumentality as a point of comparison.

Before comparing myths and oral histories, we first draw upon our own experiences visiting these sites and employ a phenomenological interpretation. It is fascinating how similar lowland portions of the Olmec coast are to coastal Louisiana and Florida, but perhaps all coastal regions bear some similarities. It was mainly in the grasses, insects, heat, and waterways where we found most of the shared experiences along the Gulf. One wonders, however fleeting interactions may have been, the ways in which communities across the Gulf recognized similar lowland environments. However, we also note, and with thanks to our reviewers for also recognizing this, that much of the American Southeast along the Gulf is fairly uniform and without significant topographic variation. While north-south running river valleys, like the Mississippi, Pearl, Mobile-Tensaw, and Chattahoochee, divide the Gulf-coastal plain, they do not create fundamental divisions and/or demarcations the way that mountains, valleys, and floodplains divide the southern Gulf coast. We therefore posit that major physiographic differences between lowland-highland environments along the southern Gulf must account for social and cultural differences in this region, as opposed to the northern Gulf, which has far more physiographic uniformity. Consequently, we must consider the unique effects of an individual society's relationship to water, floodplains, and mountains, and in particular, variations in local topography, environment, and hydrology.

We think it critically important that in stories from both sides of the Gulf, primordial waters and the animal world exist before humanity. This is particularly fascinating in light of Western canonical thought as codified in Genesis I, in which water is separated from the sky first, then



plants and animals are made, and only then is mankind created. An appealing inquiry might look at underlying structural elements of world generation myths the world over. In the Popol Vuh, the Hero Twins descend into the underworld, Xibalba, on an epic quest, ultimately leading to the structuring of the universe. The Chitimacha story, on the other hand, has crawfish, an unnamed world builder, diving into the underworld to find mud from which to create land with. Both also share a fascinating connection in that the world needs to be ordered first before humanity (men and women, in that order) can be made. Finally, we find it compelling that in the Popol Vuh, the successful making of humanity is one of maize, the fundamental Mesoamerican staple crop that was enshrined in importance in early Olmec, and in subsequent Maya writing and iconography.

In evaluating monumentality between these regions, we do not think it reasonable to compare volume, size, and scale due to differences in the raw materials from which monuments and public buildings were made. Most critically, both regions have unique histories and cultural trajectories that make comparison challenging. The thermodynamics and energetics of moving sediment is fairly different from mining, carving, and emplacing large megalithic stones (Trigger 1990). Instead, what stands out most distinctly along the northern Gulf Coast is that monument building precedes village life and agriculture. Along the Southern Gulf, complex social arrangements and monuments first develop millennia after village life and corn farming. Chronologically, Poverty Point and San Lorenzo develop within just a few centuries of one another, but their pathways to complexity are quite distinct. Once monumentality develops along the Southern Gulf, it continues unabated through the rise of Maya, Zoque, and related cultures, all supported by fairly intensive agricultural regimes. In the Southeastern United States, places like Watson Brake and Poverty Point rise and fall, followed by numerous other cultures like Tchefuncte, Orange, Mount Taylor, Coles Creek, Plaquemine, and Mississippian, but it is only the final and last cultural complex that begins to employ domesticated maize agriculture as a significant staple component of diet.

In summary, we do find some fascinatingly shared features between these two regions, most importantly shared fundamental traits on the mythological and cosmological ordering of the universe. Additionally, both regions are landscapes of abundance; low-lying swampy regions define both the Olmec and Mississippi River Delta region (see also Reilly 1994). Watery places and water underworlds are significant in the myth-praxis of both regions and perhaps this might be tied to some ancestral linkage, as Brown et al. (2014) suggest for a shared language history. However, there is far more physiographic delimitation and demarcation along the Southern Gulf. Certainly, the Northern Gulf is unique in that monumentality and complexity ebb and flow across time and how little these developments rely upon village life and/or agriculture. Conversely, once the Southern Gulf starts on the path of monumental complexity, this continues through the Maya period. Much of this development was likely catalyzed by innovations in maize cultivation and full-scale agriculture, although in abundant and fecund environments, agriculture can also catalyze the growth and development of non-domesticated edible plants (see Piperno et al. 2017). Finally, rulership and depictions of leadership seem to be the greatest dividing line between the Northern and Southern Gulf during what we call the Formative period. While monumental Olmec art make it abundantly clear that powerful individuals were critical to Olmec social organization, early monumental architecture in Mississippi and Louisiana seems to emerge, both figuratively and literally, out of the proverbial swamp (see also Kidder 2010; Knight 1986, 2006; Sassaman and Heckenberger 2004). With only

small figurative and abstract lapidary art and monumental architecture to guide us, leadership and power along the Northern Gulf are far more enigmatic than along the southern Gulf.

Acknowledgements

Maxime Lamoureux St-Hilaire deserves significant recognition here, for encouraging us to submit this work to *The Mayanist*, and for being an excellent colleague and friend. AFAR and their conference, Maya the Playa (an amazing venue to develop this paper), also deserve recognition. We also recognize the following, in no particular order: Marcello Canuto and the Middle American Research Institute, Tatsuya Murakami and Chris Rodning and Tulane University, Tanya Peres, Jessi Halligan, and Tom Leppard, Florida State University.

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Observations Based on Transillumination Photography of Diego de Landa's *Relación de las cosas de Yucatán*

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*The manuscript entitled *Relación de las cosas de Yucatán* is an oft-cited but under-investigated resource for Maya studies. This research report is the first in a series of several studies emerging from a research project carried out by the author at the Real Academia de la Historia in Madrid in 2019. Based on the use of transillumination photography, several details of the manuscript have surfaced for further analyses. This includes the appearance of 36 partial watermarks, various puncture holes on the folios, iron-gall ink corrosion, damaged sections of the manuscript, and defects in the paper used. The watermarks represent primarily variants of the so-called peregrino ('pilgrim') motif. As the peregrino watermark is typically a 16th century trait, a codicological study will help date the paper used in the manuscript and add to the overall discussion of the origins of the various sections of the multi-authored manuscript that sometime in the past became bound into a single volume under the name "Relacion de las cosas de Yucatan sacada de lo que escribió el padre fray Diego de Landa de la orden de St Francisco".*

Key words: Diego de Landa, epigraphy, paleography, transillumination photography, watermarks



Background

This research report is the first in a series of several studies emerging from an ongoing research project that documents and analyzes the manuscript titled *Relación de las cosas de Yucatán* (manuscript B-68, 9-27-2, 5153) located at the *Real Academia de la Historia* (Royal Academy of History) in Madrid, Spain. In June 2019 the author inspected the manuscript, of which he took high-resolution photographs with the help of María Josefa Iglesias Ponce de León



(Universidad Complutense de Madrid) and Óscar Torre González (*Real Academia de la Historia*). Part of these high-resolution photographs were the outcome of the use of nonintrusive transillumination techniques seeking to expose watermarks and other hidden features of this manuscript. The ultimate purpose of this research project is to better understand the dating as well as the physical details, preservation state, and overall context of the manuscript, including the dating of different handwriting styles, an analysis of the ink used, puncture holes, text in the margins, maps, and various details of Maya hieroglyphs on its pages.

The incentive for this project started during a visit at the *Real Academia de la Historia* on December 13, 2018 by the author and María Josefa Iglesias Ponce de León, and was initially discussed at the Academy with D. Miguel Ángel Ladero Quesada (*Académico Bibliotecario*) and later with the Head Librarian Doña Asunción Miralles de Imperial y Pasqual de Pobil over email, after submitting an official research proposal to the Academy. Upon examining the manuscript, the author noticed details (such as strikethrough text, different ink color, puncture holes, and various watermarks) that ought to be examined and documented. This research was necessary since these features are not apparent in the digital images (09-05153_c75_0001>0148) of the *Real Academia de la Historia*. Permission to study the manuscript was granted in the spring of 2019 and the first stage of the project (securing high-resolution photographs) was carried out on June 26-27 the same year. The basic codicological examination of the manuscript revealed the following features and this report focuses on the first three:

1) The manuscript has watermarks that were documented photographically using transillumination techniques. Furthermore, some of the watermarks extend into the binding of the manuscript, which warrant future research using additional techniques. The goal is to help date the paper of the manuscript and to compare the findings to the codicological study carried out by Matthew Restall and John Chuchiak (2002).

2) The manuscript has puncture holes on folio 45, as well as in the middle of many hieroglyphs written on the document. Using high-resolution transillumination photography, these puncture holes on the hieroglyphs (most likely made by a compass) were documented and analyzed to study their writing process. The puncture holes on folio 45, on the other hand, were made for another reason, which needs to be understood by examining the folio and the history of the manuscript itself.

3) Results include previously undocumented details on folio 45. These include pencil strokes, original lettering of hieroglyphs that were subsequently smudged, and eleven small holes on the rim or edge of the paper.

4) The manuscript contains distinct ink colors (with different glare) on different pages, and

even on the same page. By using digital photography with a macro lens and color chart (to calibrate the colors of the manuscript), these differences were documented for further analysis.

5) Several hieroglyphs written on the pages of the manuscript have lost some of their ink. These missing parts can be recovered digitally and by detailed documentation.

6) Various details on the pages of the manuscript have been faintly circled using a pencil. These details will be examined in order to know how, when, and why this occurred.

7) Folios 67–68 have cartographic information close to the binding of the manuscript that did not show in previous digital images. These include names of geographic locations in the Gulf of Mexico.

Description, Different Editions, and Previous Studies of the Manuscript

The *Relación* consists of 66 numbered folios, along with a title page folio and two folios of maps at the end of the opus. Besides these, the bound volume has five folios before the title page (whereof two contain bibliographic data) and five empty folios at the end of the manuscript, totaling 79 folios. Here, the term ‘folio’ is understood as a general term for a sheet or page in the manuscript – rather than a technical term of folio as a folded sheet of paper to produce two leaves; consequently, the term folio here ignores whether the leaf in question is physically joined with another leaf or not. The measurements of the pages are ca. 14.5x21.0 cm (the paper has been cut somewhat unevenly) and the manuscript has been bound in leather covers with marbled endpapers, both pointing to 18th century or early 19th century bookbinding. The marbling appears to be a so-called (Dutch) combed pattern, with a tradition extending from the 17th to 19th centuries. However, the traditional color scheme (red, green, blue, and yellow) seems to suggest an 18th century origin.

Since its (re)discovery by Charles Étienne Brasseur de Bourbourg in 1861 at the *Real Academia de la Historia* in Madrid, numerous versions, editions, and translations of the *Relación de las cosas de Yucatán* have been published. Most of these treat the manuscript as an abridgement of a now lost original work by Landa. This widespread belief was questioned by Matthew Restall and John Chuchiak in 2002, who pointed out (2002:663) that the existing

manuscript of the *Relación* that is the source for all editions and readings of it is an arbitrary collection by three or four compilers, probably made at different times but all after Landa’s death, of excerpts from what may have been either a larger multivolume work of Landa’s (possibly already “typeset” for publication) or a collection of writings by Landa that did not comprise anything we might grant the integrity of a book (the very definition of a recopilación).

Restall and Chuchiak (2002:664) also emphasize that “just as we can no longer be so certain that what we read in the *Relación* was all Landa had to say on a topic [...] so also can we no longer be certain that every word is Landa’s.” Regarding the different hands in the manuscript, Restall and Chuchiak (2002:661) observe that the *Relación* is the work of two principal compilers “with the assistance of an uncertain number of additional copyists and illustrators”. Furthermore, they (2002:655) note that “although [Brasseur de Bourbourg] recognized the different hands on the manuscript, he assumed that these were simply those of different copyists working from a more or less identical original, single, coherent work written by Landa”. On the other hand, Brasseur de

Bourbourg (1864: III, footnote 2) himself remarks that

[t]he Madrid manuscript on which we copied this document is not Landa's original, but a copy made about thirty years after his death, if we judge it by the writing. Judging by the title and certain sentences, it would be incomplete, and the copyist has unintentionally deleted the chapter titles that divided it, but left it with provincialisms and a spelling, barely intelligible, even for a Spaniard.

Le manuscrit de Madrid sur lequel nous avons copié ce document, n'est pas l'original de Landa, mais une copie faite trente ans environ après sa mort, si l'on en juge par l'écriture. A en juger par le titre et certaines phrases, il serait incomplet, et le copiste en a supprimé sans intention les titres de chapitres qui le divisaient, mais en y laissant des provincialismes et une orthographe, à peine intelligibles, même pour un Espagnol.

Consequently, it seems that Brasseur de Bourbourg is not so much to blame for the confusion as are the subsequent (20th century) editors, translators, and commentators of the *Relación*, as he does not explicitly state that a single volume titled “Relación de las cosas de Yucatán” was ever written by Landa (unless “*l'original de Landa*” can be interpreted as such).

In fact, we have to wait until William Gates' 1937 edition “Yucatan before and after the Conquest by Friar Diego de Landa with Other Related Documents, Maps and Illustrations” to learn that “[t]he original manuscript of Landa's Relation has long disappeared” and that “it must have been materially longer” and that “[t]he copy we have is a shortened transcript, although bearing what is quite surely the original date of the year it was written, 1566 [...]” (Gates 1937:xiv). The previous editions either do not discuss the discovery and background of the physical manuscript itself, or merely assume that there was an original manuscript written by Landa. These are Juan de Dios de Rada y Delgado's (1881) “Manuscrito de Diego de Landa tomado directamente del único ejemplar que se conoce y se conserva en la Academia de Historia” (the first complete edition of the *Relación*, except for the absence of the maps); an incomplete and unillustrated version of the manuscript appearing in the *Relaciones de Yucatán* (see Landa 1900); and Jean Genet's (1928-29) unfinished “Diego de Landa: Relation des choses du Yucatan”.

The growing interest in Mesoamerican archaeology during the interwar period saw the publication of four editions of the *Relación* within four years: the aforementioned edition by Gates (1937), José Rosado Escalante and Fávila Ontiveros' (1938) edition with full text but incomplete illustrations, Hector Pérez Martínez' (1938) first complete edition with illustrations and Alfred M. Tozzer's (1941) colossal English edition with 1154 footnotes. The Pérez Martínez 1938 version is meritorious but it uses the same set of drawings for the day signs throughout the calendar section of the manuscript, making it an unreliable source for epigraphic analysis. This oversight was subsequently replicated in the 1959 Garibay and the 1975 Pagden editions (Stuart 1988:31). Furthermore, in Pérez Martínez (1938) and Garibay (1959) the Landa “alphabet” has been reorganized – e.g., the sign in the margin representing <p> is erroneously placed between the two <u>'s. As Garibay's version is in its 12th edition, the volume and its shortcomings have become quite widespread.

Tozzer's (1941) edition, although notable in detailed commentary, lacks most of the calendrical illustrations. The translation is based on Charles Bowditch's translation of the French translation of the original Spanish text and corrected by Eleanor Adams and Tozzer himself, using the Rada y

Delgado edition and checked against the actual manuscript (Tozzer 1941:ix). In the introduction, Tozzer (1941:vii) states that “[t]he present copy of Landa is only a part of the original manuscript which is lost” – mirroring Gates’ 1937 assertion discussed above. Similarly, Garibay (1959:x) writes that “[e]ste es el tiempo en que Landa redacta su Relación” (i.e., 1560s) while Stuart (1988:23) notes that “the manuscript [...] is apparently an abstract derived from a longer original, the fate of which is unknown” and that “[u]ntil the original work of Bishop Diego de Landa comes to light – and all searches for it have so far been in vain – the manuscript in Madrid is *the* primary copy of our most important single source on Yucatecan Maya culture of the Early Colonial Period.” The idea of a “longer original manuscript” has persisted until very recently. However, as Restall and Chuchiak (2002:664) put it “even if the Relación is viewed not as a whole but as a source on specific and isolated topics, scholars cannot take for granted the authorship and dating of particular passages—let alone the reliability of published editions [...]” And as George Stuart (1988:27) emphasizes, “[n]one of the existing editions of Landa’s *Relación* fulfills *all* the needs of the scholar seeking the total context of the original manuscript.” Taking all this into account, a new improved edition of the Relación is long overdue. Restall et al. (in preparation) are working on a new translation and hopefully a new critical edition with high-resolution photographs, transliteration, transcription, and in-depth commentary will also appear in the near future. To quote the late George Stuart (1988:23), “[...] without the data set down by Landa, our progress in Maya (and Mesoamerican) studies would have been severely hampered. For this reason alone, the issue of accurate reproduction is critical to anyone using the text and illustrations of the anonymous abstract of the Landa work.”



Observations Based on Transillumination Photography

Watermarks

Little or no attention has been given to the watermarks in the *Relación* since its (re)discovery in the 1860s. While none of the early editions and commentaries discuss the issue, Pagden (1975:18) states explicitly that “there were no discernable watermarks.” Restall and Chuchiak (2002:661), however, mention that “[t]he only [type of paper] that carries a recognizably dated watermark is the paper used by the compiler we have called Hand 2 in Table I and is dated to the later colonial period, when the transcription and construction of this third part of the Relación was thus carried out.” Restall and Chuchiak’s (2002:661:Table I) “Hand 2” covers folios 50-59 and is dated to late 17th or 18th century. Interestingly (see below), the watermarks of most of the manuscript (including this section) seem to point to an earlier date in the late 16th century. This gap of one century between the proposed date of the paper and the style of handwriting is discussed further below.

The manuscript has 36 partial watermarks (Fig. 1, Table 1) on its folios, predominantly of the so-called *peregrino* (or *pilgrim*; Valls y Subirá 1965) and “hand with a flower” watermarks. All watermarks are partial, appearing close to (and partially concealed by) the manuscript’s binding, visible anywhere from as low as 4.4% to as much as 57.8% of the watermark’s height, with an average of



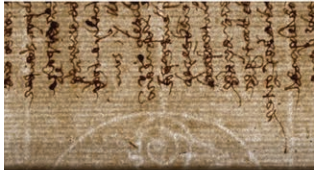
f-2r: flower with nine petals



f-1r: uppermost part of a peregrino (B1?) (part of the circle and top part of the hat)



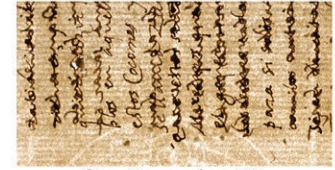
f2v: part of a circle with the pilgrim's feet; letter sequence ARA



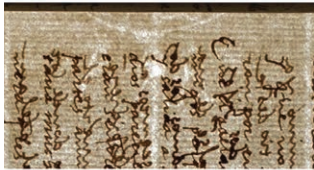
f3r: Peregrino B2 (head and hat)



f5r: Peregrino A (head, hat, and part of the staff)



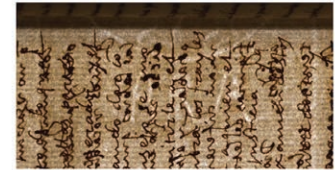
f7r: Peregrino B2 (head and hat)



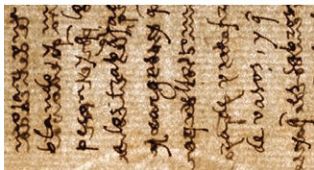
f10r: part of a circle with the pilgrim's feet; letter sequence ARA



f12v: letter sequence ARA



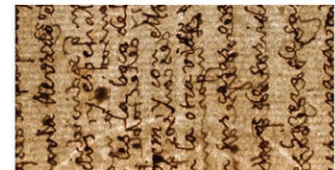
f14v: part of a circle with the pilgrim's feet; letter sequence ARA



f16r: peregrino (part of a circle)



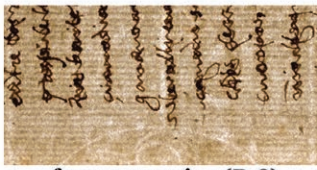
f18v: part of a circle with the pilgrim's feet; letter sequence ARA



f27r: peregrino (part of a circle)



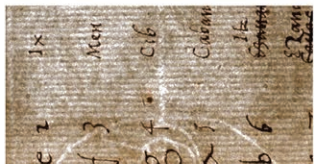
f30r: letter sequence ARA



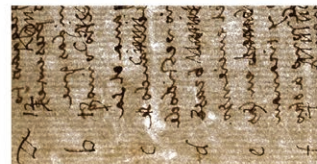
f32r: peregrino (B1?) (part of the head and hat)



f35v: part of a circle; letter sequence ARB



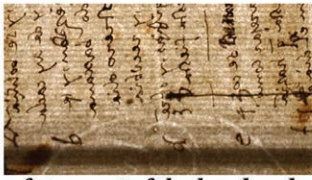
f36r: peregrino (B2?) (part of the head and hat)



f39r: uppermost part of a peregrino (part of the circle)



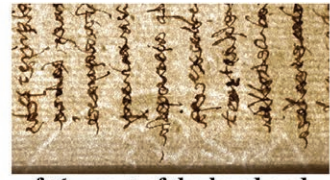
f41v: part of a circle with the pilgrim's feet; letter sequence ARB



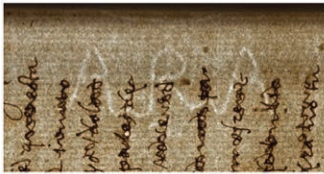
f42r: part of the head and hat of a peregrino (B2?)



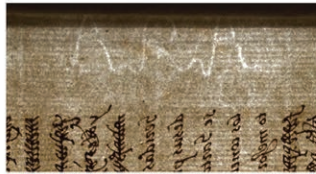
f45v: part of a circle with the pilgrim's feet; letter sequence ARB



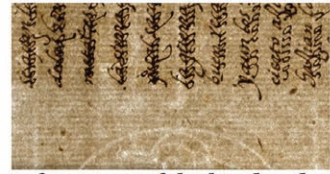
f46r: part of the head and hat of a peregrino (B1?)



f49v: bottom part of a circle; letter sequence ARA



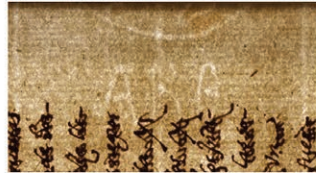
f51v: letter sequence ARA



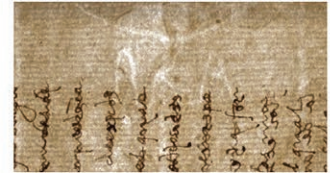
f52r: part of the head and hat of a peregrino (B3?)



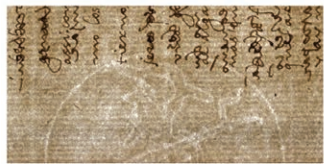
f53r: part of the head, hat, and staff of a peregrino (B3?)



f58v: part of a circle with the pilgrim's feet; letter sequence ARB?



f59r: part of a circle; letter sequence ARA



f60r: Peregrino A (torso, head, hat, beard, and part of the staff)



f62r: head and hat of Peregrino B2



f65v: part of a circle with the pilgrim's feet; letter sequence ARA



f67v: bottom part of a circle; letter sequence ARA



f68r: Peregrino A (torso, head, hat, beard, and the staff)



f69r: part of a circle with the pilgrim's cloak and feet; letter sequence ARA



f70v: Peregrino B2 (head, hat, beard, and part of the staff)



f71r: part of a hand (part of a hand-and-flower watermark)



f72r: flower with nine petals (part of a hand-and-flower watermark)

Folio:	Description:	Dimensions:	Position:	Chain lines:
-2r	Flower with nine petals	Flower Ø: 1.2cm	ca. 11.9cm	9
-1r	Uppermost part of the Peregrino B1(?) (part of the circle and top part of the hat)	Circle Ø: ca. 4.7cm	ca. 10.3cm	7
2v	Part of a circle with the pilgrim's feet; letter sequence ARA	ARA: width 2.4cm height 1.0cm; circle Ø: ca. 4.0cm	ca. 9.6cm	7
3r	Peregrino B2 (head and hat)	Circle Ø: ca. 4.5cm	ca. 9.5cm	7*
5r	Peregrino A (head, hat, and part of the staff)	Circle Ø: 4.5cm	ca. 9.6cm	7
7r	Peregrino B2 (head and hat)	Circle Ø: ca. 4.6cm	ca. 9.5cm	7
10r	Part of a circle with the pilgrim's feet; letter sequence ARA	Circle Ø: ca. 3.9cm	ca. 9.6cm	7
12v	Letter sequence ARA	ARA: width 3.4cm height 1.2cm	ca. 9.9cm	7
14v	Part of a circle with the pilgrim's feet; letter sequence ARA	Circle Ø: ca. 4.2cm; ARA: width 2.6cm, height 1.0cm	ca. 9.5cm	7
16r	Peregrino (part of a circle)	Circle Ø: ca. 4.9cm	ca. 9.5cm	7
18v	Part of a circle with the pilgrim's feet; letter sequence ARA	Circle Ø: ca. 4.2cm; ARA: width 2.3cm, height 1.0cm	ca. 9.8cm	7
27r	Peregrino (part of a circle)	Circle Ø: ca. 4.6cm	ca. 9.8cm	7
30r	Peregrino B2? (part of the head and hat)	Circle Ø: ca. 4.9cm	ca. 10.5cm	7
32r	Peregrino B1? (part of the head and hat)	Circle Ø: ca. 4.7cm	ca. 9.4cm	7
35v	Part of a circle; letter sequence ARB	Circle Ø: ca. 3.8cm; ARB: width 2.2cm, height 1.0cm	ca. 10.5cm	7
36r	Peregrino B2? (part of the head and hat)	Circle Ø: ca. 4.9cm	ca. 10.5cm	7
39r	Uppermost part of the peregrino (part of the circle)	Circle Ø: ca. 4.2cm	ca. 9.5cm	7*
41v	Part of a circle with the pilgrim's feet; letter sequence ARB	Circle Ø: ca. 4.4cm; ARB: width 2.2cm, height 1.1cm	ca. 10.5cm	8*
42r	Part of the head and hat of Peregrino B2(?)	Circle Ø: ca. 4.8cm	ca. 10.5cm	7
45v	Part of a circle with the pilgrim's feet; letter sequence ARB	Circle Ø: ca. 4.4cm; ARB: width 2.2cm, height 1.1cm	ca. 10.4cm	8*
46r	Part of the head and hat of Peregrino B1(?)	Circle Ø: ca. 4.7cm	ca. 10.4cm	8*
49v	Bottom part of a circle; letter sequence ARA	Circle Ø: ca. 4.6cm; ARA: width 3.5cm, height 1.2cm	ca. 10.5cm	8
51v	Letter sequence ARA	ARA: width 3.6cm, height 1.2cm	ca. 9.5cm	7
52r	Part of the head and hat of Peregrino B3(?)	Circle Ø: ca. 4.6cm	ca. 9.4cm	7*
53r	Part of the head, hat, and staff of Peregrino B3(?)	Circle Ø: ca. 4.8cm	ca. 10.2cm	7
58v	Part of a circle with the pilgrim's feet; letter sequence ARB?	Circle Ø: ca. 4.1cm; ARB: width 2.2cm, height 1.1cm	ca. 10.5cm	7
59v	Part of a circle; letter sequence ARA	Circle Ø: ca. 4.4cm; ARA: width 2.1cm, height 1.0cm	ca. 9.5cm	7
60r	Peregrino A (torso, head, hat, beard, and part of the staff)	Circle Ø: 4.7cm	ca. 9.3cm	7*
62r	Head and hat of Peregrino B2	Circle Ø: ca. 4.5cm	ca. 9.3cm	7*
65v	Part of a circle with the pilgrim's feet; letter sequence ARA	Circle Ø: ca. 4.1cm; ARA: width, 2.4cm height 1.0cm	ca. 9.5cm	7*
67v	Bottom part of a circle; letter sequence ARA	ARA: width 3.5cm, height 1.2cm	ca. 9.9cm	7
68r	Peregrino A (torso, head, hat, beard, and the staff)	Circle Ø: 4.5cm	ca. 9.9cm	8*
69r	Part of a circle with the pilgrim's cloak and feet; letter sequence ARA	Circle Ø: ca. 4.3cm; ARA: width 2.5cm, height 1.0cm	ca. 10.1cm	7
70v	Peregrino B2 (head, hat, beard, and part of the staff)	Circle Ø: ca. 4.5cm	ca. 10.1cm	7
71r	Part of a hand (part of a hand-and-flower watermark)	Part of a hand: width 1.7cm, partial (visible) height 2.0cm	ca. 12.1cm	9
72r	Flower with nine petals (part of a hand-and-flower watermark)	Flower Ø: 1.2cm	ca. 12.1cm	9

20.3% (a fifth of the watermark). Yet, by combining the various examples of the partial *peregrinos*, we can reconstruct even the small segments of the watermarks with relative certainty. The “hand with a flower” watermark is present only on the first of the three folios preceding the actual manuscript (two folios before its unnumbered title page [folio 0]) and on the last two unnumbered folios (if numbered, these would be folios 71 and 72) of the volume. The rest of the watermarks exhibit parts of the *peregrino* motif, as well as two sequences of three letters below the *peregrino*. The style of the motif is slightly different throughout the manuscript, and two distinctive pilgrim watermarks can be discerned on its pages, with the other one exhibiting minor variance. These watermarks are tentatively labeled here as *Peregrino A* and *Peregrino B1, B2, and B3*. The letter sequences below the pilgrim motifs are ARA and ARB. Typically, the *peregrino* watermark is a 16th century trait (Briquet 1923:415-416; Valls y Subirá 1965; Bernstein – *The Memory of Paper* 2019; *Corpus Chartarum Italicarum* n.d.) and the *peregrino* with ARA more specifically from the 1560's to the 1580's (Briquet 1923:415-416; Basanta Campos 1996: 490; Juan José Batalla Rosado, personal communication 2019).

Figure 1. Watermarks in *Relación de las cosas de Yucatán* (previous two pages).

Table 1. Watermark description, dimensions, position, and the number of chain lines per folio.

Position: the center of the watermark from the top of the page.

* Chain lines: folios 3, 62, 65, and 68 have a chain line close (0–2mm) to the top edge of the paper while folios 39, 41, 45, 46, 52, and 60 have it 0–5mm from the bottom of the paper.

A search for the *peregrino* watermark in relevant sources, including Briquet (1923), Valls y Subirá (1965), Basanta Campos (1996), as well as online watermark portals and databases (especially Bernstein – *The Memory of Paper* 2019 which has access to over 250,000 watermarks), yielded over 200 watermarks that are stylistically related to the *peregrino* we have in the *Relación*, and the earliest and latest pilgrims in the Bernstein database are dated 1399 (single mention) and 1639 (single mention). The earliest one (and most likely the latest example as well) is undoubtedly a misinterpretation, as the watermark belongs stylistically to the late 16th century assemblage. The rest of the pilgrims are dated between 1532 and 1610, and most of them between 1540 and 1590. The few early 17th century pilgrims are noticeably different from the 16th century ones. And, most importantly, the watermarks resembling the *peregrino* watermarks in the *Relación* all date between 1548 and 1589, with the closest matches being attributed (place of use and date) to the following locations: Alicante (1548, 1576-1578, 1589), Ayora (n.d.), Bocairent (1570), Orihuela (1559-1595?), Marseille (1561), Provence (1568, 1569), Milano (1570), and Genova (1583-1586).

The average diameter of the circles around the pilgrim watermarks in the *Relación* (29 examples) is around 4.5 cm. The approximate measurements of the partial circles around the *peregrino* watermarks were calculated using the $r = (y^2 + x^2) / 2x$ formula where r is the radius, y is length of the line between the two extreme points on the curve and x is the perpendicular distance from the midpoint to the curve (i.e., the middle ordinate). Compared to the stylistically corresponding *peregrinos* in the archival sources, the closest matches are attributed to Alicante 1548 (diameter 4.5 cm), Xàtiva 1565-1576 (diameter 4.4 cm), Bocairent n.d. (diameter 4.4 cm), Alicante 1548 (diameter 4.3 cm), Orihuela 1559-1595 (diameter 4.2 cm), and Tarragona 1589 (diameter 4.1 cm). In comparison, the average diameter of the circle around the Italian (Genoa, Milano, Pisa, and Messina) pilgrim watermarks is 32.7% (dating to 1554-1580) while the corresponding watermarks from Provence and Occitania (Béziers, Draguignan, Hyères, and Marseille) from 1554-1582 average 31.8%. The stylistic affinity and abundance of examples from (the Kingdom of) Valencia is not surprising, since (according to Valls y Subirá 1965) the origin of the pilgrim watermark is in neighboring Catalonia (contrary to Briquet's [1923:415] claim of Italian, Lombardian, or Genoese origin). The watermark appears in Barcelona and in the General Archive of the Crown of Aragon (Real Archivo de la Corona de Aragón), under "Generalitat de Catalunya" in the year 1500 (Valls y Subirá 1965:638), which is several decades before the pilgrim is found wandering outside of Catalonia.

Besides the different variants of the *peregrino* itself, the letter sequence ARA beneath the pilgrim (appearing 12 times in the *Relación*), shows three times in the aforementioned sources. The earliest example is from Alicante (1548) and the latest from Genova (1583/1586). The middle one (1567 [see Basanta Campos 1996:490]) from Galicia is quite close to the mean date (1574) of all the dated and provenienced *peregrinos* in the consulted sources (see Fig. 2). More research is needed to break the code and to pinpoint the source of this papermaker (or paper mill) indicator, and its companion ARB that appears four times in the *Relación* (after the middle section of the manuscript, between folios 35 and 58). The "hand with a flower" watermark appears on the empty folios at the beginning and end of the manuscript. The paper with this watermark has nine chain lines, so the paper mold (screen) that was used for making the paper is different from the rest of the manuscript (which has seven chain lines). The "hand with a flower" is a common watermark (over 5,000 examples in the Bernstein database) that was popular especially from the 1480's to the

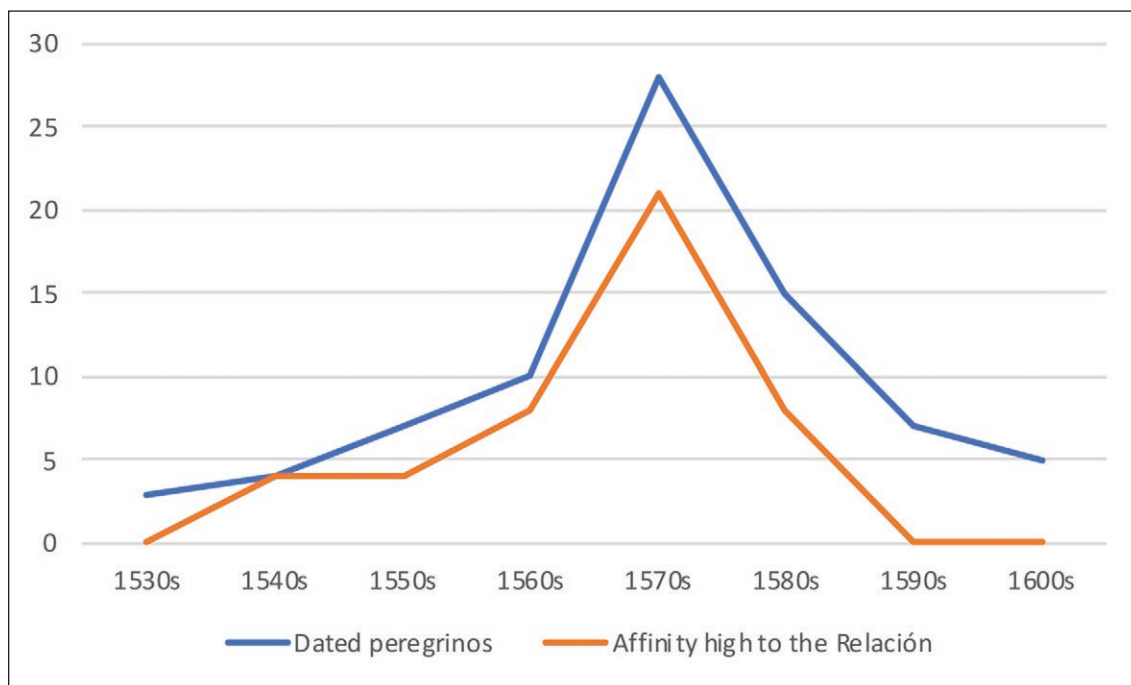


Figure 2. The frequency of the *peregrino* watermarks that are stylistically related to the corresponding watermarks in the *Relación*.

1530's. However, the closest parallels to the “hand with a flower” watermarks in the *Relación* are later, dating to between 1561 and 1591, and when the “place of use” is indicated, they are attributed to Madrid and Toledo.

Regarding the time difference between these watermarks (i.e., the manufacturing date of the paper used in the *Relación*) and the time of composing the extant manuscript at the *Real Academia de la Historia* in Madrid, there appears to be a conundrum in the research literature. Obviously, the manufacturing date of the paper precedes that of the text but for how many years or decades? As Restall and Chuchiak (2002:654-655, 661) date the various handwritings (and one watermark) that appear on the manuscript to the 17th and 18th centuries, there seems to be a considerable distance or discrepancy between the dates. Restall and Chuchiak (2002:654) note that the *earliest* handwriting in the manuscript dates to the late 17th century. If the watermarks are from the late 16th century, there is a lengthy gap between the manufacturing date of the paper and the creation of the *Relación*. Yet, according to John Chuchiak (personal communication 2019), most of the paper used in this era was probably no older than a decade or so. Consequently, it is apparent that at least the earliest sections of the manuscript were written during the last quarter of the 16th century – rather than in the 17th century (or later). On the other hand, Matthew Restall (personal communication 2020) has pointed out that the royal or governmental officials probably had loads of paper, and stacks might easily have ended up being stock-piled. The manuscript itself provides the date MDLXVI or 1566 (folio 1 recto) which probably refers to the first section of one of the original manuscripts by various authors that were later bound together under the name “*Relacion de las cosas de Yucatan*”

sacada de lo que escribió el padre fray Diego de Landa de la orden de St Francisco". According to John Chuchiak (personal communication 2019), between 1568 and 1573 Landa served as Guardian of the Castilian Convent of San Antonio de la Cabrera – where he in all likelihood wrote a major part of the manuscript later appearing in the *Relación*. Based on the watermarks, this is also the time period when the paper used in the *Relación* was manufactured. This earliest section of the partial copy of one of the original texts (i.e., the earliest section of the “*Relación*”) would then have been written not too long after the original text.

The solution to the discrepancy between the dates is quite straightforward: (1) the observation in Restall and Chuchiak (2002:654-655, 661) of the earliest handwriting in the manuscript dating to the late 17th century was a mistake, and should have instead read *late 16th century* (John Chuchiak, personal communication 2020); and (2) folios 50-58 with later (latter part of the 17th century) handwriting (*Italica Bastardilla*) and contents (not by Landa) were added later to the *empty pages* of the (bound) manuscript, as it was a common practice to leave a number of blank pages for further notes to be compiled later (John Chuchiak, personal communication 2020). As the paper used in the whole manuscript dates to the same time period (1575 ± 10 years) throughout, this is the most logical explanation.

The watermarks in the manuscript are listed on p.59-60 of this report (Fig. 1; note that the recto/verso [r/v] designation refers to the side of the folio where the watermark appears the way it was designed. Folios numbered here as -2 and -1 correspond to the two folios before the title page [folio o] of the manuscript. There are six folios in the manuscript before the folio marked as “1”. In the manuscript, the numbering starts with #1 and continues until folio 66, after which there are two folios with maps and five empty folios at the end of the manuscript. Consequently, the manuscript has altogether 66 numbered folios with six unnumbered folios [including seven empty pages] at the beginning of the [bound] manuscript and seven folios [with nine empty pages] at the end of the manuscript, totaling 156 [visible] pages).

Other Features

Besides watermarks, transillumination photography has revealed details of deterioration in the manuscript that would otherwise be difficult to detect (see Fig. 3). The following concentrates on the damaged areas of the manuscript, including iron-gall ink corrosion and paper defects. Furthermore, the manuscript has various minor stains and expected wear due to its old age.

Folio 28r (see Fig. 4) has numerous sections of ink corrosion within the *tzolk'in* calendrical signs, mostly on the recto side: **KAN** (horizontal inner stroke and rightmost part of the circle), **CHICCHAN** (lower section and right side of the circle), **MULUC** (left side of the circle), **BEN** (right side of the circle), **IX** (upper right side of the circle, leftmost [feline] spot, and the horizontal line), **CIB** (part of the inner half circle), and **CABAN** (uppermost part of the circle and part of the thicker inner design), as well as **IX** (part of the horizontal line) on the verso side of the folio.

Folio 35 (see Fig. 5) has a damaged area in the central lower section of the page, as well as ink damage on the following signs on f35v (“f” here and below refers to “folio”): **CAUAC** (bottom part of the circle), **AHAU** (upper part of the circle and central section), and **IMIX** <ymix> (upper part). Furthermore, the following signs have compass holes punctured through the paper: **LAMAT**, **MULUK**, **OK**, **CHUWEN**, **EB**, and **IX**. Besides, **IX** and **KABAN** seem to have an unintended



Figure 4. Folio 28 recto.

possible compass hole where the paper was initially punctured at the wrong spot.

On folio 36, the following signs have compass holes punctured through the paper: **EB, BEN, IX, KIB, KABAN, ETZNAB, KAWAK, IMIX** (f36 recto), and **MANIK, MULUC, OC, CHUEN, EB, BEN, IX, MEN, CIB, CABAN, and CAUAC** (f36v). Furthermore, **CIB** has an additional puncture hole. Folio 37 has fewer puncture holes through the paper and some *tzolk'in* signs lack observable compass markings altogether. On **MEN, KIB, and ETZNAB** have a hole in the center whereas on f37r only **MEN** has one. Folio 38 has a brown stain on the upper part of the folio and a damaged part on the lower section (Fig. 6). The damaged part does not show any vertical stripes (made by a wire mesh during the paper-making process), so it seems this part was first damaged and then repaired later. The folio has faint possible compass needle point impressions on the recto side on **EB, IMIX, AKBAL, and KAN** and stronger impressions or puncture holes on **MEN and CAUAC**, while on the verso side all signs have minor probable compass needle point impressions, except for **MEN, CIB, CABAN, and ETZNAB** that have more detectible holes and **CHICCHAN** that is not rendered as a round sign.

Folio 39 also has a brown stain on its upper part while its center has some wear. On f39v **CHICCHAN** has been written in a wrong place and subsequently crossed over. It is probable that the large amount of (iron gall) ink has caused a small section of the paper to be worn off. Most of the *tzolk'in* signs on f39 have relatively strong compass puncture holes. Especially in the folio's middle section (f39r: **KAN, MANIK, LAMAT, and MULUC**; f39v: **IK, AKBAL, KAN, MANIK, and OC**). Folio 40 (Fig. 7) also shows a stain on the upper part of the page while its center has a damaged part right where the month sign **TZOZ** is located, having removed part of the sign. Furthermore,

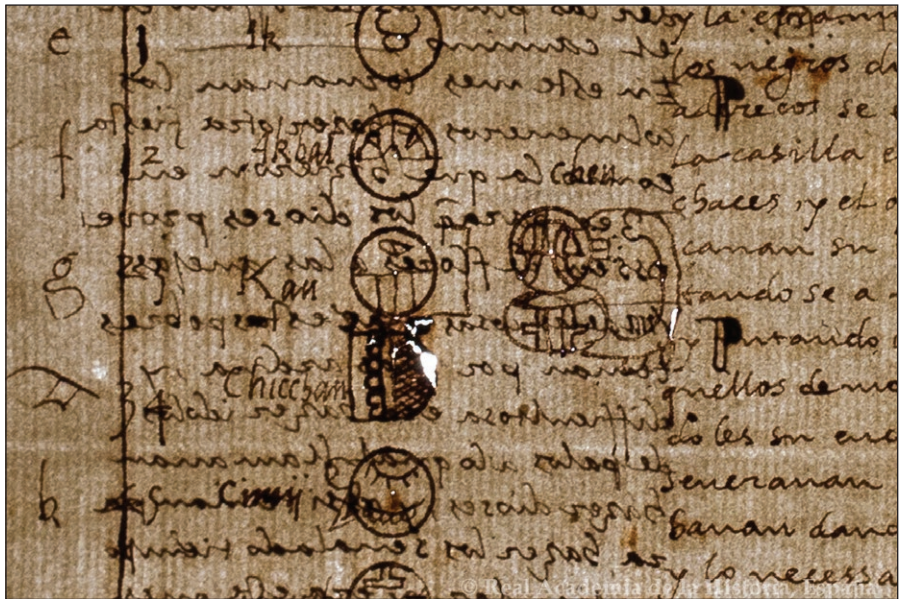


Figure 8. Folio 43 verso.



Figure 9. Folio 44 recto.

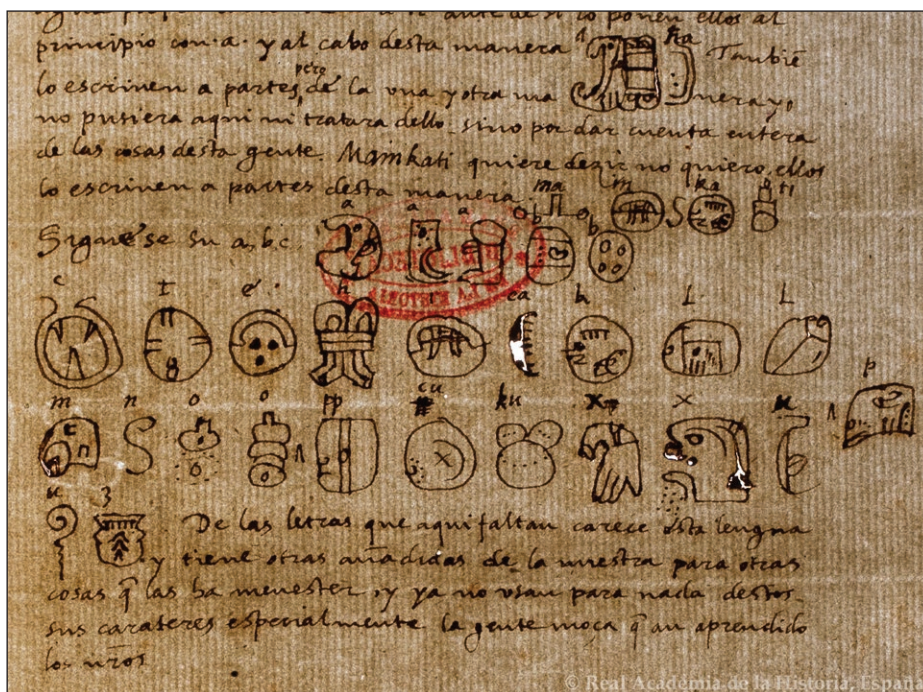


Figure 10. Folio 45 recto.

the ink on **ZIP** (f40r) has worn off part of the two circles of the sign. Compass puncture holes are clearly visible on **AHAU** through **KAN** (f40r) and **AKBAL** through **IK** (f40v).

The brown stain continues on the upper part of folio 41. Compass marks are rather indistinct and only **ETZNAB**, **AHAU**, and **IMIX**, as well as the month sign **TZEC**, on f41r and **CHUEN**, **EB**, **IX**, and **ETZNAB** on f41v have clear puncture holes. Furthermore, ink has damaged the blackened area of **IMIX** and the month sign **TZEC** has a slight erosion on the right side of the inner circle on f41r. Otherwise the folio is in good condition. The brown stain continues on the upper part of folio 42 which also has three other smaller stains. The *tzolk'in* signs have faint compass imprints, with **LAMAT** and **OC** on f42v being the most noticeable. Furthermore, a small part (4 mm) of the bottom edge of the paper has been torn off.

The brown stain continues faintly on the upper part of folio 43, along with three other smaller stains. The ink on **BEN** on f43r and on the month sign **CHEN** shows some erosion while **CHICCHAN** on f43v has suffered from considerable damage caused by the ink (Fig. 8). Compass impressions are rather faint throughout. Likewise, the brown stain continues indistinctly on the upper part of folio 44, along with three small (4 mm) round defects on the paper. In addition, a small part (4 mm) of the bottom edge of the paper has been torn off. The cross on top of the *k'atun* wheel has suffered from considerable ink erosion and the initial capital letter Q on the first line below the *k'atun* wheel also suffers from moderate erosion (see Fig. 9). There are two small compass needle point impressions in the middle of the wheel, one 2 mm above and the other one 2 mm to the right of the center of the outer circle.

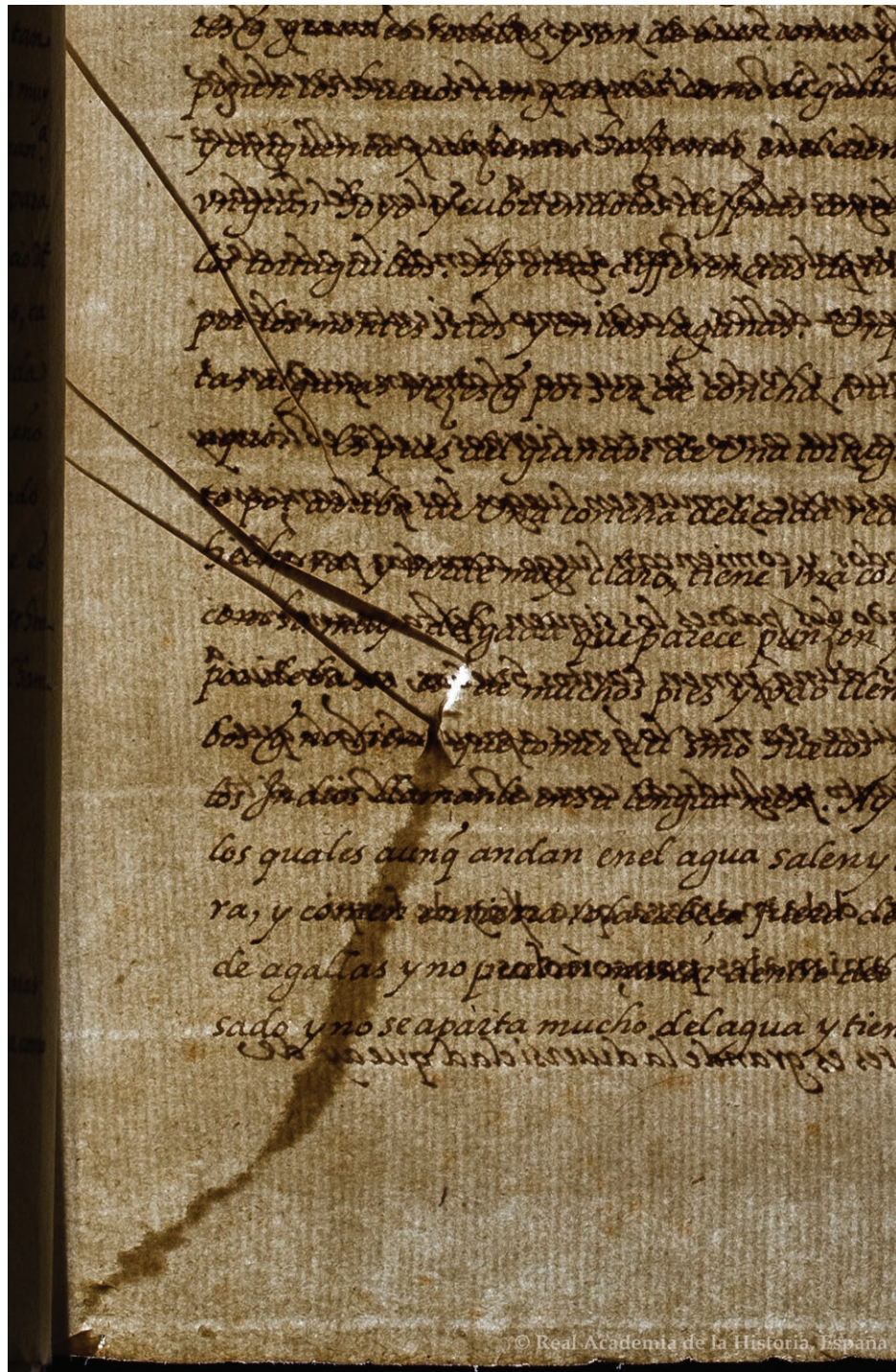


Figure 11. Folio 55 recto.

The brown stain continues faintly on the upper part of folio 45. Unlike all the other folios of the manuscript, f45 has altogether 17 small puncture holes or impressions close to the edge of the paper, whereof 11 are clearly through the paper. It looks as if the folio was sometime held in place with a pointy object – possibly for securing a copy of f45r that presents the so-called “Landa Alphabet”. Parts of the hieroglyphs (see Fig. 10) written on this page suffer from modest-to-considerable erosion. The right side of the syllabogram **che** (in **a-che-ha**), the inner part of Landa’s second <l> and the lower left side of syllabogram **me** (Landa’s <m>) all show marginal or moderate wear, while the syllabogram **ka** (Landa’s <ca>) has a major part of the ink eroded away and Landa’s <x> has significant erosion on three parts of the sign.

Besides these, transillumination photography and closer physical examination of the folio has exposed details of the smudged letterings in the “alphabet”: below Landa’s <cu> and what ought to be <y> (based on the syllabogram **ye**) between <ku> and <x>. The latter one has clearly lighter ink on the bottom part of the second sign and darker ink in what looks like a letter <y> with an extra stroke. The sign below <cu> seems to be a repetition of the previous transliteration – i.e., <pp> that was, in all likelihood, first written by mistake and then crossed over with four horizontal lines. The confusion further continues: what now reads as <ku> seems to have been originally written as <cu>, as it has a miniscule extra stroke, corresponding to the lower part of a <c>. Consequently, after the omitted “rabbit <p>” (later written in the margin), the copyist seems to have made at least four mistakes that were subsequently corrected. Furthermore, the alphabetical order breaks down at this juncture (after ‘q’ or <cu>/<ku>), adding to the overall puzzle – and making also Landa’s <x> a target of reanalysis. Ironically, since the rabbit was a trickster in Pre-Columbian Maya art, writing, and myths, this could very well be the final trick of the Trickster Rabbit.

Folio 47 has some paper damage on the left side of the map, while folio 48 has a hole through the paper and a somewhat damaged bottom edge. Furthermore, folio 49 has a damaged (and perhaps subsequently repaired) lower corner, while folios 50 and 53 display minor stains. Folio 55 has an easily observable defect on the paper (see Fig. 11). Folio 65 also displays a paper defect, although only a minor one. Folio 66 has an extra strip of paper close to the binding, as does folio 68.

Concluding Remarks

The manuscript known as the *Relación de las cosas de Yucatán* presents numerous opportunities to examine a literary work that is clearly a combination of various creations by several authors. Since its (re)discovery and initial publication in the 1860s, the *Relación* has witnessed numerous editions, versions, and translations – but while being great contributions to the field of Maya, Mesoamerican, and Latin American Studies in their own right, none of these editions are adequate for a scientific scrutiny of the manuscript. Consequently, a detailed analysis of its physical details, including the paper, watermarks, and ink, as well as different handwriting styles and various details of Maya hieroglyphs are of utmost importance. The pioneering study by Restall and Chuchiak (2002) has so far been the sole analysis of the *Relación* that takes into consideration the style and physical characteristics of the manuscript, as well as its historical context. The results of the transillumination photography of the *Relación* have exposed hitherto unidentified watermarks that has helped dating the paper of the manuscript to the latter part of the 16th century. Another question is, how long after the manufacturing date of the paper were the different sections of the manuscript

composed? From the paper, watermarks, and ink used in the manuscript to the style and contents of the text, the opus is outwardly puzzling. The fact is that the paper throughout the manuscript is from the latter part of the 16th century, as seems to be the majority of the text. However, the handwriting on folios 50-58 date to the latter part of the 17th century, which is considerably later than the paper used in that section. As a result, it seems that the later compilers/copyists continued writing to the empty pages of the manuscript that were left for further notes intentionally by the earlier compilers (John Chuchiak, personal communication 2020). Later, the manuscript was bound in a non-chronological order and, therefore, the later handwriting in the Relación appears sandwiched between the older ones. By exposing the physical details of the manuscript and contrasting these with its stylistic features and contents, we will eventually achieve a better understanding of this important work for the study of Maya culture.

Acknowledgments

I would like to thank Miguel Ángel Ladero Quesada, Feliciano Barrios Pintado, M^a del Pilar Cuesta Domingo, Asunción Miralles de Imperial y Pasqual del Pobil, and Jaime Olmedo Ramos of the *Real Academia de la Historia* for their heartfelt help and support during the process of examining the Landa manuscript. Likewise, my bottomless gratitude goes to Óscar Torre González of the Real Academia de la Historia for all the help and insights during the photography sessions in Madrid in June 2019. I also thank Juan José Batalla Rosado, John Chuchiak, and Matthew Restall for their insightful comments on an earlier version of this research report and Panos Kratimenos for his archival assistance in London. Finally, my indebtedness goes to Maria Josefa 'Ixpepa' Iglesias Ponce de León for instigating the project on studying the Landa manuscript with me in 2018 and for her hospitality during my visits to Madrid and Majadahonda 2018–2019.

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From Belize to Bagan: Framing a Comparative Analysis of Tropical Societies

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The ultimate goal of the Socio-ecological Entanglement in Tropical Societies project (SETS) is to promote the cross-cultural, transdisciplinary examination of the tropical experience, past and present, as a means to explore resilience and vulnerability to changing socio-ecological circumstances. This discussion presents the results of the initial phase of the research program, which focused on the comparative assessment of data quality and quantity across five principal foci (water management, agriculture, settlement, epicentral capitals, and integrative mechanisms), spanning nine geopolitical “divisions” (Belize, south India, Sri Lanka, Myanmar, Thailand, Cambodia, Java, and both northern and southern Vietnam). Our detailed literature reviews and comprehensive site visitations – which have so far concentrated on the Classical, or “Charter States” of the various sub-regions of interest – have also allowed us to generate some preliminary insights concerning the similarities and differences across the different case studies, with particular emphasis on how the Asian examples compare with the ancient Maya.

Keywords: Cross-Cultural, Comparative, Method and Theory, Tropical States



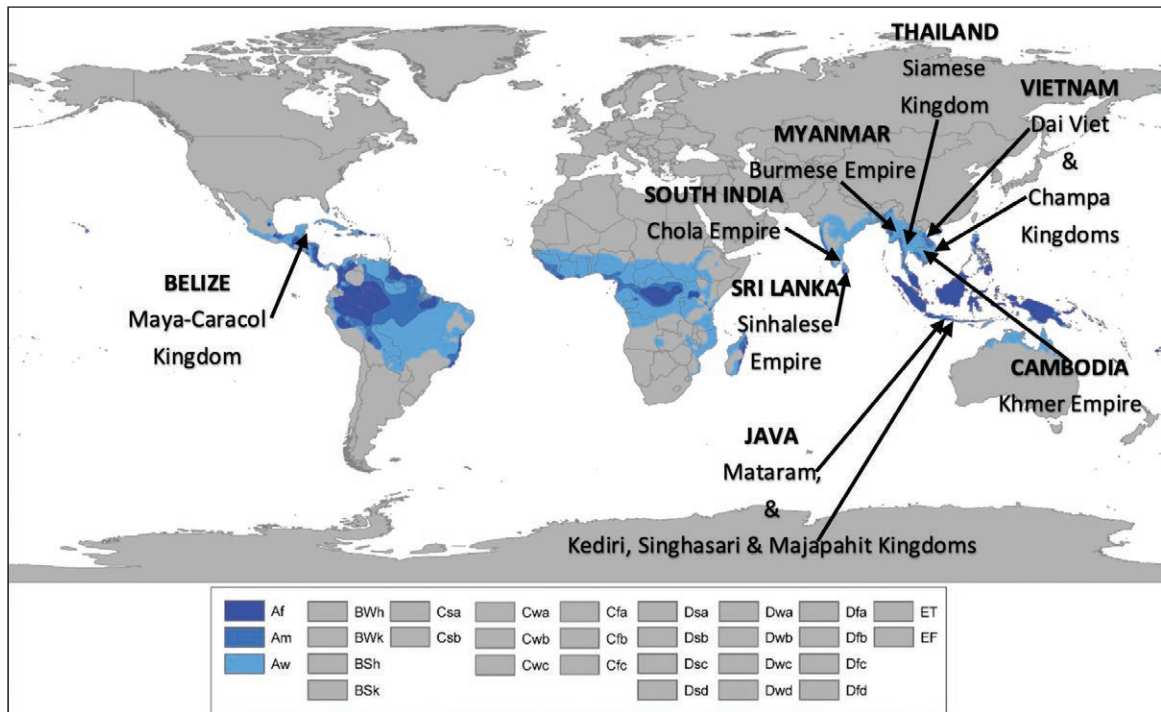


Figure 1. Köppen climate classification showing the world’s tropical zones and the locations of the SETS case studies (modified from wikipedia.org).

The *Socio-ecological Entanglement in Tropical Societies* (SETS) project has been specifically developed to promote the cross-cultural, transdisciplinary examination of the tropical experience, past and present, as a means to explore resilience and vulnerability to changing socio-ecological circumstances. An outgrowth of 23 field seasons of excavation-based research into the rise and fall of Classic Maya polities (e.g., Iannone and Connell 2003; Iannone 2014c; Iannone et al. 2016), Phase I of the SETS research program has employed an *Insight Development Grant* (2013-2015) from the Social Sciences and Humanities Research Council of Canada (SSHRC) to initiate a broader, comparative study of the development and denouement of complex societies in tropical South and Southeast Asia. This initial foray into cross-cultural research has been specifically aimed at evaluating the quality of various datasets relevant to the elucidation of the reasons for the “collapse” of a number of “classical” state formations in the latter part of what Victor Lieberman (2003, 2009, 2011) refers to as the “Charter Era” (CE 800-1400; see Figure 1 and Table 1).

The Focus of the Research Program

When contemplating the relevance of such a study, it is important to acknowledge that the world’s tropical zones were once regularly characterized as ecologically homogenous, energy-challenged, limited in terms of resources and agricultural potential – other than small-scale slash-and-burn farming – and thus unlikely places for state formation to occur (Boserup 1965, 1981; Coe

POLITICAL DIVISION	CHARTER STATE CAPITALS (ORIGINAL NAME & KINGDOM/EMPIRE)	DATES	COMPLETED SETS PHASE I VISITATIONS	SELF-FUNDED VISITATIONS
Thailand	<i>Sukhothai</i> (Thai Kingdom)	1238-1378 CE	2013	2011
	<i>Lopburi</i> (<i>Lavo</i> ; Thai Kingdom)	468-1351 CE		2011
Myanmar	<i>Bagan</i> (<i>Arimaddana Pura</i> ; Burmese Empire)	849-1287 CE	2013	2012
Cambodia	<i>Angkor</i> (<i>Yaśodharapura</i> ; Khmer Empire)	893-1431 CE		2010, 2011, 2012, 2013, 2015, 2016
	<i>Koh Ker</i> (<i>Lingapura</i> ; Khmer Empire)	928-944 CE	2013	2012
	<i>Rolous</i> (<i>Hariharalaya</i> ; Khmer Empire)	802-893 CE	2013	2010, 2011, 2012, 2013, 2015, 2016
North Vietnam	<i>Thang Long</i> (Dai Viet Kingdom)	1009-1400 CE	2014	2010
Central Vietnam	<i>Cha Ban</i> (<i>Vijaya</i> ; Cham Kingdom)	986-1471 CE	2014	
	<i>Duong Dong/My Son</i> (<i>Indrapura</i> ; Cham Kingdom)	758-986 CE	2014	2010
Java	<i>Singhasari</i> (<i>Tumapel/Singhasari</i> ; Singhasari Kingdom)	1222-1292 CE	2014	
	<i>Kediri</i> (<i>Daha/Kediri</i> ; Kediri Kingdom)	1045-1222 CE	2014	
	<i>Prambanan/Ratu Boko</i> (Sanjaya Dynasty/Mataram Kingdom)	760-1000 CE	2014	
	<i>Borobudur</i> (Sailendra Dynasty/Mataram Kingdom)	750-860 CE	2014	
South India	<i>Gangaikondacholapuram</i> (Chola Empire)	1025-1297 CE	2015	
	<i>Thanjavur</i> (Chola Empire)	848-1025 CE	2015	
	<i>Madurai</i> (Pandya Empire)	590-1333 CE		2014
Sri Lanka	<i>Polonnaruwa</i> (Sinhalese Kingdom)	933-1310 CE	2015	2011
	<i>Anuradhapura</i> (Sinhalese Kingdom)	377 BCE-933 CE	2015	2011

Table 1. Major charter state capitals visited as part of the SETS Phase I research, and via self-funded visitations.

1961; Meggers 1954; Sanders and Price 1968; Winzeler 1976:624-626). We now know that such assertions are false. Tropical environments are relatively heterogeneous (Scarborough and Burnside 2010:178), and they were often the settings for high populations, intensive agricultural regimes,

sophisticated water management systems, far-flung trade networks, and powerful state-level societies.

The SETS investigations are specifically focused on the impressive pre-industrial state formations that developed in the monsoonal, wet-dry outer tropics that occur between approximately 5° and 20° North/South (Ewel and Bigelow 1996:195; Fletcher 2009, 2012; Kricher 2011:19; Weischet and Caviedes 1993:11-12, 167), within the “sub-humid” Am and Aw climates in the Köppen-Geiger system (Köppen 1884; see Figure 1). Not only do these climate zones exhibit distinct wet and dry seasons, they also display considerable variability in terms of soil productivity, hydrological processes, and overall biodiversity (Kricher 2011; Marcus 2009; Scarborough and Burnside 2010:178; Weischet and Caviedes 1993:275-279). These environmental factors would have enabled or

constrained specific behaviors and conditioned the unique cultural developments that characterized the classical states under consideration.

To date, there have been few concerted efforts to try to understand issues of resilience and vulnerability specific to socio-ecological systems in the tropics (e.g., Iannone 2016; Isendahl and Smith 2013; Scarborough and Burnside 2010). Nevertheless, it has become clear that these civilizations do represent a divergent path to urban life, and they appear to have shared a certain range of vulnerabilities that ultimately contributed to their “collapse” (Fletcher 2009, 2012; Iannone 2016). In order to explore shifting levels of resilience and vulnerability within the various classical states, the SETS project has adopted an explicit historical-political ecology approach to the assessment and analysis of various pre-existing datasets (Thompson 2014).

Our approach is also unabashedly cross-cultural in focus yet strives to be as rigorous as possible (see Trigger 2003:15). To begin, we adhere to Robert Ascher’s (1961:319) canon that we should “seek analogies in cultures which manipulate similar environments in similar ways”; hence our focus on the world’s tropical zones, where the different pre-industrial state formations had to contend with similar socio-ecological issues over the course of their integrated histories. We also strongly concur that “data proximity” is crucial to the comparative approach (Drennan and Peterson 2012).

It is also important to stress that by adopting a comparative approach one is not necessarily devaluing the significance of more particularist, agency or event-centered analysis. Roland Fletcher (2012:317) argues that: “Cross-cultural comparison is not about creating blanket generalizations that homogenize diverse cases. Rather, we need to construct operational models that can be tested against the varied scenarios of diverse human history across the planet.” In doing so, it is imperative that we craft comparative studies that are systematically “cross cultural and cross-temporal” (Bartolini 1993). Finally, with respect to the stated goals of the SETS research program, we also agree with Drennan et al. (2012:3), who underscore that: “Comparative methods are essential if archaeologists are to contribute to transdisciplinary research in the historical and social sciences and thereby broaden the scientific understanding of the past, the present, and the future of human societies” (see also Feinman 2012:22). In other words, it is through rigorous comparative analysis that we aim to generate a nuanced understanding of resilience and vulnerability in tropical state formations across both time and space.



On Resilience and Entanglements

Resilience

What then, is “resilience”? To begin, resilience can be defined as “the capacity of a system to absorb disturbance; to undergo change and still retain essentially the same function, structure, and feedbacks” (Walker and Salt 2006:32). Importantly, resilience is “not about not changing,” but rather the ability to manage change, sometimes because staying the same will diminish resilience, at other times in efforts to avoid a critical transition, or “collapse” (Walker and Salt 2012:24). Scholars have outlined a number of specific criteria that can be used to pinpoint areas of resilience or vulnerability in socio-ecological systems (see Iannone 2016). Four of the core concepts of resilience thinking are: 1) **niche construction**, wherein people do not simply adapt to their environments, but also adapt their environments to them, which alters pre-existing ecological relationships and introduces new anthropogenic landscapes that often require additional investments and innovations (Dearing et al. 2007:266; Fischer-Kowalski, Marina 2003; van der Leeuw 2007:215), thereby increasing the locale’s historical gravity (Mrozowski 2016); 2) **risk spirals**, where efforts to solve immediate problems have unintended consequences that spawn issues in the future that are more complex and difficult to contend with, requiring further responses, and leading to a constant innovation pressure (Müller-Herold and Sieferle 1997:201-202); 3) **path dependency**, which refers to a state where specific decisions and practices lock a community or individual into a particular developmental trajectory that becomes increasingly hard to diverge from because certain options are no longer available, and particular practices have become too firmly engrained to be easily abandoned (van der Leeuw 2007:215); and, 4) **sunk-costs**, where people or communities continue to invest in existing things and relationships, even when faced with changing circumstances, which results in a tendency to undermine innovation (Cumming 2011:94; Janssen and Scheffer 2004; Walker and Salt 2006:87). The challenge for those who wish to explore resilience and vulnerability in the past is that such concepts remain abstractions, at least from an archaeological perspective, unless we can determine the material correlates for resilience and vulnerability.

Entanglement

One avenue that holds some potential for the archaeological examination of resilience is the notion of “human-thing entanglements,” as outlined by Ian Hodder (2011a, 2011b, 2012). “Entanglement” theory is based on the idea that, as we live our daily lives, humans and “things” (natural occurring and/or human-made entities) develop recursive relationships grounded in a “dialectic” between dependence – which is productive and enabling – and dependency – which is constraining and limiting (Hodder 2011a:175, 2012:17–18, 88). From a resilience theory perspective, such material entanglements are of particular concern because “people and things get trapped in entanglements that themselves direct the way further change can occur,” principally because “the entrapment of entanglement limits and channels innovation” (Hodder 2011a:178). In other words, socio-ecological systems, through processes such as niche construction, cultivate many human-thing entanglements that foster relationships of dependence that are both productive and enabling. Such entanglements enhance, and even promote the ability to manage change in resilience terms. However, over time some of the more significant human-thing entanglements are



Figure 2. Kamara Pokuna, Polonnaruwa, Sri Lanka.

transformed into relationships of dependency – they exhibit the characteristics of risk spirals, path dependency, and sunk costs – and they therefore become more constraining and limiting in resilience terms. Such entanglements limit innovative potential and stifle the ability to manage change. Importantly for archaeologists, entanglements – relationships of dependence and/or dependency – have material correlates, and their formation and transformation can therefore be examined over time as proxies for shifting levels of resilience and vulnerability.

Exploring Resilience and Entanglements on the Ground

The question remains, what kinds of archaeological data can we work with that provide the best fit with resilience and entanglement theory? To begin, it is useful to follow the lead of Walker and Salt (2012), who stress that researchers should practice *requisite simplicity* when applying resilience theory to a specific case study. In other words, one should: “identify the minimum but sufficient information” required to explore the levels of resilience and vulnerability exhibited by a particular case study (Walker and Salt 2012:23). They posit that, in general, between three and five key variables will play the most significant roles in determining resilience in most situations. It also seems most profitable to explore human-thing entanglements using variables for which we are able to chart shifts from dependence to dependency over the long-term.

In terms of examining entanglement and resilience within early tropical state formations, the most fruitful variables to examine appear to be: 1) *Water Management*: many tropical societies relied on sophisticated water management systems that needed to be constructed and maintained (Figure 2); 2) *Agricultural Intensification*: the majority of tropical societies were agrarian based,

and highly reliant on agroecosystems and a specific staple crop (Fletcher 2012:298; Figure 3); 3) *Urban Epicentral Plan and Composition*: overtime, all of the early tropical state formations put great efforts into building, elaborating, and maintaining the ostentatious epicentral complexes at the very heart of their sacred and political capitals (Figure 4); 4) *Integrative Mechanisms*: all early tropical societies put considerable effort into building and maintaining integrative features such roads, bridges, temples, markets, administrative nodes, state controlled fields and water holding facilities, hospitals, rest houses, and a diverse range of sacred natural sites (Figure 5); and, 5) *Settlement Patterns*: the various pre-industrial tropical state formations all seem to have developed a somewhat unique low-density, or dispersed urban footprint (Fletcher 2009, 2012; Scarborough et al. 2012; Figure 6).

Specific Goals of SETS Phase I: Data Evaluation

The specific goal of the recently completed Phase I SETS research was to assess the quality of the various datasets associated with the aforementioned variables. This assessment was achieved using a three-stage approach. Initially, SETS team members immersed themselves in the general literature on the culture history of South and Southeast Asia. Subsequently, on-the-ground visitations across eight different political divisions of South and Southeast Asia were carried out, including South India, Sri Lanka, Myanmar, Thailand, Cambodia, North and Central Vietnam, and Java. Prior to each field trip more specific literature reviews for each particular Charter State case study were conducted, and detailed itineraries were formulated. A total of 18 separate epicentral capitals



Figure 3. Candi Selogriyo Area, Central Java.



Figure 4. Bagan, Myanmar.

were explored (see Table 1) as part of the study. Various contemporaneous cultural features were also visited on each sojourn. These represented the four remaining variables that were established as the foci of the SETS I study: water management infrastructure, settlement features, integrative mechanisms, and agricultural systems. In combination with a series of self-funded research trips conducted by the Principal Investigator (Iannone) across the study region, over 550 unique localities have been visited by SETS team members as part of our Phase I study.

On-site visitations were a crucial component of the SETS Phase I research program. Although extensive literature reviews were also conducted, these were no substitute for the “data proximity” provided by on-the-ground examinations. It was determined, time and time again, that many points of interest – such as sacred groves, minor temples and shrines, smaller water management features, architectural embellishments, and less significant locales in general – were often not discussed in the literature at all, or if they were, they were only mentioned in passing, with no visual accompaniment. While visiting the different locales – both small and large, well-known and obscure – we were also able to informally engage with knowledgeable local guides and community members who were able to provide interesting details relevant to our study. We were also able to peruse informative signage and display texts at the various sites and museums we visited and acquire monographs and shorter guidebooks that are not readily available outside the country of origin.

Data proximity was especially crucial to carrying out the agriculture, sacred natural sites

(integrative mechanisms), and settlement sub-projects, as evidence for these important components of the ancient tropical lifeway are not as well preserved, primarily due to their palimpsestic nature. In addition, there is both limited literature and a paucity of archaeological research associated with these areas of investigation. It was often by travelling from one study location to the next that we were able to observe, from the vantage of the van or train window, vestiges of the ancient settlement pattern, pockets of intensive agricultural production, and examples of previously unknown sacred groves.

It was also much easier to gauge the actual extent and overall quality of temple complexes and monasteries, urban epicenters, water management systems, and even agroecosystems by roaming around, through, and between different components of these. Our extensive on-the-ground wanderings also made it much easier to ascertain the associations between different material elements of the overall settlement pattern, thus providing us with a more holistic understanding of the broader settlement footprint and its various entanglements. In South India and Myanmar there was the added benefit of being able to visit many of the “living temples,” and in doing so phenomenologically engage with the sights, sounds, smells, and actions that, although part of the contemporary world, are still reminiscent of those that framed the social and spiritual life of the early state societies we study. With respect to these living temples, the on-site-visitations were vital because photographs were sometimes not allowed within the inner sanctums of the more popular



Figure 5. Spean Praptos Bridge, Cambodia.



Figure 6. Situs Pemukiman, Trowulan, East Java.

temple complexes, and our first-hand encounters with these spaces therefore proved invaluable.

Through these efforts we determined that the five variables that were selected for analysis can be used to effectively examine the broader socio-ecological issues surrounding resilience and vulnerability in the various pre-industrial, tropical state formations under examination. However, we also noted a certain unevenness in terms of the quality of specific datasets across both time and space. For example, settlement patterning has witnessed decades of study in the Maya world, but is virtually absent from the research programs of South and Southeast Asian archaeologists. These limitations establish some parameters with respect to the degree to which shifting levels of resilience may be recognized within the various integrated histories we are attempting to craft as part of the broader SETS research program.

Preliminary Observations Generated During the SETS I Comparative Research Program

Some interesting similarities and differences emerged as a result of our examination of the various case studies. These observations can be considered as a whole, to help inform our general understanding of tropical lifeways, or individually, to stimulate follow-up research of a more focused variety.

To begin, it is noteworthy that water management was of a much higher magnitude in South Asia, and particularly Southeast Asia, when compared to that of the ancient Maya. The sheer number of moats, canals, and small reservoirs found in association with the South and Southeast Asian case studies is truly astounding. Most impressive are the expansive reservoirs – often referred to as “lakes” – that were constructed by the Khmer of Cambodia and the Sinhalese of Sri Lanka. The need for such widespread and high capacity water management systems was not simply due to

the occurrence of marked wet and dry seasons – the Maya also had to contend with this issue – but rather reflects two other fundamental differences: 1) the less porous sandstone geology found across much of South and Southeast Asia resulted in the need to manage runoff to avoid flooding during the rainy season; and, 2) the requirements of the Asian wet-rice economy, which demanded extensive and comparatively high volume irrigation systems.

Like maize for the Maya, rice was the staple food for South and Southeast Asian societies, as it continues to be today. That said, we also know that across the tropics agricultural practices were quite diverse, and fundamentally resilient in character, with polycultural cultivation practices being the norm. There is, however, still much that we need to learn about the agrarian economies of the ancient tropics, both in the Maya world and in the realms of the Asian case studies.

We do know much more about the monumental epicenters of the Maya and their Asian counterparts. Here I am referring to the main agglomeration of monumental architecture that demarcates the socio-spiritual *axis mundi* of an urban center. Across the various case studies these epicenters are dominated by towering temples and sprawling palace complexes. Whereas the temples are generally constructed of durable stone or brick, there are significant differences in palace architecture. Maya palaces – specifically royal residences – are largely constructed of stone, whereas their Asian equivalents are made of wood, and they are thus rarely preserved. We must, therefore, infer their presence based on other datasets, such as inscriptions and historical narratives. In contrast to the Maya case study, Asian epicenters are often surrounded by walls and moats. Another difference is that Maya epicenters demonstrate a historical stratigraphy – with rulers building new temples and courtyards overtop those of their predecessors – whereas the Asian epicenters were often added to in a lateral fashion, with new rulers constructing their own seat of power in the vicinity of, or sometimes distant from, those of their predecessors (Michael D. Coe, M@P2010 keynote address). As such, Maya epicenters can be said to be more vertically oriented (like Russian Stacking Dolls), whereas the Asian epicenters are more horizontally dispersed (like pieces on a chess board).

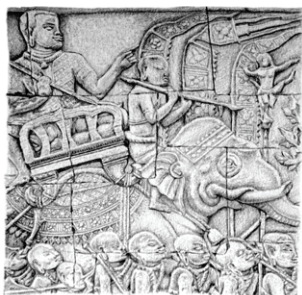
Regardless of the aforementioned differences, one fundamental similarity is that the monumental epicenters in all of the tropical case studies are embedded within a dispersed peri-urban landscape exhibiting a mixed urban-rural character. We know much more about these peri-urban zones in the case of the Maya, due to the many decades of settlement archaeology that have been carried out in Mesoamerica. In South and Southeast Asia our understanding of peri-urban zones and support populations continues to be limited by the long-standing emphasis on elite-focused inscriptions, historical narratives, art, and architecture. A significant period of comprehensive settlement archaeology will need to be completed before we can begin to draw some empirical conclusions as to the demographic and socioeconomic characteristics of the agrarian societies of Classical South and Southeast Asia.

Finally, in considering how all of the tropical societies under consideration were integrated at the community and societal levels, our comparative study made it clear that ritual and religion were fundamental to social cohesion, with temples and temple complexes figuring prominently both within and outside the monumental epicenters. One thing that may, at first blush, appear to differ from the Maya case study is that in South and Southeast Asia religious institutions were crucial not only for unifying people of varying socio-spiritual, economic, and political status, but also in terms of basic economic expansion and amalgamation. That said, other than Marc Zender's (2004)

detailed analysis, there have been few considerations of whether the ancient Maya had well-organized religious institutions akin to the powerful *Sangha* of South and Southeast Asia, with its temples, monasteries, priests, nuns, and expansive landholdings. Until such research is carried out in the Maya world, we should be cautious about overstating this apparent organizational difference.

Conclusions

In conclusion, the SETS investigations are envisioned as a long-term research program that will bridge the gap between the past and the present in order to examine socio-ecological relationships, and issues concerning resilience and vulnerability, in the world's tropical zones. SETS Phase I constitutes the first stepping-stone in this endeavour, and these preliminary investigations have already resulted in two open access edited volumes (Iannone 2014b; Iannone et al. 2015), one book chapter (Iannone 2016a), nine conference papers (Hills 2016; Iannone 2013, 2014a, 2015a, 2015b, 2016b, 2016c; Macrae 2016; Marajh 2016a), five Master's theses (Baron 2019; Goldberg 2018; Marajh 2016b; Mody 2018; Shirkey 2015), and an electronic image library containing over 68,000 photos.



So, “what’s next” for the SETS team? Beginning in May 2017, we began leveraging the general results of our initial SETS data evaluation exercise as part of a more focussed, and traditional research project, in collaboration with Yangon University, Mandalay University, and Yadanabon University.

Our primary goal is to generate an integrated socio-ecological history for residential patterning, agricultural practices, and water management at the Classical Burmese (Bama) capital of Bagan (mid-11th to early-14th century CE), Myanmar. The *IRAW@Bagan* project gains its importance from the fact that our current understanding of Bagan society is biased towards its upper echelons, being based almost entirely on elite-focused texts, art, and architecture. A settlement archaeology study within the peri-urban (mixed urban-rural) zone immediately surrounding Bagan’s walled and moated, regal-ritual epicenter will: 1) provide much needed balance to our conception of Bagan as a dynamic capital city; 2) generate insights useful for elucidating the unique aspects of urban development in the tropics; and, 3) help inform considerations of resilience and vulnerability in tropical metropolises, both past and present.

Acknowledgements

I extend my gratitude to the Social Sciences and Humanities Research Council of Council of Canada (SSHRC) and Trent University for their generous support. I also graciously thank the various hotels, local guides, and drivers who assisted us with our investigations. Finally, I appreciate the useful commentary and information sharing provided through our interactions with Michael Aung-Thwin, Alison Carter, Christophe Pottier, Arthur Demarest, Damian Evans, Roland Fletcher, Bob Hudson, Lisa Lucero, Vern Scarborough, and Miriam Stark.

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Photo by Harri Ketunnen.

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Photo by Harri Ketunnen.

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Photo by Harri Ketunnen.

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Photo by Harri Ketunnen.

Gyles Iannone

Gyles Iannone is a Professor in the Anthropology Department at Trent University. He earned his degrees at Simon Fraser University (B.A.), Trent University (M.A.), and University College London (Ph.D.). An anthropological archaeologist, his main areas of interest include the archaeology of climate change, natural disasters, human impact on ancient environments, collapse and resilience theory, settlement archaeology, early tropical state formations, Mesoamerica (esp. Maya), and South and Southeast Asia

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The editors at M@P2020 (from left to right): Maxime Lamoureux-St-Hilaire, Harri Kettunen, and C. Mathew Saunders. Photo by Kathy Considine.

The Mayanist Team

Editor-in-Chief: Maxime Lamoureux-St-Hilaire is a Visiting Assistant Professor of Anthropology at Davidson College and the Director of Publications for AFAR. He is the co-organizer of the Maya@Playa/Lago Conferences and President of the Board of Directors of the Boundary End Archaeology Research Center (BEARC). He also is co-editor (with Scott Macrae) of the new volume *Detachment from Place: Beyond and Archaeology of Settlement Abandonment* (2020; University Press of Colorado).

Executive Editor: C. Mathew Saunders teaches anthropology at Davidson Day School and is the Founder and Executive Director of AFAR. He also is the creator of the long-running Maya@Playa/Lago Conferences and Secretary of the Board of Directors of the BEARC.

Guest Editor: Harri Kettunen is an Adjunct Professor of Latin American Studies at the University of Helsinki and President of the European Association of Mayanists, Wayeb. He has carried out interdisciplinary research projects on Mesoamerican topics, combining archaeology, anthropology, iconography, epigraphy, and linguistics. His publications include textbooks on Maya hieroglyphs, methodological studies on Maya iconography, and interdisciplinary articles on Mesoamerican subjects. Dr. Kettunen is currently leading a collaborative project with the Real Academia de la Historia in Madrid to study the manuscript known as *Relación de las cosas de Yucatán*.

Layout and Advisor: Joel Skidmore is associate editor of *The PARI Journal* and associate director of Precolumbia Mesoweb Press.

Watercolor Artist: Aaron Alfano holds a B.A. in Archaeology/Anthropology from Trent University and studied Drawing and Painting at the Haliburton School of Art and Design, ON, Canada. Aaron and his dog Atlas still call the highlands of Haliburton home. Aaron does carpenter's work and spends his free time making art and exploring nature. His work focuses on narratives through an exploration of wildlife and the ancient world.

Photographer: Harri Kettunen – in addition to researching all things Mesoamerican – is a photographer extraordinaire.

Cover Lettering: Michael Thomas teaches art and illustration at Davidson Day School and is responsible for the bulk of the graphics for the Maya@Playa/Lago Conferences, including their awesome posters.



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