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Front and back cover: Scenes M1 and M2 from the mural painted in Uaxactun Structure B-XIII (drawing by Jakub Špoták)

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FROM THE EDITORS

This issue of the *Contributions in New World Archaeology* journal contains papers from the 24th European Maya Conference that took place in Kraków between the 11th and 16th of November, 2019. The main conference theme was: '*Contact and Conquest in the Maya World and Beyond*'. The intention was to refer to events from 500 years ago, since the start of the conquest of Mexico, the colonization and collision of cultures from the early sixteenth century onwards, the changes it brought about and the dawn of globalization. The conference also addressed the subject of conquests and contacts between different Mesoamerican societies and cultures before the Spanish invasion.

During the conference, more than 20 papers were presented, most of which are published in this (No. 13) and the following volume of CNWA (No. 14). The first of these two volumes presents the subject of interaction between the Maya and Teotihuacan and concentrates on interactions and contact between different Maya and Mesoamerican groups as seen in linguistic, epigraphic and archaeological records.

The volume begins with an article by Stephen Houston, Thomas Garrison, and Omar Alcover ('*Citadels and surveillance: conflictive regions and defensive design in the Buenavista citadels of Guatemala*') who describe different military features that have been recently discovered to the west of Tikal, thanks to the LiDAR technology, and place them in the context of Teotihuacan invasion of the second part of the fourth century.

The following article '*Uaxactun after the Conquest by Teotihuacanos as told by the Mural from Palace B-XIII*' by Milan Kováč, Dmitri Beliaev, Jakub Špoták, and Alexander Safronov reports on the reexamination of Uaxactun mural paintings from Structure B-XIII, which provide new insights on the problem of the '*entrada*' and Teotihuacan invasion in the Maya Lowlands.

The next paper in the volume is by Joanna Jabłońska and it is entitled '*What do ceramics tell us about the contacts between the Maya and Teotihuacan? The meaning and social context of Teotihuacan-like ceramics in the Maya area and Maya-like ceramics at Teotihuacan in the Early Classic period*'. It builds on the subject of Teotihuacan invasion and contact and concentrates on the ceramics discovered in the Maya Lowlands, that exhibit Teotihuacan influences or were imported from this central Mexican metropolis. Based on ceramic data, the author attempts to show the character and intensity of the Maya-Teotihuacan relations within different Maya sites and regions during the Early Classic period.

Mary Kate Kelly's paper ('*Political domination and linguistic preferences in ancient Maya hieroglyphic writing: A case study of Piedras Negras and Yaxchilan*') focuses on what may be termed the prestige language used by the Maya elites at court, and shows how conquest and political domination in the region of Usumacinta influenced the written language of the elites used by different scribal schools.

In their paper titled '*Gold and calques in Mesoamerica: tracing the introduction of gold to Mesoamerica through linguistic evidence*', Magnus Pharao Hansen and Christophe Helmke describe the linguistic contact between different cultural groups of Mesoamerica. The authors show how the term for 'gold' was adopted from Central America and then spread through different Mesoamerican languages from east to west.

The volume closes with an article by Rosa-Maria Worm Danbo titled '*An investigation of shared signs and xenographs in Maya writing*'. The author describes certain signs that bear graphic similarities which were used in different writing systems of Mesoamerica, and discusses the implications of such signs sharing.

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CITADELS AND SURVEILLANCE: CONFLICTIVE REGIONS AND DEFENSIVE DESIGN IN THE BUENAVISTA CITADELS OF GUATEMALA

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Abstract

Maya conflict left many images. With a few exceptions, however, they reveal limited numbers of victors and captives. In contrast, glyphic accounts point to broader convulsions, and the challenge remains of linking such conflicts to the infrastructure of concerted attack and defense. Lidar, a technology using laser pulses to record and model surfaces, does so with aplomb. By now, most Mayanists accept that, in the late 4th century A.D., Classic Maya kingdoms became entangled with the distant polity of Teotihuacan, Mexico. Tikal refers to that encounter in precise detail, identifying an enigmatic, victorious belligerent, Sihyaj K'ahk', and possible ruptures in the local dynasty. To unexpected extent, lidar shows that the western entry to Tikal bristled with numerous citadels, surveillance platforms, moats with protected settlement, and ramps for rapid ascent and descent on high ridges and hilltops. Current evidence places these features in the general time of Sihyaj K'ahk', underscoring that the threat and actuality of violence enmeshed regions, at systemic scale.

Keywords: warfare, Lidar, Teotihuacan, fortifications, planned settlement, weapons, atlatl, slingstones

Resumen

El conflicto Maya dejó muchas imágenes que sin embargo, salvo algunas excepciones, representan un número limitado de vencedores y cautivos. En contraste, los relatos glíficos demuestran una serie más amplia de convulsiones, vinculadas y atestiguadas por la presencia de una infraestructura de ataque y defensa concertada. Lidar, una tecnología que utiliza pulsos de láser para registrar y modelar las superficies antiguas, confirma dicha infraestructura defensiva ubicada en las cercanías de Tikal, Guatemala. Hasta el momento, la mayoría de los mayistas han aceptado que a fines del siglo IV d. C., los reinos del periodo Clásico se enredaron con la ciudad distante de Teotihuacán, México. Tikal recuerda ese encuentro con alto nivel de detalle, identificando a un enigmático y victorioso beligerante, Sihyaj K'ahk', y posibles rupturas en la dinastía local. Sorprendentemente, lidar afirma que la entrada occidental a Tikal estaba conformada por numerosas ciudadelas, plataformas de vigilancia, fosas con asentamientos protegidos y rampas para facilitar un rápido ascenso y descenso de altas crestas y colinas. La evidencia actual coloca estas estructuras en la época de Sihyaj K'ahk', subrayando que la amenaza y la realidad de la violencia involucraron a regiones enteras, de una manera sistémica.

Palabras clave: guerra, lidar, Teotihuacan, fortificaciones, asentamientos planificados, armas, atlatl, hondas

INTRODUCTION

The relations between Teotihuacan, Mexico, and the Classic Maya form a central issue in scholarship, with varying emphasis on the timing, intensity, and number of people involved. The presence of contact is not in doubt. The issue is how to conceptualize it. One approach envisions a symmetrical milieu of long-term contact. Operating over multiple generations, relations between the Maya and Teotihuacan ebbed and flowed at relatively low intensity, with exchanges of belief, replication of temple forms and the rituals they imply (the celebrated *talud-tablero* configuration of molding); foreign deities and distinct systems of depiction were selectively incorporated. Work by Juan Pedro Laporte exemplifies this perspective (Laporte 2003b: 293-300; see also Braswell 2003: 36-38, 40-41, who characterizes Teotihuacan as a "peer polity," if a hefty one among many). The other view posits asymmetrical, short-term, and high-intensity contact. Its impact was locally and regionally momentous. Detectible actors fronted armed groups of invaders, and Maya settlement was affected both within and between cities. Support for this interpretation comes from Tatiana Proskouriakoff (1985: 4-10), albeit in an exploratory way, and David Stuart, who builds on further glyphic decipherments (Stuart 2000; see also Martin 2003: 11-17; Stuart 2019; Stuart and Houston 2019). At the end of his career, George Cowgill, a prominent researcher of Teotihuacan, leaned towards this view as well (Cowgill 2015: 201-203).

Choosing between the two—light and long-term engagement or heavy and intensive interference—is daunting. In comparison, a Classicist would not be asked to summarize, without texts, Rome's relations to the Mediterranean. But there are some patterns worth observing. Almost from the start, Teotihuacan showed clear contact with the Maya (Sugiyama *et al.* 2020: 136-137, table 5.1). Altun Ha, Belize, reveals imports from Miccaotli-era Teotihuacan (ca. A.D. 100–170), and Tikal, Guatemala, and Caracol, Belize, offer artifacts and shared architectural forms close to those of Tlamimilolpa to Early Xolalpan times in that distant Mexican city (ca. A.D. 170–350) (Chase and Chase 2011: 9-13, figs. 3-5, 7; Laporte 2003a: 200, 203). Contact is thus variable but long-term. A mutual symbolic fascination, expressed as a kind of artistic "code-switching," embellishes ceramics, buildings, and murals (Sugiyama *et al.* 2020: 160-161; Taube 2003, 2017). Whether this or that artist was Maya or non-Maya is almost beside the point. Conventions and content were deployed with assurance, suggesting more than informal or haphazard transmission of knowledge.

But there are also claims to heavier intrusions. Paintings at El Rosario, Querétaro, imply belligerent, martially oriented occupation of that city by Teotihuacan (Nielsen *et al.* 2019: 64-65; see also, Los Horcones, Chiapas, although downplayed for such impact by its excavator, García-Des Lauriers 2007: 210-211, 249-251). To some extent, researchers are shaped by their convictions. Partisans of low-intensity contact explain *talud-tablero* molding, distinctive imagery, and stray deposits of artifacts as the result of trade, limited movement of people or erudite, artistic, and ritual contact. For them, there is no need to invoke a Teotihuacan empire, armed invaders wishing to control and exploit or a Grand Strategy of pan-regional ambition. In contrast, those who see invasions are more likely to focus on complex, costly or labor-intensive deposits that have no local origin, or glyphic texts that chart in detail the lives and acts of invaders and local antagonists.

LOCALS AND FOREIGNERS

The neutral ground is to concede the obvious, that there could have been many kinds of interactions that varied across sites, and that the most solid arguments build on compounded evidence. Long-term contact at low thrum could exist at the same time as spasms of violent conflict and occupation. The strongest cases are those that draw on varied, convergent data, such as those that occur with unique fullness in the area of Tikal, Guatemala, in conjunction with a series of citadels discovered by lidar on the western reaches of that important Classic Maya city (Canuto *et al.* 2018: 13-14, fig. 10). Tikal's glyphic record is among the best studied in the region, providing a textured setting for one period of contact. Locally, there is the Tikal ruler Chak Tok Ich'aak (ca. A.D. 350 until his abrupt disappearance on Jan. 17, A.D. 378), followed by Yax Nuun? Ahiin (acceding Sept. 13, A.D. 379, ruling until ca. A.D. 406), evidently ensconced by Teotihuacan forces. Then there is a seldom-mentioned figure, Sihyaj Ka'n K'inich (ruling ca. May 17, A.D. 406), and the final lord of the series, Sihyaj Ka'n (acceding May 27, 411 A.D. and ruling until Feb. 3, A.D. 456; the most developed account remains Martin and Grube 2008: 28-36, but see also the pioneering essay by Stuart [2000]).

In tandem with these figures are "foreigners," those unlikely to be local. The most singular and widely mentioned is Sihyaj K'ahk', "Born-from-Fire." He employs an unprecedented title of high rank, subsequently used by many high Maya lords (**KAL-ma-TE'**; fl. A.D. 350, then last mentioned on March 25, A.D. 416), and is widely recorded in sites across northern Guatemala (Estrada Belli *et al.* 2009; García Capistrán and Rodríguez 2017; Nondédéo *et al.* 2019). His arrival on the scene also comes with a flourish of Teotihuacan imagery and references to a sacred journey (*huliiy*, "arrived," but in its most formal exposition, **TZUTZ-yi mi-NAL**; cf. Tikal Stela 31:C20–C21, Temple IV, Lintel 3:D6-C7). That journey involved a deity known as the Ochk'in K'awiil. A god of the "west" (*ochk'in*), this entity was linked to lightning and supernatural warrant to rule. To judge from texts at Copan and Uaxactun, Ochk'in K'awiil had firm ties to Teotihuacan, traveling, probably, as an actual object or divine fetish, with various stops (*hil-i okel*) along the way (cf. Copan Altar Q:A2, C3–D3; Uaxactun Stela 22:B10; Stuart 2006: 38, fig. 28; such interruptions of ritual motion occur with other fetishes, as in the "Celt-Image" [?-*baah*] cited on Throne 1, Piedras Negras, Guatemala, that both "arrives" [*hul-*i*] and then "first-rests" [**ba-hi-li**] before completing its circuit [**K'OT?-ja**]; Thompson 1950: fig. 58). Its movement and emplacement served to cement shifts in dynasties. At Calakmul, Mexico, in much later texts, changes in dynasties were identified and later lords enumerated with respect to this god and its successive possession (Martin 2005: 7-8, fig. 4; see also Xultun Stela 25:B4-B5, **u-13-TAL K'AWIIL**). At Caracol, on fragments of a hieroglyphic stairway that made its way to Xunantunich, Belize, there is a detailed account of what happens when that relation is broken. The fetish is lost or missing (**ma-cha-ja**) and must be remade (*pat-l-i*, Martin 2017: fig. 4).[1]

[1] For other discussion, see Helmke and Awe (2016: 13-15), although they interpret the reference at Xunantunich in a less physicalized sense, in terms of "the more abstract meaning of 'authority' as in political power." A related reference occurs on a monumental stucco text on Tikal Structure 5D-141, its glyphs nearly 40 cm high: **cha TAHN-na wi-WINIK? 7-WINAL? PAT-ta li-ya K'AWIIL la cha TAHN-na u-12-TAL yo-OK?[K'IN]-ni** (data courtesy of Peter Harrison, excavator of the text). The use of the less common, "primary" version of a positional verb, here with past tense (*pat-l-iiy*), matches the form at Xunantunich. It is possible that the enumerated **7-WINAL?** specifies the number of times this event had taken place in the *chatahn* region to the north of Tikal, within the broader kingdom of Calakmul, Tikal's hereditary antagonist. Had Tikal penetrated that region and appointed its own proxy? The stucco captions a figure seated on a throne, also of stucco, evidently gripping a ceremonial bar with two K'awiil heads,

The supernatural quality of the journey and its legitimating role may explain why Yax Nuun(?) Ahiin, a ruler evidently placed on the Tikal throne by Sihyaj K'ahk', displays this god above his head (Tikal Stela 4). The deity is poised as though in some parental or supervisory role. On Tikal Stela 31, Yax Nuun(?) Ahiin appears in two distinct uniforms, both war-related. Identified as a *mam*, "ancestor," he may be shown posthumously in two distinct, non-Maya roles. Or, as a less secure alternative, the ruler had abdicated yet remained active for a time, making it possible for him to appear on the monument.

The other foreigner, indeed one who overlaps in time with Sihyaj K'ahk', is a figure possibly named Jatz' Ohl Kuy(?). He is also the bearer of the **KAL-ma-TE'** title, but is seemingly a forceful presence long after Sihyaj K'ahk'. His last reference is on June 11, A.D. 439, his date of death (Stuart 2019). He also uses what may be a rare sign for "overlord" or some kindred concept, shown as a vulture consuming the glyph for "person" (Tikal Stela 31: G20; Dos Pilas Panel 7:A4, in relation to Dos Pilas' subordination to Calakmul; and La Corona Stela 1:pD7). That sign and his general statements of supervision suggest a preeminent role, perhaps, according to Stuart, as the ruler of Teotihuacan itself (Stuart 2019). In one evocative text at Tikal, central Mexico may even be described as the land of 5 Snowy ("cotton") Peaks (**5-TINAM-WITZ**, Stuart and Houston 2019), a possible reference to the many snow-capped volcanoes. By the testimony of passages on Tikal Stela 31, Jatz' Ohl Kuy(?) was the father of Yax Nuun(?) Ahiin, the figure placed on the Tikal throne after the removal of the local lord. Teotihuacan's impact was thus heavy impact and invasive. What most studies do not stress is that there were yet *other* foreigners noted at Tikal. The so-called "Marcador," a monument drenched with Teotihuacan symbols, may refer to at least two such figures (positions G1, G3; Figure 1), and the sides of Tikal Stela 31 appear to record someone whose name is spelled out with syllables, suggesting some grappling with exotic words (**k'o?-cha-k'i-wa**; positions K2, O2; the **k'o** reading was proposed by David Stuart). The back of the Hombre de Tikal carving (position F5), another unusual monument, exhibits the name of a Sihyaj "Atlatl-dart," someone not clearly the same as Sihyaj K'ahk'—the final element in their names is quite distinct. An unprovenanced ceramic and one of the incised bones from Tikal Burial 116 similarly refers to one Kupoom Yohl Ahiin (Miscellaneous Text 32), a person paired with Sihyaj K'ahk' in a much later image from the Late Classic period (Dmitri Beliaev, personal communication, 2019; Beliaev *et al.* 2017). These are not casual or low-intensity contacts but ones that involve many identifiable people. That the span of time coincides with a major shift in phases at Teotihuacan (Late Tlamimilolpa, A.D. 250–350, to Early Xolalpan, A.D. 350–450) is likely to be significant. Intrusions into the Maya region and signal changes at Teotihuacan hint at highly individual shifts of dynasties and their governing personalities.

What accompanied these shifts at Tikal and its region is our principal concern. Even after its demise, Teotihuacan exercised a ritual and symbolic impact on Maya dynasties, leaving a residual memory of specific events, personages, deities, and practices of war (Stone 1989). Some years ago, Linda Schele and David Freidel went further, contending that the rulers of Tikal—their emphasis is on Maya, not foreign agency—looked to Teotihuacan for an astronomically timed "war on an entirely different scale"; this was a "new warfare of death and conquest, [in which] the winner would gain the kingdom of the loser" and "spearthrowers, the hunter's weapon"

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probably in crosstie with the text. The report of "his 12th *yok'in*" recalls an expression in Colonial Tzeldal, *yoquin* [*yok'in*], as in *qyoquin qbet ta tzoghol*, *traspasar deuda o señorío o cargo*, "transfer a debt, lordship or office"(Ara 1986: 312). Nonetheless, there remain unresolved details with the "animal head" in this sign and how to read it.

Figure 1. El Marcador, Tikal, Guatemala (photograph of rubbing courtesy of Juan Pedro Laporte).

were now directed against people (Schele and Freidel 1990: 145, 152). Their interest, based on then-current knowledge, was more with local antagonisms—Tikal against the dynasty of Uaxactun, some 24 km to the north. Some of their proposals have not held up completely. Tikal and Uaxactun were more allies than rivals, and disruptive conflict certainly existed long before the arrival of Teotihuacan on the scene. There are several first-millennium A.D. fortifications at places like Edzna, Campeche (Forsyth 1983: 220, 223; Matheny *et al.* 1983: 191), Macabilero, Guatemala (Alcover 2020), El Mirador, Guatemala (Morales *et al.* 2015: 10, fig. 11), Cival, Guatemala (Estrada-Belli 2011: 131-132, fig. 4.2), El Pilar, Belize (Horn and Ford 2019: 5, fig. 3), Muralla de León, Guatemala (Bracken 2015: fig. 48), Zancudero, Guatemala (Golden and Scherer 2006: 12-13), and possibly Becan, Campeche (Webster 1976: 103), and Punta de Chimino, Guatemala (Bachand 2006: 229; dating of the latter remains ambiguous). The canal system at Cerros, Belize (constructed 200–50 B.C.) may have served defensive as well as irrigation functions or as a delimiter of sacred precincts (Scarborough 1991: 152), and similar multifunctional ditches appear early at Tintal, Guatemala (Acuña and Chiriboga 2019). That earlier darts from atlatl failed to pierce humans seems equally improbable—in violence, any weapon will do. But the central claims, of novel materiel, battle tactics, and martial organization, bear up well with lidar data from the citadels near Tikal. The data also argue, in their abrupt appearance, for high-intensity interventions by Teotihuacan.

A SEETHING LAND

In a corridor running southwest to northeast is the Buenavista Valley, Peten, Guatemala, a structural feature of some 30 km in length, splitting a higher karst plateau oriented north-south (Figure 2). The western opening of the valley extends into a far wider expanse of wetlands draining into the Río San Pedro Martir, leading eventually to the site of El Perú-Waka', while a massif in and around Tikal itself terminates the eastern opening; in between, about half-way through the valley, sits a lake (the Cival Palmar) and surrounding, seasonal wetlands (Beach *et al.* 2015: 258-259). Puncturing the northern rim of the valley are three drainages, at least two of which support, in elevated areas to the side, Classic Maya cities of substantial size (La Brisanta and El Zotz; Houston *et al.* 2018: 5-7). In glyphic history, the local record is sparse. Scattered texts, some on ceramics, show it be a kingdom known as *Pa'ka'n*, perhaps "split" or "fortress-sky"—a label relevant to notable features on the escarpment (see below, Houston *et al.* 2018: 23). To the northeast of the valley, at the diffuse upland settlement of Bejucal, is a key text that refers to the overlordship of the local kingdom by none other than Sihyaj K'ahk'(Figure 3 for Bejucal; Garrison *et al.* 2016: 536-537, fig. 4). The Valley was clearly enmeshed in events with Teotihuacan and its proxies.

Lidar captures by the National Center for Airborne Laser Mapping (NCALM, University of Houston), which employed a Teledyne Optech Titan MW (multi-wavelength) sensor (Fernandez-Diaz *et al.* 2016), yielded the same degree of extensive, high-quality evidence as in other parts of the Maya world (Chase and Chase 2011; Chase *et al.* 2011). That capture is ongoing as a continuation of the Pacunam Lidar Initiative, with promise of almost tripling the coverage from the initial recording of 2144 km^2 in 2016, a harvest from 10 non-adjacent polygons ranging from 91 to 454 km^2 in extension (Canuto *et al.* 2018: 1, fig. 3). Evaluations in the area of El Zotz, Guatemala, in 2018 and 2019 demonstrated that lidar data could not only result in false positives, but it also missed features proportionally, especially in areas of steep terrain. The net effect was that overall settlement remained roughly the same (ground-

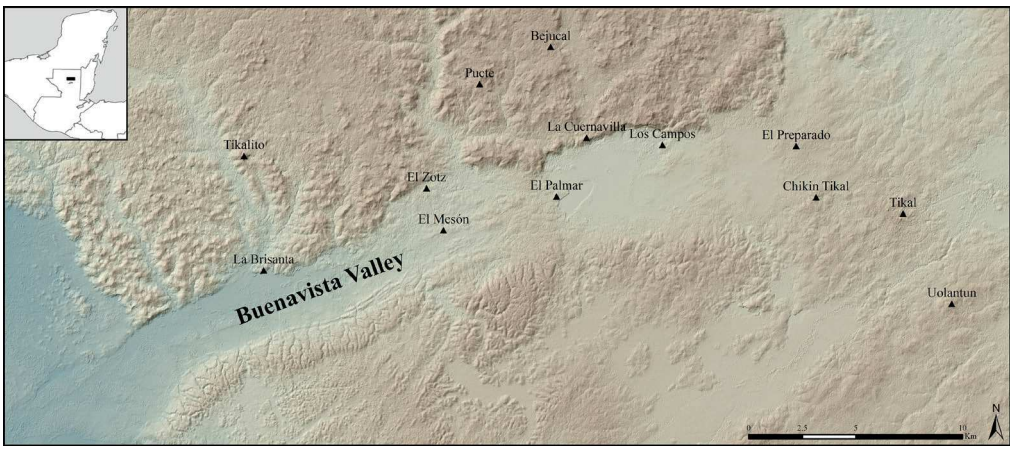


Figure 2. The Buenavista Valley (T. Garrison/Proyecto Arqueológico El Zotz [PAEZ]).

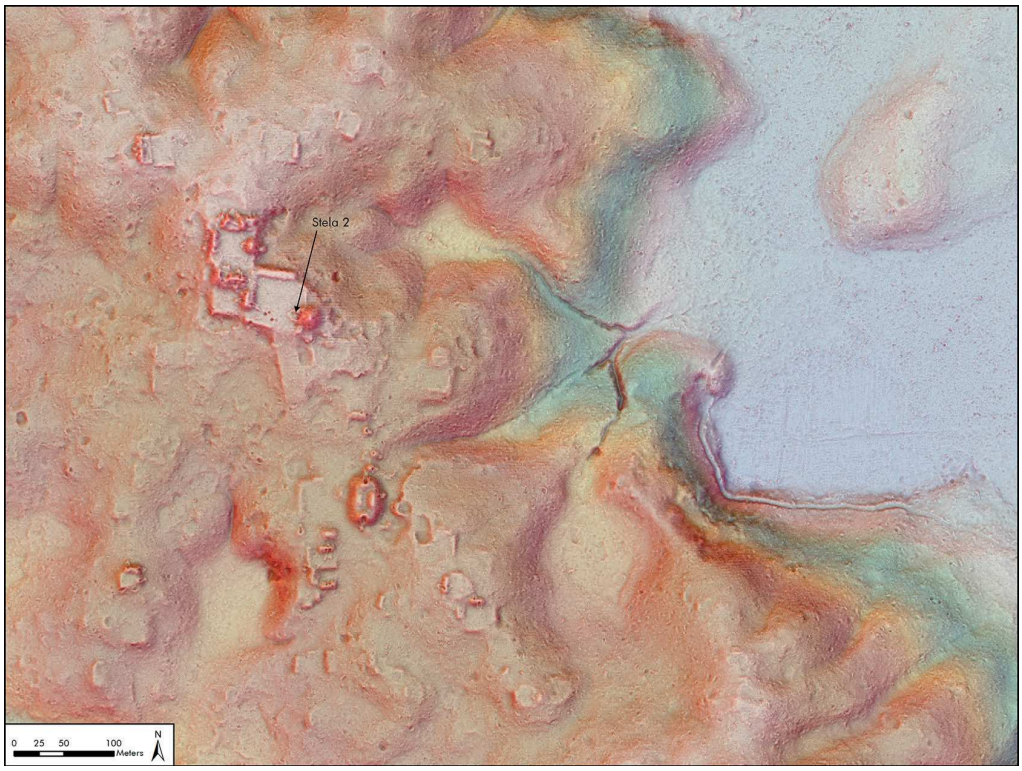
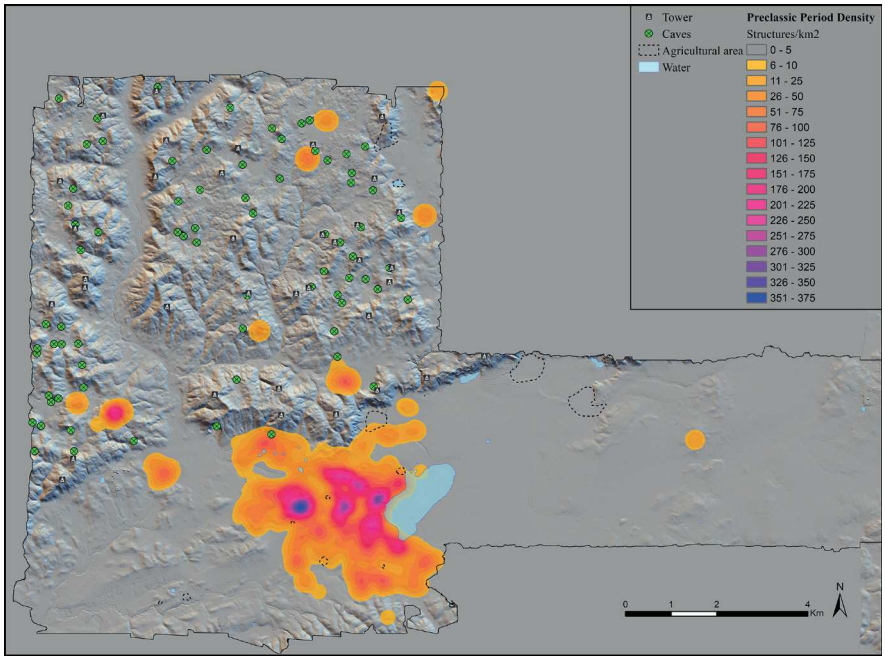


Figure 3. Bejucal, Guatemala (T. Garrison/Pacunam).

a



b

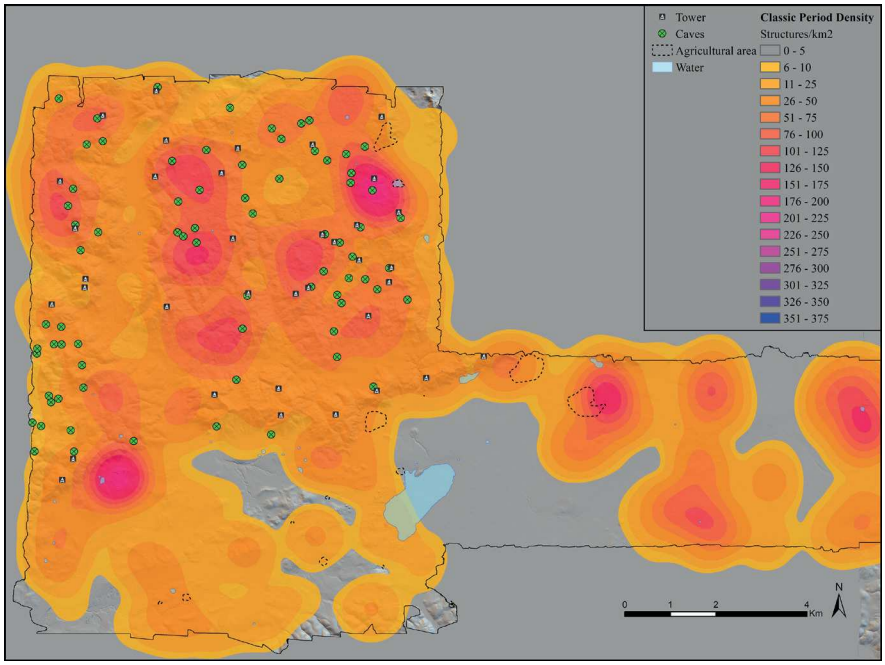


Figure 4. Comparison of structure density in the area of El Zotz between the a) Preclassic and b) Classic periods (T. Garrison/Pacunam and PAEZ).

truthing increased the number of structures and platforms by 2.6% over 29 km^2), and that the lidar achieved a relatively close overview of ancient occupation. The vast majority of defensive features were found in the vicinity Tikal (Canuto *et al.* 2018: 13-14, fig. 10). Aside from the well-known walls around the epicenter of Tikal (Puleston and Callender 1967; Webster *et al.* 2004), the largest concentration are in a settlement labeled "La Cuernavilla," a special-purpose, defensive complex sitting atop and at the base of the Buenavista escarpment. Among the more surprising results from the lidar was the ability, at least at broad level, to date ancient buildings and platforms by their degree of erosion. Our team called this "melt," with the understanding that long exposure had reduced the crisp outlines of earlier structures; more recent buildings from the Classic period showed clearer demarcation of edges. Settlement in the valley can be dated through excavations but also roughly by this attribute (Garrison *et al.* 2019: 137, fig. 4). The patterns were striking (Figure 4). Characterized by high degrees of erosion, Preclassic structures (< A.D. 100) clustered in the open sections of the valley, especially near the Preclassic city of El Palmar and its year-round lake and adjacent wetlands. By Classic times, that settlement shifted perceptibly to higher, more defensible zones, away from the valley floor. To put this more precisely, Preclassic settlement could and did underlay Classic-era building (Garrison *et al.* 2019: 137-139). But areas highlighted by "melt" were almost certainly of earlier date.

THE BUENAVISTA SYSTEM

A set of citadels extended over much of the northern escarpment in the Buenavista Valley, albeit with concentrations irregularly spaced over about 10 km. From west to east, the first citadel was the Early Classic palace of El Diablo and its neighbor, El Tejón, both linked by a ridge-top causeway; another appeared 7 km to the east, but with less evidence of finished construction, the final set being the two linked citadels of La Cuernavilla a further 2 km northeast (Figure 5). Tikal lies about 14 km southeast of La Cuernavilla, but the 2016 lidar capture does not include the rest of the escarpment. There is every reason to believe that these hilltop citadels continue along the north end of the valley until the escarpment veers north towards Uaxactun. Notably, the ones that we do have occur, not near or astride the major breaks in the escarpment, but at some km from them. The location responded, it seems, to well-spaced proximity to all-season paths (a favored area for east-west transit even today) and water supplies at the northern base of the escarpment (Doyle *et al.* 2012). Lidar detected a far smaller citadel in a broken, hilly landscape 6.5 km to the north of El Zotz, defended areas near the confluence of stream valleys, as well as a series of isolated platforms on hill summits. These have been interpreted as watchtowers, a reasonable supposition given their location and viewsheds (Figure 6, Alcover 2016). If correctly identified, they would have offered supplemental vigilance to the hills encircled by ramparts, ditches, and platforms, especially in the sector between El Diablo and La Cuernavilla. Watchtowers and facilities for smoke-signals are attested in highland Guatemala, in an unpublished translation of the *Título de Totonicapan* (ca. A.D. 1554, Allen Christenson, personal communication, 2019): "[t]hen went the furious men, the watchers of the warriors, toward their homes which they saw atop the mountain called Muq'b'asib' [Looking/Watching Place Smoke"]. Then arose their smoke as a message." Such messaging would enhance communication dramatically, at distances far greater than permitted by simply the inter-visibility of platforms. What also merits attention is the investment in fortified hilltops, a trait fully consistent with the idea of *pa'ka'n*, or "fortress-sky." Rather than being peripheral or ancillary features, the citadels may have been primary markers of identity for the community.

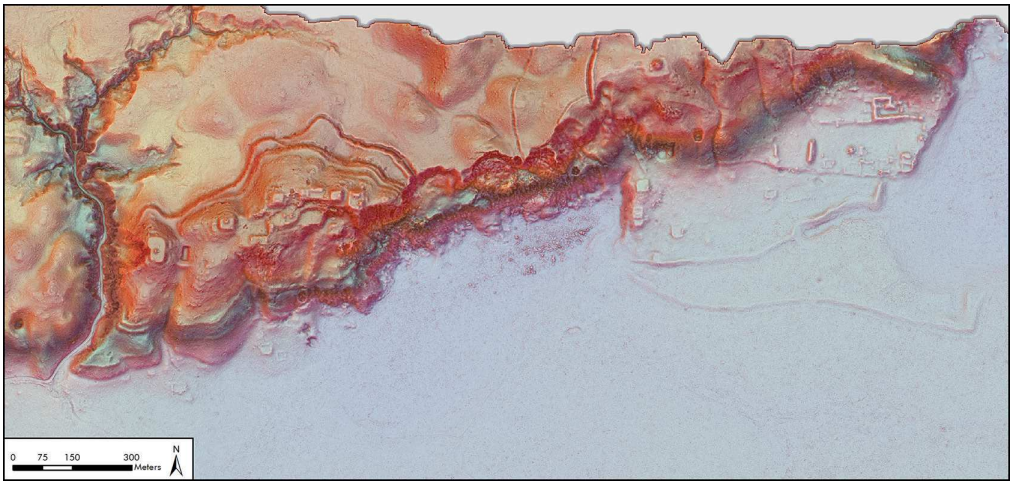


Figure 5. La Cuernavilla citadels (T. Garrison/Pacunam).

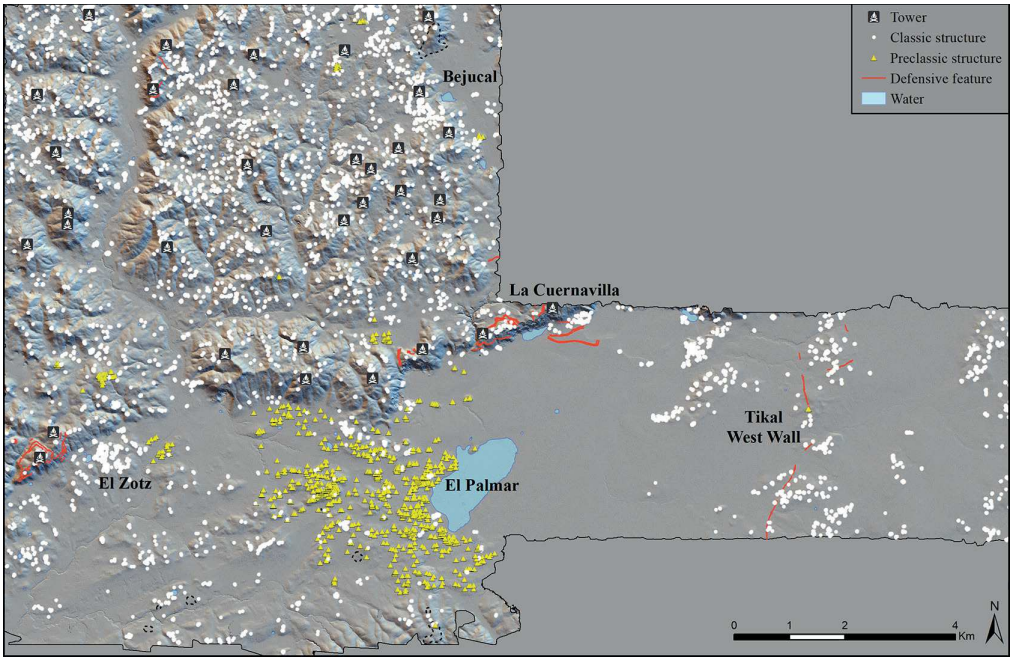


Figure 6. Watchtowers and structures in the region north of the Buenavista Valley (T. Garrison/Pacunam and PAEZ).

The intent behind a system of citadels can be understood narrowly, in terms of a focal hilltop or defended enclosure or enceinte (see Keeley *et al.* 2007 for cross-cultural examples), or regionally, as part of a landscape to be surveilled and controlled. A "threat environment" in the area must have guided ancient building and involved careful management by locals and the creation of deterrents (Levy and Thompson 2011: 2-3). Broad comparisons suggest that, in conditions of occupation by invaders, such fortifications were situated along routes of communication; they dominated a landscape visually, intercommunicating with other citadels by means of beacons or other signaling devices, housing warriors for potential sallies, and operating as occasional residences for presiding elites (for comparable patterns in Crusader castles, see Petre 2010: 69-71; for an early GIS analysis of a Celtic Iron Age hillfort system see Madry and Rakos 1996). If created by local forces, there might be less likelihood of rapid onset of construction or material discordances between those inside and outside the fortifications; in much the same way, design and construction would reflect local precedent. Elsewhere, defensive features—often used offensively when warriors sallied forth—constitute the most obvious signs of conflict. Comparative evidence suggests that, as deterrents and protective devices, they relied on, as at La Cuernavilla and the other Buenavista citadels: (1) local topography, whether of eminences, bodies of water or sheer drops ("promontory forts," Keeley *et al.* 2007: 79-80; Martindale and Supernant 2009: 202-203; Maschner and Reedy-Maschner 1998: 32-36; Roscoe 2008: 509-510); (2) natural obstacles like thorn bushes (Palka 2001: 428; for illustrations of such features in highland Guatemala, see Restall 2014: 109-111, figs. 4.11–4.12); (3) V-shaped ditches and berms or interior "curtains" or ramparts (Keeley *et al.* 2007: 57); (4) gates to allow ingress yet to control it too (Keeley *et al.* 2007: 62-67); (5) weaponry, as in <110 m downhill for sling stones or <46 m for spear-throwers, both known to have been employed by the Maya (Keeley *et al.* 2007: table 1; see York and York 2011: 79-80); and (6) traps to ensnare those allowed to enter a defended enclosure (Roscoe 2008: 514). In addition, key variables in their success derive from: visibility and slope, an optical and "biomechanical" reality for defenders and assailants alike (Martindale and Supernant 2009: 192); the relative number of aggressors or defenders in relation to their weaponry (Martindale and Supernant 2009: 203); and sources of food and water should an attack turn into a siege (Keeley 2016: 299). In the case of La Cuernavilla and other citadels of the valley it is likely that any conflict would have taken place on or about near-denuded hills: uncontrolled vegetation would have obstructed views and provided cover for potential assailants. This might have led in turn to higher rates of erosion that would soften or de-accentuate defensive features but also result in heightened collection of rain water for reservoirs. A final assessment is whether defenses failed. Was a place abandoned and destroyed, its occupants slaughtered or its sacred spaces desecrated? In such cases, "a morality tale" was left behind, a visible memorial to victory or defeat (Snead 2008: 141).

The Buenavista system exhibits varied defenses: rapid-response ramps from citadel summit to base or to connect adjacent hilltops; landscape, hilltop, and stand-alone ditch-and-rampart structures, sometimes doubled; contoured terraces; and stone walls; or combinations of these defense. But the core of the system—more extends off the area of lidar capture from 2016, and the systems are doubtless more expansive—contains ramparted, moated areas with distinct sectors, girded to either side by lakes and swamps, and at least one palace, probed by the project in 2018 and 2019 (Román *et al.* 2019). There are also: leveled causeways permitting rapid access up the escarpment; flattened platforms with prominent, centered mounds; water reservoirs; pinched points of access; serried embankments; gates; and the inter-visible citadels that embrace an area extending 10 km west, to the Classic Maya city of El Zotz. An area to the north, intersected by a modern logging road, shows a long wall passing off-capture, of a sort close to the more extensive

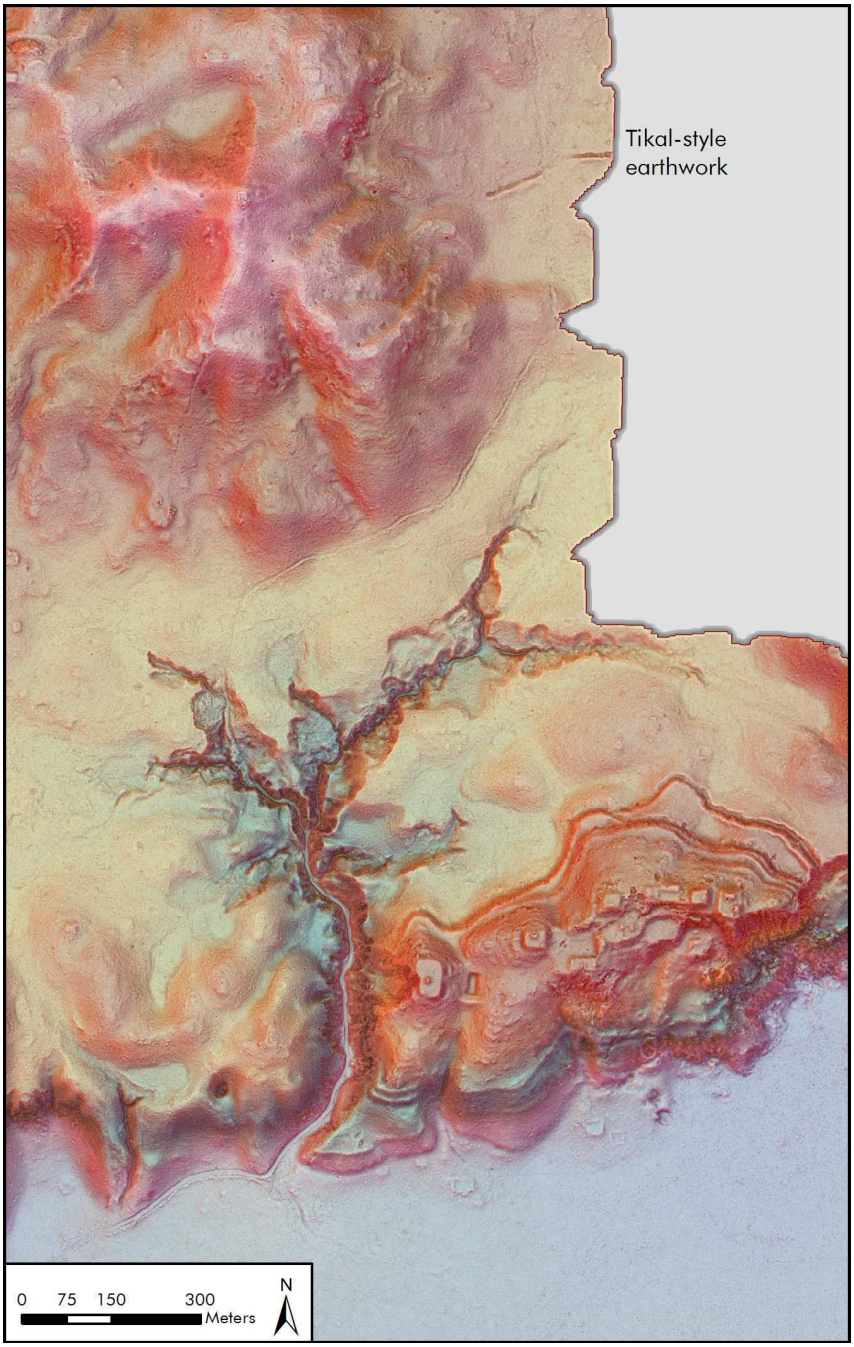


Figure 7. Wall resembling that around Tikal's epicenter, north of La Cuernavilla citadels (T. Garrison/ Pacunam).

system documented around Tikal (Figure 7, cf. Webster *et al.* 2004). Test-pits in the palace and adjacent zones in the moated area of La Cuernavilla prove, not surprisingly, that it was occupied over a considerable length of time, from the Preclassic to Terminal Classic (Román *et al.* 2019: 119). The water nearby, a relatively clean source issuing as outflow from the escarpment (Beach *et al.* 2018: 168, 185-186), would have attracted settlement at all periods. Preliminary dating to the time of the Teotihuacan incursion in the region comes more affirmatively from a *talud-tablero* building in a cleaned out looter's trench in the La Cuernavilla East Group, if otherwise scant in datable material (Figure 8, Garrison *et al.* 2018: fig. 6.50).

Figure 8. Talud-tablero in looter's trench, East Group, La Cuernavilla (T. Garrison/PAEZ).

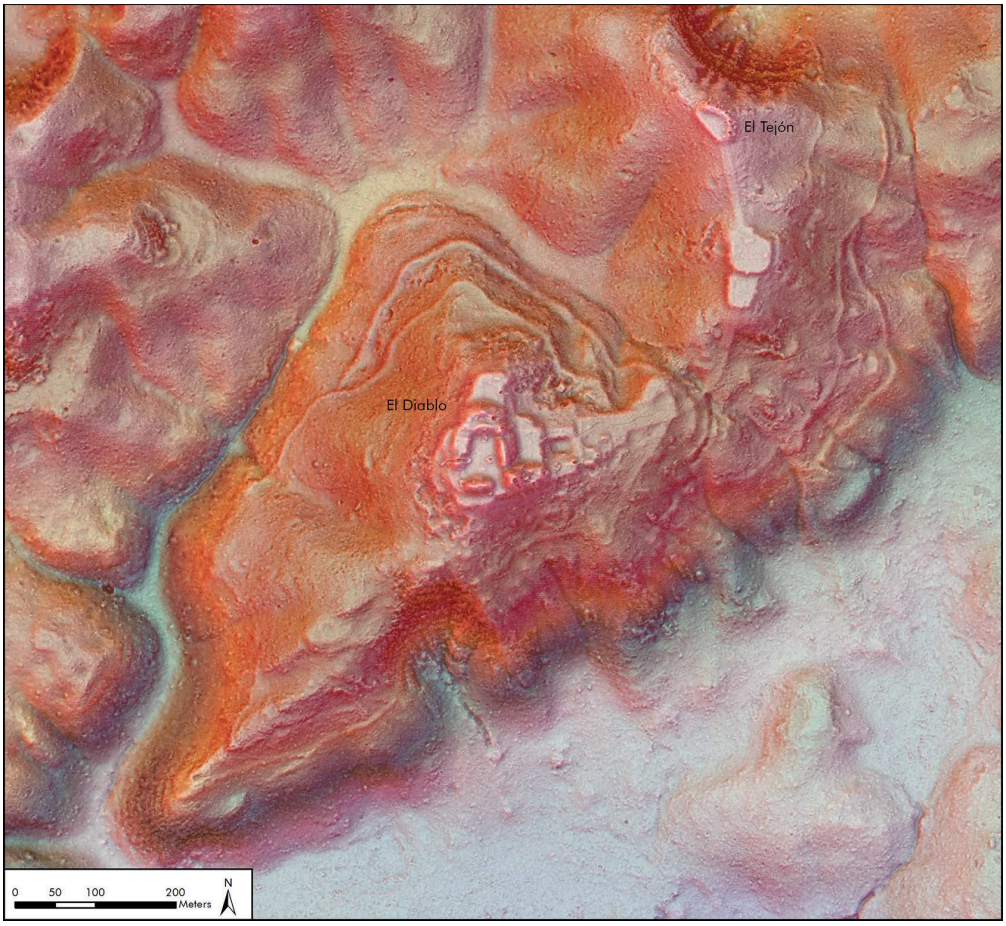


Figure 9. El Diablo and El Tejón, both part of El Zotz, Guatemala (T. Garrison/Pacunam).

The most decisive evidence is comprehensive excavation in the walled Diablo palace and nearby El Tejón, for it reveals that it largely dated to the middle and later years of the Early Classic, or the mid-fourth century A.D. (Figure 9, Houston *et al.* 2015: 86-76, 78). All major buildings were abandoned in the early to mid-fifth century A.D., if with outliers extending into the early sixth century (Román Ramírez 2017: 110-111; the author suggests a range of A.D. 450–570, based on one-sigma deviation of several radiocarbon dates). Its foundational tomb, likely that of a dynastic founder, contains ceramics affiliated with Teotihuacan styles and designs (Houston *et al.* 2015: figs. 3.20, 3.23, 3.27). Much excavation needs to be done, but these data, especially the more decisive evidence from El Diablo, point to a time close to the historical events recorded at Tikal and within the lifetime of Jatz' Ohl Kuy(?) and perhaps Sihyaj K'ahk'. The local overlordship of the latter at Bejucal, a site closely linked to El Zotz and its El Diablo palace, and the well-documented emplacement of a dynastic founder offer sturdy testimony that the other citadels bear the same approximate date. Their configuration

is close to that at El Diablo, with similar patterns of encircling battlements, ditches, ramparts, and platforms, along with impoundments of elevated supplies of water (reservoirs appear at both La Cuernavilla and El Diablo; see Houston *et al.* 2015: 19, fig. 1.6). The reservoirs draw special interest, for they would have been doubly convenient: to avoid frequent descents to springs or pools at the base of the escarpment, and to ensure a reliable source of water during siege. This suggests a pattern of conflict that involves: (1) sustained assault (or infrastructure that gives pause to assailants); (2) specialized refuges in some cases (perhaps La Cuernavilla); (3) protected royal palaces with dynastic necropolis in others (El Diablo); and, by the scale and wide distribution of the Buenavista citadels (4), a desire to monitor a valley over much of its east-west extension. The tight dating suggests that this was a system: not isolated citadels within a few km of each other—their proximity, regular placement, and single-minded orientation to the valley make mutual antagonism unlikely—nor structures built slowly or incrementally. Alternatively, El Diablo could have formed a distinct, opposed set of fortifications. The region does appear to have had a coordinated scheme devised over a relatively short span of time. That these occur in the principal western axis to Tikal, in a period of embroilment with Teotihuacan and its proxies, slots them into a larger historical picture and centralized organization at regional scale. But what remain unclear are the actors in this threat environment and the motivations behind such investment. If there were a *pax Teotihuacana*, a "new order," as some propose, possibly orchestrated out of Tikal (Martin and Grube 2008: 29), the threat would presumably come from those opposed to it. Absent texts, the identity of these discontents is difficult to prove, and our temporal control insufficient to sort out the ebb and flow of hostilities. The builders could have been Maya responding, at unprecedented scale, to foreign intervention—an exogenous inducement to heightened local organization. Yet this fails to account for the founder's tomb at El Diablo and the *talud-tablero* at La Cuernavilla. The former signals a new order indeed, consistent with the evident destruction of earlier inscriptions at Tikal (Martin 2000).

WEAPONRY AND CITADEL DESIGN

The platforms and concentric circumvallations in the Buenavista system must in part have arisen from weapons of the time, along with a need to defend in sequence, by fall-back sectors, distances determined by "throwsheds" of particular arms. The citadels bespeak an intensity of defense, as well as assurance maximum, overlapping coverage. There may also have been a density of protectors. The Tikal system shows, where preserved, all the indices of defense, with internal berming visible in lidar if substantial infill from erosion in certain sections (Figure 10). But "manning" these c. 4.5 m deep trenches over such expanses would have made responses either slow or dependent on a large force—to be sure, surveillance and signaling in a more treeless setting could have enhanced speed and efficiency of deployment. The Buenavista citadels may be dispersed spatially but reflect the expectation of high-intensity encounters, with weaponry of the Classic period.

Such weapons differentiate into "near" and "far" arms. Knife blades are known, the closest weapon of all in the Bonampak murals from the final years of the Late Classic period (Miller and Brittenham 2013: Room 2, folder insert). Studies of spears, for example, suggest they have dramatic ineffectiveness (high percentages of misses) between 5 and 10 m (Milks *et al.* 2019: fig. 5). The Bonampak murals—if one can trust such representations—hint that spears were not flung at distance, but held at the proximal end, by steady grip with one hand at some 30–40 cm

Figure 10. Portion of Tikal wall system (T. Garrison/Pacunam).

from the base: a quick thrust, then a retraction. The earnest desire may have been to thrust deeply but also at remove, to avoid slashes with other weapons. Blowguns were inconsequential, best used for felling birds, with no evidence for attacks against humans.[2] As for "far" arms, those thrown at distance (again, spears seem not clearly to have been employed in this manner), there are two in particular that must have conditioned citadel design in the Buenavista Valley.

The first are slingstones. Spherical in shape, with various degrees of finish, these were reported in much of ancient America as the weapons *par excellence* of the underprivileged, for they involved little more than a common, local material (limestone in the Maya case) and a leather or fiber sling (Hassig 1992: 28-29; York and York 2011: 81-85). The model could be the sword/longbow distinction relevant to class divisions in medieval England (or, indeed, to the United States military in formal dress), yet it could also have marked different phases of battle, slingshots (or atlatl, see below) in medium- or longer-distance contact, and spears and daggers up close; shields parried at all levels of contact. Weapons were probably used by expedience, not only by niceties of status. Larger ones could also be held in the hand for pummeling assailants at close quarters, yet flung with some accuracy. Experiments underscore their long reach, 78 m the average throw for men, but going up to 130 m, and women flinging an average of 53 m and a maximum of 82 m (Brown Vega and Craig 2009: 1266). Skeletal remains advertise some such trauma (Tiesler and Cucina 2012: 171), but perhaps not with mortal effect, the aim being rather to dissuade or stun while taking captives. Slingstones, c. 112 of them, averaging 10 cm in diameter, have been recovered from the wall systems at El Diablo (Figure 11, Rivas 2019: 80-81, 98-99, fig. 5.19–5.22). These were located near plastered surface levels of the walls that

[2] Blowguns are shown in many Maya images (e.g., K808, 1226, 3055, 3413, 4151, 6298, 7795), and even clutched by a jaguar in imagery on Yaxchilan Stela 24. Some appear to be single-tubed, others of bound reed or wood, and most display a sighting element on the far end, the better to target prey (for wider study, see Jett 1970). Small pellets were used, and these may occur in archaeologist deposits, often confused for rattles in ceramic supports (Ventura 2003: fig. 5). A glyphic reference to such weapons may occur on a shell from Structure M8-10, Aguateca, Guatemala, in connection with a royal youth: '**a-CHAK-ka ju-'u-TE'**, '*A Chak Ju'te'*, "He of the Red/Great Blowgun" (for shell, see Inomata 1997: fig. 14; for "blowgun," see also Ch'orti' *huht te'*, Wisdom 1950: 472). In Ch'orti', *huht* is an onomatopoeic expression for exhalation (the language had collapsed most distinctions between velar and glottal spirants at this point), *te'* a nod to the wood of such a weapon. Possibly the internal glottal stop of *ju'te'* expressed some phonological outcome of word-union with two sequent *t* sounds.

Figure 11. Slingstones in situ, El Diablo, Guatemala (A. Rivas/PAEZ).

circumscribe the hill, the better to facilitate rapid, unobstructed movement by defenders; by the same token, jagged, uneven terrain downhill, often pitted by quarrying, made climbs difficult. That not all such stones were tossed by slings is illustrated by a scene on an unprovenanced ceramic (Figure 12). A mythic narrative, almost a Maya "Rape of the Sabine Women," the vessel displays an attacking force, two subdued, bleeding, and pleading women, each embodying

Figure 12. A tableau of attack against a hilly redoubt, with figure flinging a stone at an enemy warrior (K5451, courtesy of Justin Kerr).

a different age of life, one of motherhood, the other youth, and, to the upper left, a figure against flinging a stone. Seemingly in mid-air, the *witz* or "hill" sign behind suggests instead that he is in an elevated redoubt, rather like the Buenavista citadels.[3]

[3] There may be a logographic glyph for such flinging of stones, a hand holding a stone. A credible reading for the sign is **JATZ'**, "strike" (Taube and Zender 2009: 202-203, fig. 7.24), but another possibility can be entertained: **TZ'ON**, with occasional usage as a syllable, **tz'o**, a syllabic reading proposed by David Stuart in 1997 (personal communication, 2019). In Yukateko, *tz'on* is a well-attested term for "blowgun, hunt, shot" or the root for "shoot" with a blowgun, as well as "rifle" (Barrera Vásquez *et al.* 1980: 889); Chontal, a Ch'olan language, has *tz'on* for "shoot," but the sense in both would be a object ejected or propelled with speed (Knowles 1984: 475). Some contexts are not explained by this reading, but many are, including the use of this term to describe ballplay at Yaxchilan, Mexico (Hieroglyphic Stairway 2:Q1) and a blowgunning youth from a "codex-style" sherd at Calakmul, Mexico (**tz'o/TZ'ON?~nu XIB**, "blowgun youth," personal observation). A looted pot hints that some blowguns shot seeds, perhaps read *saak* (David

The other "far" weapon is the atlatl or spearthrower (Slater 2011). These would have been most effective in denuded areas, the most likely condition of the citadels, and exceedingly difficult to use in thick wood or vegetation (Joshua Kwoka, personal communication, 2019). Most were fashioned of reed or, by increasing evidence, suitable sorts of bamboo (Houston *et al.* 2017; Hruby 2019). The flexibility of this material might have been attractive in promoting straight flight (Baugh 1998: 41). A noteworthy iconographic feature is that the spearthrower darts of the Maya are unfletched (without feathers), while those of Teotihuacan-garbed warriors are fletched. If these artistic canons reflect material realities, the fletched Teotihuacan darts would have stabilized in flight, thus leading to more precise shots. What had been largely practical could also come to signal ethnic difference. If operating in groups, warriors so equipped might have had devastating effect on the opposing side, much like the longbow men at Agincourt, where opponents died not in a "storm" of darts but skilled, highly selective, and limited use of them (Richardson 2016). The Bonampak scene is eloquent in this regard, by including figures holding short sticks. These may have been discharged atlatl. Most Maya images of Teotihuacan-styled warriors show only a handful of atlatl darts at most, and these weapons would have run out rapidly in the heat of battle. Unfortunately, dart and spear points, most of them stemmed bifaces, are not always easy to distinguish archaeologically. In an essay on lithic variation, Kazuo Aoyama and Elizabeth Graham (2015: 7, 11) appear to use the two terms together, make no perceptible technological distinctions between them, other than, in a separate essay by Aoyama (2005: 294, 297), a morphological measure of "medium-width" versus "larger"; they use imagery to discern the introduction of such darts from Teotihuacan or Central Mexico. There may have been a gendered or age-grade advantage to atlatl as well (Joshua Kwoka, personal communication, 2019). Spears probably need more muscular handling while atlatl could discharge darts sent by the less brawny. Where colored in depiction, atlatl darts were either black (K2036), probably obsidian, or white, probably chert (K8592). It is equally striking that far later, wooden atlatl from Chichen Itza, Mexico, are carved into the shape of feathered vipers, their jaws the tine for thrusting wooden dart shafts (Coggins and Ladd 1992: figs. 8.17, 19). Chichen Itza offers visual proof that atlatl could send flames on thatched dwellings (Bolles 1977: 199, 202-203), and the thought arises that some blades might have been slathered with poison: fishing with toxins is certainly known in Yukateko sources, and detailed understanding of pharmacological effects would most likely be known to those in millennia-long contact with tropical forests (Barrera Vásquez *et al.* 1980: 872, "poisoning fish with the bark of certain trees to grab them," from the *Diccionario de la Lengua Maya* by Juan Pío Pérez).

The dense array of berms, platforms, terraces, concentric or serried ditch-and-ramparts, moats, rapid-descent ramps, and the incorporation of abrupt drops or steep slopes must have accorded with the perception of threat, the weaponry involved in defense and offense, the number of warriors or defenders to delay or stop attack, and the length of such attacks. At La Cuernavilla, areas to the base and beyond of the escarpment would fall comfortably within the "throwshed" of slingstones and atlatl darts, if directed from the edges of platforms or ramparts. Subsequent levels were certain to be fallback points, or areas for reserves if the initial ascent proved successful. In the Bonampak murals, the overwhelming display of noise, blaring trumpets, shouts and cries in its battle scene support an approach that would also explore the acoustical properties of the Buenavista citadels, for communicating between defenders and

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Stuart, personal communication, 2010), for its pellet takes the form of a sign with that possible reading (K4151).

for disorienting and dispiriting assailants. The murals seem to show that such trumpeters had another role: standing towards the back of the fray, they may have signaled or guided movements of soldiers (Persons 7, 8, 86, Room 2; Miller and Brittenham 2013: insert).

SYSTEMIC CITADELS

The novelty of the Buenavista system of citadels is beyond doubt. Nothing on this scale and dispersion, yet concentrated in an access route to a major city, is known before in the Maya region. Earlier, there were large-scale defenses, yet all occur in epicentral disposition, around one center only, not bristling along an expanse of valley. The pressing, future question about the Buenavista citadels is their precise dating, only addressable by excavation, and the elusive matter of central planning. At El Diablo, there can be little uncertainty about the link of royalty to defense, for the defenses surround a heavily excavated, palatial sector with occupation taking place over two centuries at most; it bears secure, previously established links to a dynastic founder and the Teotihuacan-related presence in and around Tikal. The chance that the citadels are unrelated to one another is also unlikely, as is the chance that they are autonomous foci of defense. They lie too close to one another, their features are too similar. But this matter is still subject to discussion, pending further research. In fact, the duplication of some features, such as reservoirs or watchtower-like platforms with central buildings, even implies distinct garrisons; with its palaces, El Diablo stands out as a royal setting and necropolis, although La Cuernavilla may eventually prove to contain quarters of comparable variety if not bulk. Ultimately, the development of the citadels suggests that it *is* a system, that it arose from central planning, with hills carefully chosen for circumvallation. In one area, between La Cuernavilla and El Diablo, there is the possibility of arrested construction. Walls were initiated but further development apparently lapsed. But, on the whole, the evidence channels strongly to a single scenario: of short-term, high-intensity, weapon-contingent, highly organized and coordinated building of a bellicose nature.

Central planning connotes central personages. Other parts of the world, such as France of King Louis XIV, had figures such as Marshall Vauban (Griffith 2006), innovators who thought large and by means of design principles responsive to the weaponry of the time. For Vauban, this would have involved depth in defense, with secondary enceintes and water obstacles, and his vaunted *Pré Carrée*, a comprehensive program of fortifications to defend the perimeter French realm (Griffith 2006: 12, 21); similar regional design inform boundaries between the Maya kingdoms of Yaxchilan and Piedras Negras (Scherer and Golden 2014: fig. 3.18). Before his passing, Michael Coe wondered, while looking at the Buenavista lidar, about the footprint of such a figure here. If so, there would be slighter evidence of incremental adjustments in major features, although likely modifications for minor ones. From mounting evidence, it does seem clear that the novelty was not just in infrastructure but the humans to staff it. The first references to young men in Maya texts appear to be to youthful warriors tied to Teotihuacan signs, *en face* depictions in glyphs, and, perhaps, new forms of martial organization, a legacy with material residue at Buenavista and its necklace of fortress on the northern side of the valley (Houston 2018: 47). Harder to assess are the perceived vulnerabilities and whether ostentatious display figured importantly in the Buenavista system. Those working in fields below, or passing east and west, would have been intensely conscious of these citadels. That psychological impact, less the reality than the threat of violence, may have been the overriding consequence of constructions from the time of Teotihuacan's strongest influence over the Classic Maya.

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REFERENCES

ACUÑA, MARY JANE AND CARLOS R. CHIRIBOGA

2019 Water and the Preclassic Maya at El Tintal, Petén, Guatemala. *Open Rivers* 14: 147-166.

ALCOVER FIRPI, OMAR

2016 Landscapes of War, Landscapes of Cooperation: Regional Settlement at El Zotz, Guatemala. Unpublished Master's thesis. Providence: Department of Anthropology, Brown University.

2020 Conflict, Defense, and Cooperation at Macabilero, Peten, Guatemala. Ph.D. dissertation. Providence: Department of Anthropology, Brown University.

AOYAMA, KAZUO

2005 Classic Maya Warfare and Weapons: Spear, Dart, and Arrow Points of Aguateca and Copan. *Ancient Mesoamerica* 16: 291-304.

AOYAMA, KAZUO AND ELIZABETH GRAHAM

2015 Ancient Maya Warfare: Exploring the Significance of Lithic Variation in Maya Weaponry. *Lithics: the Journal of the Lithic Studies Society* 36: 5-17.

ARA, DOMINGO DE

1986 *Vocabulario de lengua Tzeldal según el orden de Copanabastla*. Edited by Mario Humberto Ruz. Mexico City: Universidad Nacional Autónoma de México.

BACHAND, BRUCE R.

2006 Preclassic Excavations at Punta De Chimino, Petén, Guatemala: Investigating Social Emplacement on an Early Maya Landscape. Unpublished Ph.D. dissertation. Tucson: Department of Anthropology, University of Arizona.

BARRERA VÁSQUEZ, ALFREDO, JUAN RAMÓN BASTARRACHEA AND WILLIAM BRITO SANSORES

1980 *Diccionario Maya Cordemex*. Mérida, Yucatan: Ediciones Cordemex.

BAUGH, RICHARD A.

1998 Atlatl Dynamics. *Lithic Technology* 23(1): 31-41.

BEACH, TIMOTHY, SHERYL LUZZADDER-BEACH, COLIN DOYLE AND WILLIAM DELGADO

2018 Environments of El Zotz: Water and Soil Chemistry, the El Zotz Dam, and Long-Term Environmental Change. *An Inconstant Landscape: The Maya Kingdom of El Zotz, Guatemala*, edited by Thomas G. Garrison and Stephen Houston, pp. 163-188. Boulder: University Press of Colorado.

BEACH, TIMOTHY, SHERYL LUZZADDER-BEACH, JONATHAN FLOOD, STEPHEN HOUSTON, THOMAS G. GARRISON, EDWIN ROMÁN, STEVE BOZARTH AND JAMES DOYLE

2015 A Neighborly View: Water and Environmental History of the El Zotz Region. *Tikal: Paleoecology of an Ancient Maya City*, edited by David L. Lentz, Nicholas P. Dunning, and Vernon L. Scarborough, pp. 258-279. Cambridge: Cambridge University Press.

BELIAEV, DMITRI, DAVID STUART AND CAMILO A. LUIN

2017 Late Classic Maya Vase with the Mention of Sihyaj K'ahk' from the Museo VICAL, Casa Santo Domingo, Antigua Guatemala. *Mexicon* XXXIX(1): 1-4.

BOLLES, JOHN S.

1977 *La Monjas: A Major Pre-Mexican Architectural Complex at Chichen Itza*. Norman: University of Oklahoma Press.

BRACKEN, JUSTIN

2015 Muralla de León. In Proyecto Arqueológico Itza: Informe Preliminar Presentado al Instituto de Antropología e Historia de Guatemala de la Temporada de Investigación, año 2015, edited by Timothy W. Pugh and Evelyn M. Chan Nieto, pp. 52-70. New York: Queens College.

BRASWELL, GEOFFREY E.

2003 Introduction: Reinterpreting Early Classic Interaction. *The Maya and Teotihuacan: Reinterpreting Early Classic Interaction*, edited by Geoffrey E. Braswell, pp. 1-43. Austin: University of Texas Press.

BROWN VEGA, MARGARET AND NATHAN CRAIG

2009 New Experimental Data on the Distance of Sling Projectiles. *Journal of Archaeological Science* 36: 1264-1268.

CANUTO, MARCELLO A., FRANCISCO ESTRADA-BELLI, THOMAS G. GARRISON, STEPHEN D. HOUSTON, MARY JANE ACUÑA, MILAN KOVÁČ, DAMIEN MARKEN, PHILIPPE NONDÉDÉO, LUKE AULD-THOMAS, CYRIL CASTANET, DAVID CHATELAIN, CARLOS R. CHIRIBOGA, TOMÁŠ DRÁPELA, TIBOR LIESKOVSKÝ, ALEXANDRE TOKOVININE, ANTOLÍN VELASQUEZ, JUAN C. FERNÁNDEZ-DÍAZ AND RAMESH SHRESTHA

2018 Ancient Lowland Maya Complexity as Revealed by Airborne Laser Scanning of Northern Guatemala. *Science* 361, Issue 6409, DOI: 10.1126/science.aau0137.

CHASE, ARLEN F. AND DIANE Z. CHASE

2011 Status and Power: Caracol, Teotihuacan, and the Early Classic Maya World. *Research Reports in Belizean Archaeology* 8: 3-18.

CHASE, ARLEN F., DIANE Z. CHASE, JOHN F. WEISHAMPEL, JASON B. DRAKE, RAMESH L. SHRESTHA, K. CLINT SLATTON, JAIME J. AWE AND WILLIAM E. CARTER

2011 Airborne LiDAR, Archaeology, and the Ancient Maya Landscape at Caracol, Belize. *Journal of Archaeological Science* 38: 387-398.

COGGINS, CLEMENCY C. AND JOHN M. LADD

1992 Wooden Artifacts. *Artifacts from the Cenote of Sacrifice, Chichen Itza, Yucatan*, edited by Clemency C. Coggins, pp. 235-344. Memoirs of the Peabody Museum of Archaeology and Ethnology 10, 3. Cambridge, MA: Harvard University.

COWGILL, GEORGE

2015 *Ancient Teotihuacan: Early Urbanism in Central Mexico*. Cambridge: Cambridge University Press.

DOYLE, JAMES A., THOMAS G. GARRISON AND STEPHEN D. HOUSTON

2012 Watchful Realms: Integrating GIS Analysis and Political History in the Southern Maya Lowlands. *Antiquity* 86: 792-807.

ESTRADA-BELLI, FRANCISCO

2011 *The First Maya Civilization: Ritual and Power before the Classic Period.* New York: Routledge.

ESTRADA-BELLI, FRANCISCO, ALEXANDRE TOKOVININE, JENNIFER FOLEY, HEATHER HURST, GENE A. WARE, DAVID STUART AND NIKOLAI GRUBE

2009 A Maya Palace at Holmul, Guatemala, and the Teotihuacan "Entrada": Evidence from Murals 7 and 9. *Latin American Antiquity* 20(1): 228-259.

FERNANDEZ-DIAZ, JUAN CARLOS, WILLIAM E. CARTER, CRAIG GLENNIE, RAMESH L. SHRESTHA, ZHIGANG PAN, NIMA EKHTARI, ABHINAV SINGHANIA, DARREN HAUSER AND MICHAEL SARTORI

2016 Capability Assessment and Performance Metrics for the Titan Multispectral Mapping Lidar. *Remote Sensing* 8: 936, DOI: 10.3390/rs8110936.

FORSYTH, DONALD W.

1983 *Investigations at Edzná, Campeche, Mexico, Vol. 2: Ceramics*. Papers of the New World Archaeological Foundation 46. Provo: Brigham Young University.

GARCÍA CAPISTRÁN, HUGO AND EDUARDO SALVADOR RODRÍGUEZ

2017 Evidencia de la presencia de Siyaj K'ahk' en Río Azul: nuevo registro de los monumentos. *XXX Simposio de Investigaciones Arqueológicas en Guatemala 2016*, edited by Bárbara Arroyo, Luis Méndez, and Gloria Ajú, pp. 643-656. Guatemala: Museo Nacional de Arqueología y Etnología.

GARCÍA-DES LAURIERS, CLAUDIA

2007 Proyecto Arqueológico Los Horcones: Investigating the Teotihuacan Presence on the Pacific Coast of Chiapas, Mexico. Unpublished PhD dissertation. University of California, Riverside.

GARRISON, THOMAS G., STEPHEN HOUSTON AND OMAR ALCOVER FIRPI

2019 Recentering the Rural: Lidar and Articulated Landscapes among the Maya. *Journal of Anthropological Archaeology* 53: 133-146.

GARRISON, THOMAS G., STEPHEN D. HOUSTON, ANDREW K. SCHERER, DAVID DEL CID, JOSE LUIS GARRIDO LÓPEZ, EWA CZAPIEWSKA-HALLIDAY AND EDWIN ROMÁN

2016 A Royal Maya Country House: Archaeology at Bejucal, Guatemala. *Journal of Field Archaeology* 41: 532-549.

GARRISON, THOMAS G., KEVIN MERCY, STEPHEN HOUSTON, OMAR ALCOVER FIRPI, YENY GUTIÉRREZ AND ALBERT LIN

2018 Parte II: Resultados de las investigaciones regionales del campo de 2017. *Proyecto Arqueológico El Zotz Informe Real, 12va Temporada de Campo*, edited by Yeny Myshell Gutiérrez Castillo, Jose Luis Garrido López, Thomas G. Garrison, Stephen Houston and Edwin Román pp. 108-123. Guatemala: Dirección General del Patrimonio Cultural y Natural.

GOLDEN, CHARLES AND ANDREW SCHERER

2006 Border Problems: Recent Archaeological Research along the Usumacinta River. *The PARI Journal* 7(2): 1-16.

GRIFFITH, PADDY

2006 *The Vauban Fortifications of France*. Botley: Osprey.

HARRISON-BUCK, ELEANOR

2004 Nourishing the Animus of Lived Space through Ritual Catching. *K'axob: Ritual, Work, and Family in an Ancient Maya Village*, edited by Patricia A. McAnany, pp. 64-85. Monumenta Archaeologica 22. Los Angeles: Cotsen Institute of Archaeology, University of California, Los Angeles.

HASSIG, ROSS
1992 *War and Society in Ancient Mesoamerica*. Berkeley: University of California Press.
HELMKE, CHRISTOPHE AND JAIME J. AWE
2016 Sharper than a Serpent's Tooth: A Tale of the Snake-head Dynasty as Recounted on Xunantunich Panel 4. *The PARI Journal* 17: 1-22.
HORN, SHERMAN III AND ANABEL FORD
2019 Beyond the Magic Wand: Methodological Developments and Results from Integrated Lidar Survey at the Ancient Maya Center El Pilar. *STAR: Science & Technology of Archaeological Research*, DOI: 10.1080/20548923.2019.1700452.
HOUSTON, STEPHEN
2017 Getting Stoned (in the Grolier Codex). *Maya Decipherment: Ideas on Ancient Maya Writing and Iconography*: https://mayadecipherment.com/2017/04/08/getting-stoned-in-the-grolier-codex/ [Accessed: Jan. 8th, 2020].
2018 *The Gifted Passage: Young Men in Classic Maya Art and Text*. New Haven: Yale University Press.
HOUSTON, STEPHEN, THOMAS G. GARRISON AND EDWIN ROMÁN
2018 A Fortress in Heaven: Researching the Long Term at El Zotz, Guatemala. *An Inconstant Landscape: The Maya Kingdom of El Zotz, Guatemala*, edited by Thomas G. Garrison and Stephen Houston, pp. 5-45. Boulder: University Press of Colorado.
HOUSTON, STEPHEN, SARAH NEWMAN, EDWIN ROMÁN AND THOMAS GARRISON
2015 *Temple of the Night Sun: A Royal Tomb at El Diablo, Guatemala*. San Francisco: Precolumbia Mesoweb Press.
HOUSTON, STEPHEN, KARL TAUBE, SHERYL LUZZADDER-BEACH AND TIMOTHY BEACH
2017 Bamboo–A Neglected Maya Material? *Maya Decipherment: Ideas on Ancient Maya Writing and Iconography*: https://mayadecipherment.com/2017/07/12/bamboo-a-neglected-maya-material/ [Accessed: Jan. 8th, 2020].
HRUBY, ZACHARY X.
2019 The Maya Atlatl. Unpublished manuscript.
INOMATA, TAKESHI
1997 The Last Day of a Fortified Classic Maya Center: Archaeological Investigations at Aguateca, Guatemala. *Ancient Mesoamerica* 8(2): 337-352.
2008 *Warfare and the Fall of a Fortified Center: Archaeological Investigations at Aguateca*. Vanderbilt Institute of Mesoamerican Archaeology Vol. 3. Nashville, TN: Vanderbilt University Press.
JETT, STEPHEN C.
1970 The Development and Distribution of the Blowgun. *Annals of the Association of American Geographers* 60: 662-688.
KEELEY LAWRENCE H.
2016 Food for War, War for Food, and War on Food. *The Archaeology of Food and Warfare: Food Insecurity in Prehistory*, edited by Gregory D. Wilson and Amber M. VanDerwarker, pp. 291-302. New York: Springer.
KEELEY, LAWRENCE H., MARISA FONTANA AND RUSSELL QUICK
2007 Baffles and Bastions: The Universal Features of Fortifications. *Journal of Archaeological Research* 15(1): 55-95.
KNOWLES, SUSAN M.
1984 A Descriptive Grammar of Chontal Maya (San Carlos Dialect). Unpublished Ph.D. dissertation. New Orleans: Department of Anthropology, Tulane University.

LAPORTE, JUAN PEDRO

2003a Architectural Aspects of Interaction between Tikal and Teotihuacan during the Early Classic Period. *The Maya and Teotihuacan: Reinterpreting Early Classic Interaction*, edited by Geoffrey E. Braswell, pp. 199-216. Austin: University of Texas Press, Austin.

2003b Thirty Years Later: Some Results of Recent Investigations in Tikal. *Tikal: Dynasties, Foreigners and Affairs of State: Advancing Maya Archaeology*, edited by Jeremy A. Sabloff, pp. 281-318. Santa Fe: School of American Research Press.

LEVY, JACK S. AND WILLIAM R. THOMPSON

2011 *The Arc of War: Origins, Escalation, and Transformation*. Chicago: University of Chicago Press.

MADRY, SCOTT L. H. AND LYNN RAKOS

1996 Line-of-Sight and Cost-Surface Techniques for Regional Research in the Arroux River Valley. *New Methods, Old Problems: Geographic Information Systems in Modern Archaeological Research*, edited by Herbert D. G. Maschner, pp. 104-126. Center for Archaeological Investigations, Occasional Paper No. 23. Carbondale: Southern Illinois University.

MARTIN, SIMON

2000 At the Periphery: The Movement, Modification and Re-use of Early Monuments in the Environs of Tikal. *The Sacred and the Profane: Architecture and Identity in the Southern Maya Lowlands*, edited by Pierre R. Colas, Kai Delvendahl, Marcus Kuhnert, and Annette Schubart, pp. 51-62. Acta Mesoamericana 10. Markt Schwaben: Verlag Anton Saurwein.

2003 In Line of the Founder: A View of Dynastic Politics at Tikal. *Tikal: Dynasties, Foreigners and Affairs of State: Advancing Maya Archaeology*, edited by Jeremy A. Sabloff, 11-17. Santa Fe: School of American Research Press.

2005 Of Snakes and Bats: Shifting Identities at Calakmul. *The PARI Journal* 6: 5-15.

2017 The Caracol Hieroglyphic Stairway. *Maya Decipherment: Ideas on Ancient Maya Writing and Iconography*: https://mayadecipherment.com/2017/01/20/the-caracol-hieroglyphic-stairway/ [Accessed: Jan. 7th, 2020].

MARTIN, SIMON AND NIKOLAI GRUBE

2008 *Chronicle of the Maya Kings and Queens: Deciphering the Dynasties of the Ancient Maya*. 2nd ed. London: Thames and Hudson.

MARTINDALE, ANDREW, AND KISHA SUPERNANT

2009 Quantifying the Defensiveness of Defended Sites on the Northwest Coast of North America. *Journal of Anthropological Archaeology* 28: 191-204.

MASCHNER, HERBERT D. C. AND KATHERINE REEDY-MASCHNER

1998 Raid, Retreat, Defend (Repeat): The Archaeology and Ethnohistory of Warfare on the North Pacific Rim. *Journal of Anthropological Archaeology* 17: 19-51.

MATHENY, RAY, DEANNE L. GURR, DONALD W. FORSYTH AND R. RICHARD HAUCK

1983 *Investigations at Edzná, Campeche, Mexico, Vol. 1, Part 1: The Hydraulic System*. Papers of the New World Archaeological Foundation 46. Provo: Brigham Young University.

MILKS, ANNEMIEKE, DAVID PARKER AND MATT POPE

2019 External Ballistics of Pleistocene Hand-Thrown Spears: Experimental Performance Data and Implications for Human Evolution. *Nature: Scientific Reports* 9: 820: https://doi.org/10.1038/s41598-018-37904-w.

MILLER, MARY AND CLAUDIA BRITTENHAM

2013 *The Spectacle of the Late Maya Court: Reflections on the Murals of Bonampak*. Austin: University of Texas Press.

MOHOLY-NAGY, HATTULA

2002 *The Artifacts of Tikal: Utilitarian Artifacts and Unworked Material*. Tikal Report 27B,

University Museum Monograph 118. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

MORALES-AGUILAR, CARLOS, RICHARD D. HANSEN, DOUGLAS MAURICIO AND MARVIN PRADO

2015 El Mirador Mapping Program 2003-2015: Investigation of an Ancient Maya City with Total Station, Remote Sensing, and GIS. Paper presented at the 80th Annual Meeting of the Society for American Archaeology. San Francisco: Society for American Archaeology April 19.

NIELSEN, JESPER, CHRISTOPHE HELMKE, FIORELLA FENOGLIO LIMÓN AND JUAN CARLOS SAINT-CHARLES ZETINA

2019 *The Early Classic Murals of El Rosario, Querétaro, Mexico: Description and Iconographic Analysis*. Ancient America 14. Barnardsville: Boundary End Center.

NONDÉDÉO, PHILIPPE, ALFONSO LACADENA AND JUAN IGNACIO CASES MARTÍN

2019 Teotihuacanos y mayas en la 'entrada' de 11 eb' (378 d.C.): nuevos datos de Naachtun, Petén, Guatemala. *Revista Española de Antropología Americana* 49 (número especial): 53-75.

PALKA, JOEL W.

2001 Ancient Maya Defensive Barricades, Warfare, and Site Abandonment. *Latin American Antiquity* 12(4): 427-430.

PETRE, JAMES

2010 Crusader Castles of Cyprus: The Fortifications of Cyprus under the Lusignans: 1191-1489. Unpublished Ph.D. dissertation. Cardiff: School of History and Archaeology, University of Cardiff.

PROSKOURIAKOFF, TATIANA

1985 *Maya History*. Edited by Rosemary A. Joyce. Austin: University of Texas Press.

PULESTON, DENNIS, AND DONALD CALLENDER, JR

1967 Defensive Earthworks at Tikal. *Expedition* 9(3): 40-48.

RESTALL, MATTHEW

2014 Invasion: The Maya at War, 1520s–1540s. *Embattled Bodies, Embattled Places War in Pre-Columbian Mesoamerican and the Andes*, edited by Andrew K. Scherer and John W. Verano, pp. 93-116. Washington, D.C.: Dumbarton Oaks Research Library and Collection.

RICHARDSON, THOM

2016 *The Tower Armoury in the Fourteenth Century*. Leeds: Royal Armouries.

RIVAS, ANDRÉ

2019 Excavaciones en áreas defensivas del Grupo El Diablo (Operación 28). *Proyecto Arqueológico El Zotz: 13ª. Temporada De Campo, Informe Entregado a la Dirección General del Patrimonio Cultural y Natural*, edited by Yeny Myshell Gutiérrez Castillo, Thomas G. Garrison, Jose Luis Garrido López, Edwin Román Ramirez and Stephen Houston, pp. 73-104. Guatemala: Proyecto Arqueológico El Zotz.

ROMÁN RAMÍREZ, EDWIN R.

2017 The Early Classic Encounter: An Examination of the Cultural and Historical Implications of an Ancient Maya Palace at El Diablo, El Zotz, Guatemala. Unpublished Ph.D. dissertation. Austin: Latin American Studies, University of Texas, Austin.

ROMÁN, EDWIN, STEPHEN HOUSTON AND FERNANDO VELIZ

2019 Excavaciones en el sitio La Cuernavilla (Operación 1). *Proyecto Arqueológico El Zotz: 13ª. Temporada De Campo, Informe Entregado a la Dirección General del Patrimonio Cultural y Natural*, edited by Yeny Myshell Gutiérrez Castillo, Thomas G. Garrison, Jose Luis Garrido López, Edwin Román Ramirez and Stephen Houston, pp. 105-132. Guatemala: Proyecto Arqueológico El Zotz.

ROSCOE, PAUL

2008 Settlement Fortification in Village and "Tribal" Society: Evidence from Contact-Era New Guinea. *Journal of Anthropological Archaeology* 27: 507-519.

SCARBOROUGH, VERNON L.

1991 *The Settlement System in a Late Preclassic Maya Community*. Archaeology at Cerros, Belize, Central America Vol. III. Dallas: Southern Methodist University Press.

SCHELE, LINDA AND DAVID FREIDEL

1990 *A Forest of Kings: The Untold Story of the Ancient Maya*. New York: William Morrow.

SCHERER, ANDREW K. AND CHARLES GOLDEN

2014 War in the West: History, Landscape, and Classic Maya Conflict. *Embattled Bodies, Embattled Places War in Pre-Columbian Mesoamerican and the Andes*, edited by Andrew K. Scherer and John W. Verano, pp. 57-92. Washington, D.C.: Dumbarton Oaks Research Library and Collection.

SLATER, DONALD A.

2011 Power Materialized: The Dart-Thrower as a Pan-Mesoamerican Status Marker. *Ancient Mesoamerica* 22: 371-388.

SNEAD, JAMES E.

2008 War and Place: Landscapes of Conflict in Prehistory. *Journal of Conflict Archaeology* 4(1-2): 147-158.

STONE, ANDREA

1989 Disconnection, Foreign Insignia, and Political Expansion: Teotihuacan and the Warrior Stelae of Piedras Negras. *Mesoamerica After the Decline of Teotihuacan*, edited by Richard Diehl and Janet Berlo, pp. 153-172. Washington, D.C.: Dumbarton Oaks.

STUART, DAVID

2000 The "Arrival of Strangers": Teotihuacan and Tollan in Classic Maya History. *Mesoamerica's Classic Heritage: From Teotihuacan to the Aztecs*, edited by Davíd Carrasco, Lindsay Jones, and Scott Sessions, pp. 465-514. Boulder: University Press of Colorado.

2006 *The Inscriptions from Temple XIX at Palenque: A Commentary*. San Francisco: Pre-Columbian Art Research Institute.

2019 Owl Striker: A Historical and Archaeological Interpretation of “Spearthrower Owl,” A Possible Ruler of Teotihuacan. Unpublished paper. Austin: The Mesoamerica Center, University of Texas.

STUART, DAVID AND STEPHEN HOUSTON

2019 Cotton, Snow, and Distant Wonders. *Tiempo detenido, tiempo suficiente: Ensayos y narraciones mesoamericanistas en homenaje a Alfonso Lacadena García-Gallo*, edited by Harri Kettunen, Verónica Amellali Vázquez López, Felix Kupprat, Cristina Vidal Lorenzo, Gaspar Muñoz Cosme, and María Josefa Iglesias Ponce de León, pp. 317-328. Couvin, Belgium: Wayeb.

SUGIYAMA, NAWA, WILLIAM L. FASH, BARBARA W. FASH AND SABURO SUGIYAMA

2020 The Maya at Teotihuacan? New Insights into Teotihuacan-Maya Interactions from Plaza of the Columns Complex. In *Teotihuacan: The World Beyond the City,* edited by Kenneth G. Hirth, David M. Carballo, and Bárbara Arroyo, pp. 139-172. Dumbarton Oaks Research Library and Collection, Washington, D.C.

TAUBE, KARL A.

2003 Tetitla and the Maya Presence at Teotihuacan. *The Maya and Teotihuacan: Reinterpreting Early Classic Interaction*, edited by Geoffrey E. Braswell, pp. 273-314. Austin: University of Texas Press.

2017 Aquellos del este: Representaciones de dioses y hombres mayas en la pinturas realistas de Tetitla, Teotihuacan. *Las pinturas realistas de Tetitla, Teotihuacan: Estudios a través de La obra de Agustín Villagra Caleti*, edited by Leticia Staines Cincero and Christophe Helmke, pp. 71-99. Mexico City: Universidad Nacional Autónoma de México, Instituto Nacional de Antropología e Historia.

TAUBE, KARL AND MARC ZENDER

2009 American Gladiators: Ritual Boxing in Ancient Mesoamerica. *Blood and Beauty: Organized Violence in the Art and Archaeology of Mesoamerica and Central America*, edited by Heather Orr and Rex Koontz, pp. 161-220. Los Angeles: Cotsen Institute of Archaeology Press.

TIESLER, VERA AND ANDREA CUCINA

2012 Where Are the Warriors? Cranial Trauma Patterns and Conflict Among the Ancient Maya. *The Bioarchaeology of Violence: Bioarchaeological Interpretations of the Human Past, Local, Regional, and Global Perspectives*, edited by Debra L. Martin, Ryan P. Harrod and Ventura R. Pérez, pp. 160-179. Gainesville: University Press of Florida.

VENTURA, CAROL

2003 The Jakaltek Maya Blowgun in Mythological And Historical Context. *Ancient Mesoamerica* 14(2): 257-268/

WEBSTER, DAVID L.

1976 *Defensive Earthworks at Becan, Campeche, Mexico: Implications for Maya Warfare*. Middle American Research Institute, Tulane University Publication 41. New Orleans: Tulane University.

WEBSTER, DAVID, JAY SILVERSTEIN, TIMOTHY MURTHA, HORACIO MARTÍNEZ AND KIRK STRAIGHT

2004 *The Tikal Earthworks Revisited*. Occasional Papers in Anthropology No. 28. State College: Department of Anthropology, Pennsylvania State University.

WISDOM, CHARLES

1950 *Materials on the Chorti Lnaguage*. University of Chicago Microfilm Collection of Manuscripts of Cultural Anthropology 28. Chicago: Joseph Regenstein Library, University of Chicago.

YORK, ROBERT AND GIGI YORK

2011 *Slings and Slingstones: The Forgotten Weapons of Oceania and the Americas*. Kent: Kent State University Press.