





THE PRECERAMIC AND EARLY CERAMIC PERIODS IN BELIZE AND THE CENTRAL MAYA LOWLANDS

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Abstract

This introduction to the Special Section provides a summary of our current understanding of the first humans and the first Maya in these regions and presents seven articles that examine these critical periods from varied, intersecting perspectives. The Introduction begins with a brief history of early preceramic research (primarily in northern Belize) and provides a current chronology for the Paleoindian, Archaic, and Early Preclassic periods. The Paleoindian and Archaic (ca. 11,500–900 B.C.) periods are discussed in terms of the origins of the first peoples in these regions, lithic technology, subsistence, and early ritual. Next, a summary of archaeological evidence for the transition to the first villages (ca. 1200–800 B.C.) is provided, with examinations of a horticultural lifestyle, the earliest ceramics, increased socio-economic complexity, new ideology and ritual practices, and developing social inequality. Proto-Mayan and Mayan languages—their dating, origin, and early lexicon—are discussed in relation to the first Maya. Material culture and language are explored with regard to conceptions of Maya culture.

INTRODUCTION

Despite more than a century of archaeology in Belize and the central Maya lowlands, many aspects of the past in this part of Mesoamerica still elude us and continue to provoke lively discussions. Among the most pressing, perplexing, and debated topics are those related to the first humans in these regions and the appearance of the first people who can be called “Maya.” To assist in addressing these topics, in addition to other questions concerning the preceramic and early ceramic-using people of Belize and the central Maya lowlands, seven articles in this Special Section, titled “The Preceramic and Early Ceramic Periods in Belize and the Central Maya Lowlands,” summarize and expand upon much of what we currently know about the first humans and the first Maya.

This introduction to the Special Section provides a brief summary of early research into the preceramic in Belize and the central Maya lowlands (the term “preceramic” is used to refer to all periods before the appearance of pottery rather than Iceland’s [1997:177, 204] specific Late Archaic phases). It also provides a current chronology used by archaeologists to define the Paleoindian through the Terminal Early to Early Middle Preclassic periods and discusses significant aspects of both the preceramic and early ceramic people in Belize and the central Maya lowlands. For the Paleoindian and Archaic periods, a brief discussion of early human remains and aDNA is provided, followed by a summary of preceramic lithic technology, subsistence strategies of preceramic peoples (including early cultigens), occupation patterns, lithic production locales, and possible evidence for early

ritual behavior. Evidence associated with the appearance of the first Maya in these regions is discussed in terms of archaeological remains and language. Notably, our consideration of archaeological evidence for the first Maya includes early horticulture, specifically involving maize, the first appearance of ceramics, early traces of villages, evidence for increases in both socioeconomic and ideological complexity, and traces of emerging social inequality. The transition from proto-Mayan to early Mayan languages is explored using multiple lines of evidence to demonstrate the connections of the Mayan lexicon to the preceramic past, including early food production and domesticates. In light of the current archaeological and linguistic information about the Maya, we summarize various explanations for the origins of the earliest Mayan speakers and their diverse connections to preceramic people.

EARLY RESEARCH AND THE PRECERAMIC IN BELIZE AND THE CENTRAL MAYA LOWLANDS

Prior to the 1980s, there was minimal evidence for preceramic people in the central Maya lowlands (MacNeish and Nelken-Terner 1983a; Zeitlin 1984). What little was known of the Paleoindian and Archaic was based on a few fluted points and scatters of chipped stone from the highlands of Guatemala and Honduras, most of questionable date (e.g., Brown 1980; Coe 1960; Gruhn et al. 1977; Hayden 1980). Concerning the paucity of evidence for a preceramic in the Maya lowlands, Marcus (1983:457) noted at the time:

While Maya archaeologists assumed the Lowlands must have been occupied in preceramic times, they did little to test this

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assumption during the 1950s, 1960s, and 1970s while preceramic sites were being excavated in Tamaulipas, Tehuacán, Oaxaca, the Grijalva Depression, and the Basin of Mexico.

Following four years of fieldwork in northern Belize in the early part of the 1980s, under the auspices of the Belize Archaic Archaeological Reconnaissance (BAAR) Project, MacNeish and Nelken-Terner (1983a, 1983b) proposed a tentative six-phase preceramic sequence of stone tools for Belize. It began with the Late Paleoindian/Early Archaic Lowe-ha phase, which included fluted points and stemmed bifaces that were possibly as early as 9000 B.C. The subsequent Sand Hill phase (7500–6000 B.C.) also contained stemmed bifaces that are recognized as Lowe points today (Hester et al. 1980; Kelly 1993). This early typology was built on seriation and included cultural phases with their own distinctive chipped and ground stone technologies that extended throughout the Archaic to as late as about 2000 B.C. Based on excavations at nine stratified sites, the testing of four sites, and the identification of about another 100 preceramic locations, there was much speculation by MacNeish and Nelken-Terner (1983b:63; Zeitlin 1984) about the changes in settlement types, subsistence practices, and mobility of these earliest peoples over time. However, in the early 1980s, the possibility of a significant preceramic occupation in Belize and the BAAR typology were both met with some reservation:

It must be emphasized that this preceramic sequence is a seriation, with no single site having more than two components in stratigraphic superposition, and most sites consisting only of surface material. The interpretation of the sites as preceramic [...] and the dynamic model interrelating the sites, are, although plausible, based at present mainly on artifact morphology and interregional analogy (Hammond 1982:355).

A main concern about the proposed BAAR chronology was its paucity of supporting radiocarbon dates. The work by BAAR overlapped with that of the Colha Project Regional Survey, which focused on areas within the Northern Belize Chert-bearing Zone (NBCZ), including Ladyville, Sand Hill, and Lowe Ranch (Figure 1; Hester et al. 1980; Kelly 1993; Shafer et al. 1980). The search for preceramic sites in the NBCZ continued from 1987 to the mid-1990s at Colha and the Kelly site, with the Colha Preceramic Project producing additional evidence for a Late Archaic presence in northern Belize, including stone tool production locations (Hester et al. 1996; Iceland 1997; Kelly 1993). Excavations and coring at sites in the region between the Río Hondo and New River of northern Belize revealed Archaic levels associated with chipped stone, notably a Lowe point and a constricted uniface, maize and manioc pollen, and evidence for deforestation (Pohl et al. 1996). As the work of Hester, Shafer, Kelly, and Iceland, among others, continued in northern Belize, there was increased awareness that the original BAAR sequence needed significant modification. In the late 1990s and early 2000s, excavations by Rosenswig and Masson (2001; Rosenswig 2004, 2015; Rosenswig et al. 2014) demonstrated that preceramic human occupation was more widespread than previously known, including evidence for possible living floors. Although there was some mention of diagnostic artifacts, including a Lowe point and constricted adzes, in central Belize (see Iceland 1997), excavations into Archaic deposits occurred only in the mid-2000s, with the work of Lohse (2007, 2010, 2020; Lohse et al. 2006) at Actun Halal. Both Brown (M. K. Brown et al. 2011) and Horowitz (2017) also

encountered preceramic lithic debitage in paleosols beneath Maya occupations in central Belize. Despite some surface finds (Stemp and Awe 2013; Stemp et al. 2016; Weintraub 1994), preceramic occupations had been suspiciously absent in southern Belize. However, the work by Pruffer (2018; Pruffer and Kennett 2020; Pruffer et al. 2017, 2019, 2021) in three rockshelters south of the Maya Mountains has provided some of the oldest dated deposits with stone tools and human remains in the central Maya lowlands.

THE PRECERAMIC AND EARLY CERAMIC CHRONOLOGY

Whether crossing the Bering land bridge or traveling by boat down the Pacific coast of the Americas, the first migrants to enter the “New World” ultimately arrived in Mexico and Central America at least by the Late Pleistocene (ca. 11,000 B.C.) (Acosta Ochoa 2010; Acosta Ochoa et al. 2019; Chatters et al. 2014; Cooke 1998; González et al. 2015; González González et al. 2008a, 2008b, 2013; Stinnesbeck et al. 2017; Waters et al. 2020; Zeitlin and Zeitlin 2000; see Flannery 2009; Flannery and Hole 2019). Until recently, there were few radiocarbon dates for the preceramic in the central Maya lowlands overall (Iceland 1997; Kelly 1993; Pohl et al. 1996; Zeitlin 1984). Preceramic sites and isolated surface finds were mainly identified by diagnostic stone tool types, heavily patinated debitage, and the lack of pottery (e.g., MacNeish and Nelken-Terner 1983a, 1983b; Rosenswig 2004, 2021; Rosenswig and Masson 2001; Stemp and Harrison-Buck 2019). Historically, the preceramic chronology that most archaeologists referenced for the central Maya lowlands was based on stone tool types and some radiocarbon dates from northern Belize (see Iceland 1997; Jacob 1995; Jones 1994; Kelly 1993; Lohse 2010; Lohse et al. 2006; Pohl et al. 1996). This chronology divides early occupation into the Paleoindian period (ca. 11,500–8000 B.C.) and the Archaic period (ca. 8000–900 B.C.). The Archaic is further subdivided into the Early Archaic (8000–3400 B.C.) and the Late Archaic (3400–900 B.C.), the latter of which consists of an Early Preceramic phase (3400–1900 B.C.) and a Late Preceramic phase (1500–900 B.C.) in northern Belize (Figure 2; Iceland 1997; Lohse et al. 2006:222, Figure 8; Zeitlin and Zeitlin 2000).

The earliest ceramics, such as Swasey/Bolay phase pottery from northern Belize (Andrews and Hammond 1990; Kosakowsky et al. 2018; Valdez et al. 2021) and Cunil phase pottery from central Belize (Awe 1992; Awe et al. 2021a; Cheetham 2005; Sullivan and Awe 2013; Sullivan et al. 2018), have been dated to the Early to Middle Preclassic (ca. 1200/1000–1000/800 B.C.). Therefore, the 900 B.C. date for the end of a “preceramic” Late Archaic may be too recent for some sites. Moreover, dates for the first pottery in other parts of Mesoamerica, such as the Tronadora complex (ca. 2000 B.C.) from northwest Costa Rica (Hoopes 1994), the Barra phase (ca. 1900 cal B.C.) from the Soconusco region of Chiapas (Rosenswig 2006), the Espiridión phase (ca. 2000 B.C.) in Oaxaca (Flannery and Marcus 2015), and the Baharona phase (ca. 1600 B.C.) along the Caribbean coast of Honduras (Joyce and Henderson 2001), are presently earlier than those in the central Maya lowlands and are also chronologically within the Belizean Archaic.

THE PALEOINDIAN AND ARCHAIC PERIODS

The First People: Who Were They?

There are few skeletons from preceramic contexts from the central Maya lowlands (Wrobel et al. 2021a). As such, we do not have a

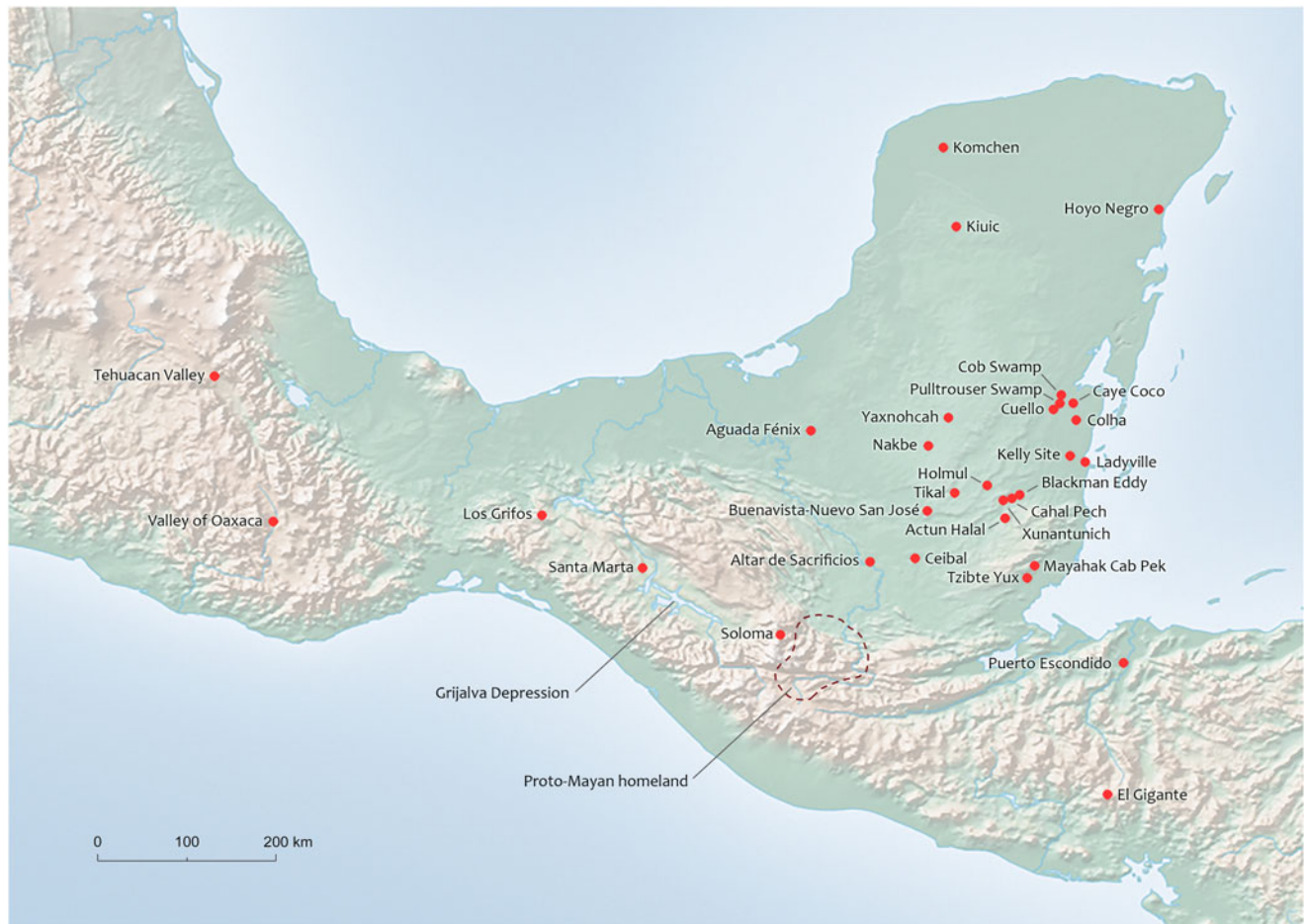


Figure 1. Map of Mesoamerica showing the sites and locations mentioned in the text. The postulated proto-Mayan homeland is also outlined. Map by Helmke.

good sense of population composition or changes in demography over time as preceramic hunter-gatherers gave way to early settled Maya populations (Wrobel et al. 2021b). Despite some controversies over dating these human remains, there is incontrovertible evidence for people in the region as early as around 13,000 to 12,000 years ago, based on dated human remains from caves in the Yucatan Peninsula (Arroyo et al. 2015; Chatters et al. 2014; González González et al. 2008b, 2013; Jackson et al. 2015; Posth et al. 2018; Stinnesbeck et al. 2017; Wrobel et al. 2021a). These remains point to genetic connections to ancient North and South Americans, and link indigenous peoples to ancient Eurasians.

These genetic data support reconstructions of a complex process of multiple migrations into the lowlands from North and South America (Chatters et al. 2014; Posth et al. 2018; Prufer et al. 2019; Roca-Rada et al. 2020; Wrobel et al. 2021a; also see Ochoa-Lugo et al. 2016 for connections between prehispanic Maya and East Asian populations). However, some of the remains indicate no biological connection between the earliest humans in Mesoamerica and the ancestors of the people who would become the Maya (Chatters et al. 2014; Posth et al. 2018). Moreover, current genetic evidence provided by skeletons from southern Belizean rockshelters paints a complex picture of incipient development. The aDNA data from these skeletons indicate that preceramic people buried in southern Belize possess some ancestry associated

with modern people from lower Central America and northern South America (Posth et al. 2018; Roca-Rada et al. 2020). Migrants from these regions (who were part of the initial Clovis population [Anzick] who moved into Central and South America) appear to have traveled north again and intermixed with populations already in Belize in the Early Archaic.

Based on human (and plant) genetic evidence, populations from regions in lower Central America and northern South America contributed to the first people in the central Maya lowlands (Kistler et al. 2020; Posth et al. 2018; Prufer et al. 2019, 2021). This constitutes an important heritage, as today's Maya demonstrate a significant genetic connection to these early migrants from lower Central America and South America (see Awe et al. 2021a; Prufer et al. 2021; Wrobel et al. 2021a).

Lithic Technology

The Paleoindian period in Mesoamerica was mainly defined by the presence of stone tools, specifically fluted lanceolate (or Clovis-style) and fishtail (or Fell's Cave-style) bifaces, that are similar to dated examples from North and South America (Acosta Ochoa et al. 2019; Miller et al. 2013; Morrow and Morrow 1999; Nami 2021; Waters et al. 2015, 2020). There are a few fluted points from highland Chiapas and Guatemala that have been dated

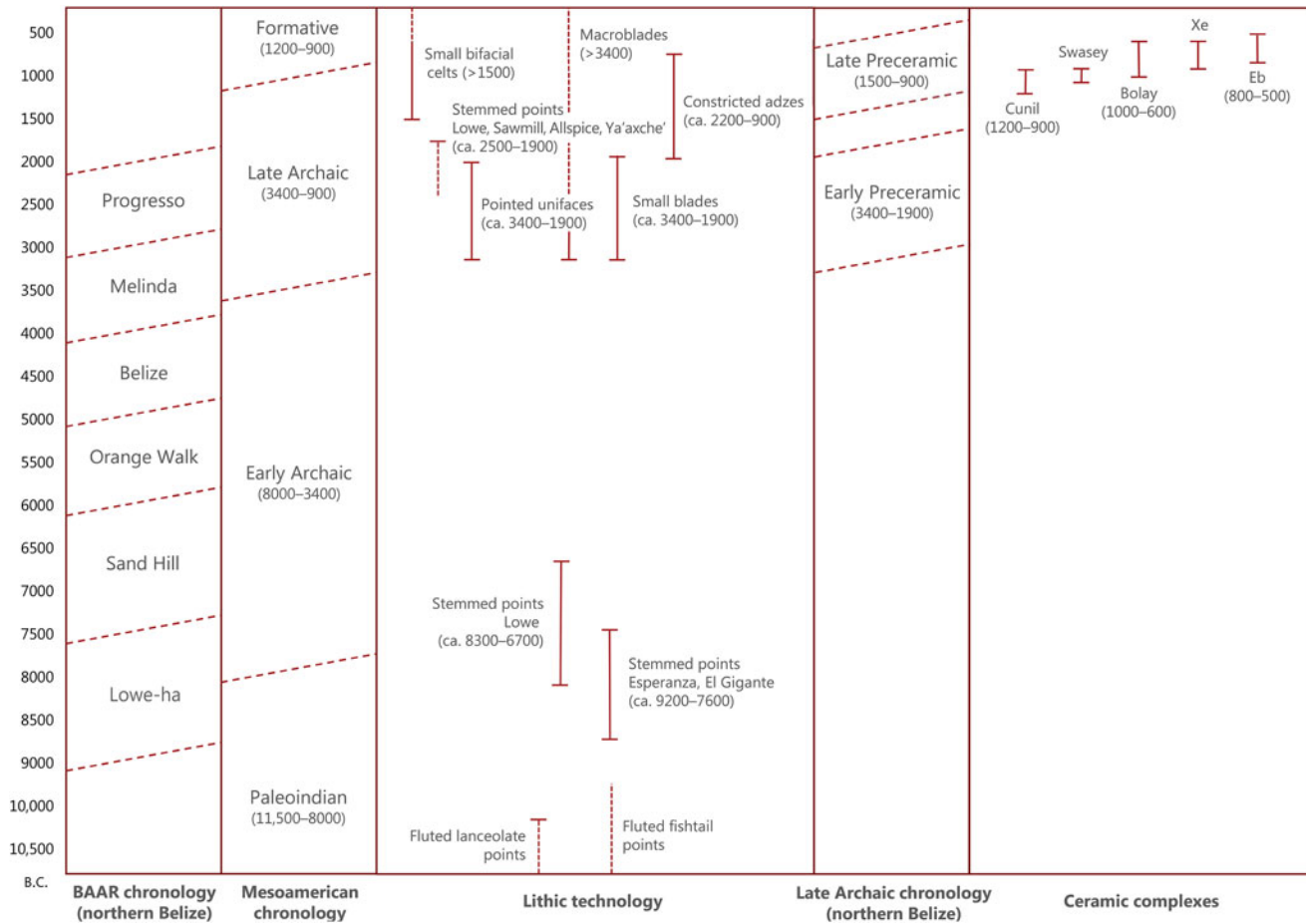


Figure 2. Preceramic and early ceramic Belize Archaeological Reconnaissance (BAAR) chronologies and technologies in Belize and the central Maya lowlands. Chart by Helmke.

to the Paleoindian period (see Acosta Ochoa 2012:133; Acosta Ochoa et al. 2019:99; Santamaría and García-Bárcena 1989), but most are undated or of questionable date (Brown 1980; Bullen and Plowden 1963; Coe 1960; Gruhn et al. 1977; Hayden 1980; Méndez Salinas and Lohse 2010). Similarly, there are no radiocarbon dates for the three fluted lanceolate points and four fluted fishtail points from Belize (Hester et al. 1981; Lohse et al. 2006; MacNeish and Nelken-Terner 1983a; MacNeish et al. 1980; Pearson and Bostrom 1998; Valdez and Aylesworth 2005; Weintraub 1994; see Supplementary Material 1). The presence of both fluted lanceolate and fishtail points in the central Maya lowlands, as well as the “fishtail”-like traits on some lanceolate points from Belize (Hester et al. 1981; Lohse et al. 2006:216; Pearson 2017:216–217; Valdez and Aylesworth 2005), suggests migration into the region from both the north and the south.

Recent excavations in the Mayahak Cab Pek and Tzibte Yux rockshelters (Prufer 2018; Prufer et al. 2017, 2019, 2021; Stemp et al. 2016) in southern Belize have provided some radiocarbon dates associated with an alternately beveled biface point fragment (10,450–10,085 cal B.C.) and three, possibly four, stemmed points called Lowe (8275–6650 cal B.C.; Prufer et al. 2021). These discoveries indicate a much earlier age for the first appearance of edge beveling and stemmed and barbed bifaces than the Late Archaic date (2500–1900 B.C.) previously proposed for Lowe points; that age is based on two radiocarbon dates possibly associated with three of

these points recovered from Ladyville 1 and Pulltrouser Swamp in northern Belize (Iceland 1997; Lohse et al. 2006; Pohl et al. 1996).

The new dates from southern Belize suggest that stemmed, barbed, and alternately beveled Lowe points (Figures 3a–3f) first appear in Belize in the Early Holocene and should be considered Late Paleoindian to Early Archaic in age; however, their relationships to fluted lanceolate and fishtail points and other stemmed points in Belize are not clear. It is possible that other stemmed points from Belize, specifically Sawmill, provisional Allspice, and provisional Ya'axche', are also earlier, but they remain to be dated (Hester et al. 1980; Kelly 1993; Lohse et al. 2006; Stemp and Awe 2013; Stemp et al. 2016; see Supplementary Material 1; Figures 3g–3k). Relatedly, the whole stemmed points and point fragments with basally thinned or fluted stems from the Esperanza phase (ca. 9200–7600 B.C.) in El Gigante rockshelter, Honduras, provide additional support for an Early Archaic date for stemmed points in southern Mesoamerica (Iceland and Hirth 2021; Kennett et al. 2017; Lohse 2020:16; Scheffler 2008; Scheffler et al. 2012). For most of the Early Archaic, there are few sites with examples of lithic technology, although expedient tools were being used (Acosta Ochoa 2010; Acosta Ochoa et al. 2019; Lohse 2007; Prufer et al. 2017, 2019; Rosenswig et al. 2014; Scheffler 2008). By the middle of the Early Archaic (ca. 6000 B.C.), bifacial point technology seems to have disappeared throughout much of the central Maya lowlands (Acosta Ochoa et al. 2019; Prufer et al. 2021; Scheffler et al. 2012:604–605).

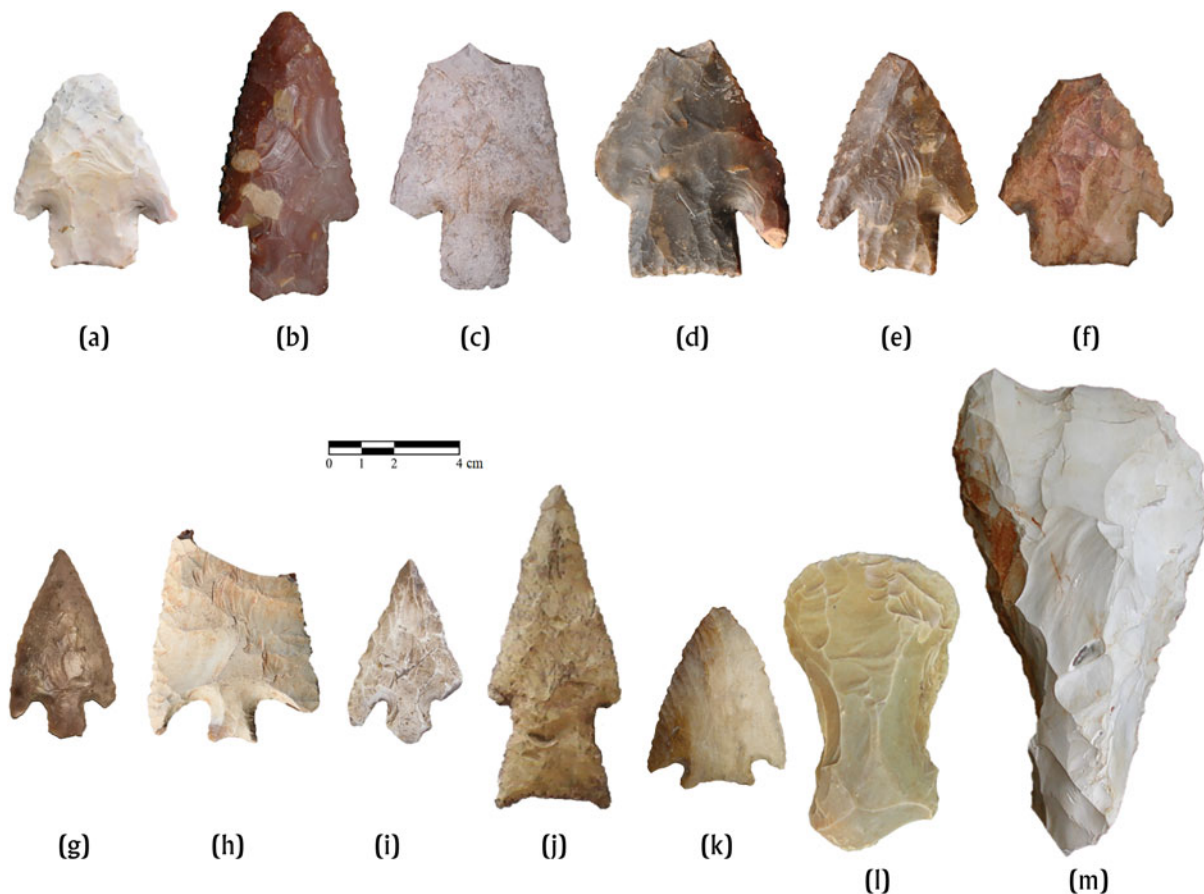


Figure 3. Diagnostic Archaic period lithics from Belize, including (a–f) Lowe points; (g–i) Sawmill points; (j) a provisional Allspice point; (k) a provisional Ya'axche' point; and (l–m) constricted adzes. Photographs by Awe, Stemp, L. McLoughlin, Satoru Murata, and Gabriel Wrobel.

Around the beginning of the Late Archaic (ca. 3400 B.C.), other diagnostic tools, including blades, macroblades, and pointed unifaces, appear in northern Belize (Hester et al. 1996; Iceland 1997, 2005; Lohse et al. 2006; Zeitlin and Zeitlin 2000:87). Macroblades, as well as small bifacial celts, continued to the end of the Late Archaic in northern Belize; forms of these tools are also found in Middle Preclassic contexts at Colha (Iceland 1997; Lohse et al. 2006; Potter 1991; Rosenswig et al. 2014; Stemp and Harrison-Buck 2019). However, these tool types appear to be absent in central Belize, where there was a reliance on expedient lithic technology near the end of the Late Archaic into the Preclassic periods (M. K. Brown et al. 2011; Horowitz 2015, 2017; Stemp et al. 2018a).

A diagnostic tool type from the latter half of the Late Archaic is the constricted adze used on wood and in soil (Gibson 1991; Hudler and Lohse 1994; Iceland 1997; Stemp and Harrison-Buck 2019; see Supplement Material 1; Figures 3l and 3m). These tools have been assigned a date range of approximately 2200–900 B.C., based on radiocarbon dates from Colha and Pulltrouser Swamp in northern Belize (Hester et al. 1996; Iceland 1997; Pohl et al. 1996) and Actun Halal in central Belize (Lohse 2020; see also Lohse 2007: Table 1; Lohse 2010:340, Figure 13 for RC date Beta-221898). Constricted unifaces and one constricted biface have been found in northern and central Belize (Iceland 1997; Murata 2011; Rosenswig et al. 2014; Stemp and Awe 2013; Stemp et al. 2018a), but have not been reported from elsewhere in the central

Maya lowlands. The use of constricted adzes indicates that early inhabitants of Belize were starting to clear the forest to create open spaces for farming as they transitioned to more settled lifestyles.

Subsistence: Hunting, Gathering, and Early Cultigens

Current evidence indicates that the first people who arrived in Central America in the Late Pleistocene adapted to increasingly warmer and wetter environments. They began to exploit new biota that accompanied the transition to the Holocene and the development of dense tropical broadleaf forests in later millennia (Hodell et al. 2008; Grauel et al. 2016; Piperno and Pearsall 1998; Piperno and Smith 2012; Prufer and Kennett 2020; Winter et al. 2020). Preserved plant remains from preceramic sites in Belize and Guatemala are quite limited. Currently, there are no plant remains dated from the Paleoindian to the middle of the Early Archaic period (ca. 11,500–4500 B.C.) in these regions. However, starch grains, pollen, and microfossil evidence from the Santa Marta rockshelter in Chiapas, Mexico indicate the likely consumption of wild plant resources and possibly semi-domesticated species, such as green tomato, nance, figs, and possibly cacao, as well as teosinte (Acosta Ochoa 2010). The remains of maguey/agave, hog plum, avocado, mamey (*Pouteria sapota*), mesquite beans, and acorns have also been recovered from El Gigante rockshelter in

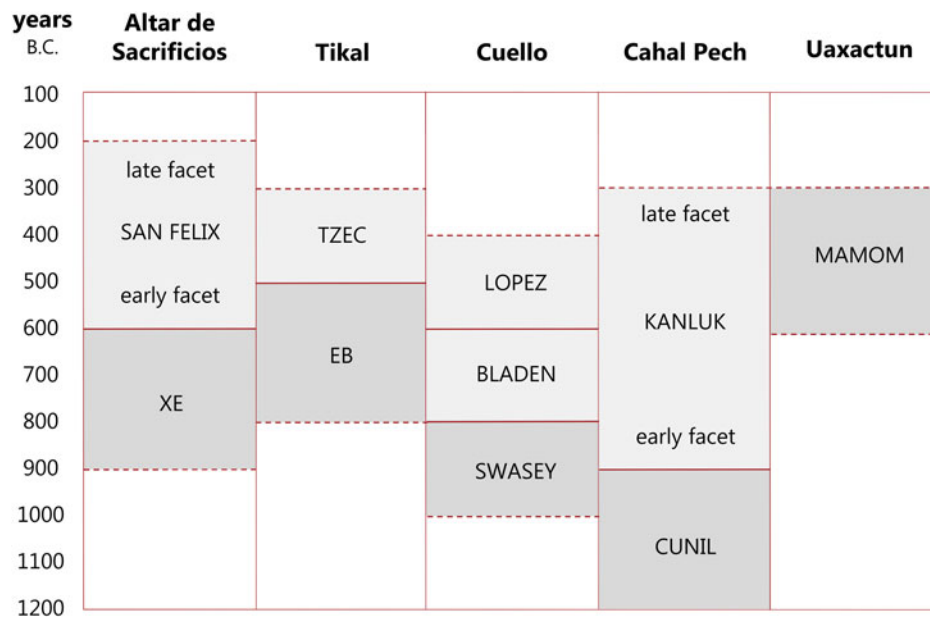


Figure 4. Early ceramic complexes in Belize and Guatemala. Graph by Sullivan and Helmke.

Honduras in the Early Archaic (Kennett et al. 2017; Scheffler 2008; Scheffler et al. 2012).

Although relatively little is known about the fauna from preceramic sites in the central Maya lowlands, skeletal remains provide clues to subsistence as early as the Late Pleistocene. The remains of horse, peccary, and spectacled bear in Actun Halal suggest the consumption of these Terminal Pleistocene Ice Age mammals; however, associations with nondiagnostic chipped stone tools are tenuous (Griffith and Morehart 2001; Griffith et al. 2002; Lohse 2007; Lohse and Collins 2004; Lohse et al. 2006). Excavations in the Santa Marta rockshelter revealed the bones of deer, peccary, rabbits, snakes, iguana, and tortoises, as well as the shells of the freshwater snail known as *jute* (*Pachychilus* sp.) (Acosta Ochoa 2010). Also found in Actun Halal were the bones of the common agouti, in association with a small quantity of chert debitage from deposits dating to near the end of the Early Archaic (Lohse 2007, 2010:323, Table 1, 2020), and deer, birds, turtles, crab, and snails have been reported from El Gigante in Honduras (Scheffler 2008; Scheffler et al. 2012). Moreover, the stratified rockshelters of southern Belize indicate that *jute* was an important dietary resource beginning in the Early Archaic (Prufer et al. 2017, 2019).

The use of plant domesticates, based on the recovery of starches and pollen from Archaic sites in northern and central Belize, began around 4500 B.C., with increased use by around 3400 B.C. (Blake 2015; Jones 1994; Lohse 2007, 2010, 2020; Lohse et al. 2006; Pohl et al. 1996; Rosenswig 2015, 2021; Rosenswig et al. 2014). Collectively, the floral remains from sites in northern and central Belize suggest a diet of wild plant resources and the incorporation into the diet of cultigens such as maize and manioc, in addition to chili pepper, squash, and beans, during the transition from the end of the Early into the Late Archaic (beginning before ca. 3000 B.C.). Relatedly, the earliest maize in the El Gigante rockshelter, Honduras, dates to the Late Marcala phase (4340 and 4020 cal B.P.); however, the majority of the botanical remains consist of wild plant foods (Kistler et al. 2020:33125).

The increasing reliance on cultigens like maize and manioc in the Late Archaic (ca. 3000–1500 B.C.) coincides with evidence for forest disturbance and deforestation, as well as landscape modification, in northern and central Belize, and the Peten and Petexbatun regions of Guatemala (Jacob 1995; Jones 1994; Lohse 2007, 2010, 2020; Lohse et al. 2006; Pohl et al. 1996; Rosenmeier et al. 2002; Rosenswig 2021; Rosenswig et al. 2014; Wahl et al. 2006). Dietary reliance on maize may have been even more widespread in the lowlands than previously assumed. Pollen from soil cores from Basil Jones on Ambergris Caye indicates use of maize in offshore coastal locations as early as the Late Archaic (2900 B.C.; Bermingham et al. 2021). A constricted uniface was recovered at Laguna de Cayo Francesa on Ambergris Caye as well, perhaps suggesting that more land clearance for growing food was occurring on the caye in the preceramic than previously thought (Iceland 1997:215; Stemp and Harrison-Buck 2019:195).

Human remains provide additional clues regarding preceramic diet. For example, it has been suggested that the extensive dental caries in the teeth of Naia, a Paleoindian female adolescent from Hoyo Negro, Mexico, may have been due to consumption of fruit and possibly honey (Chatters et al. 2014). Carbon and nitrogen isotopes in bone collagen and bone apatite from human skeletal remains from southern Belize indicate no maize in the diet prior to around 2750 cal B.C. (Kennett et al. 2020; Prufer et al. 2021). Significant amounts of vegetable protein, however, came from tropical forest plant resources. Increased consumption of maize is demonstrated between 2750 and 2050 cal B.C., with consumption on par with that observed among the Maya in the Classic period based on isotopic signatures and bone apatite data (Kennett et al. 2020; Prufer et al. 2021). Dental calculus from Archaic human remains in northern Belize provides additional evidence for plant foods, including beans, squash, sweet potato, yam, amilto, and llerén, as well as palms, grasses, and other herbaceous plants (Aebersold 2018:216, Figure 5; Valdez et al. 2021).

By the Late Archaic, faunal remains from northern and central Belize indicate a wide range of prey, including common agouti,

armadillo, snakes, turtles, freshwater fish, freshwater mollusks, and possibly white-tailed deer. This evidence suggests a broad-spectrum diet that included both aquatic and terrestrial animals of various types and sizes, in addition to plant foods (Iceland and Hester 2001:293; Lohse 2010; Lohse et al. 2006; Pohl et al. 1996; Prufer et al. 2017, 2019; Stemp and Harrison-Buck 2019). Overall, Archaic period diets appear to rely on a diverse range of wild plant and animal resources, with an increasing number of cultigens, particularly maize and manioc, with the transition from the Early to Late Archaic period (Cagnato 2021; Lohse 2010; Rosenswig 2015, 2021; Pohl et al. 1996).

Preceramic Living Spaces

For the most part, there is little evidence for preceramic occupation across the central Maya lowlands. Evidence from Chiapas, at Los Grifos and Santa Marta rockshelters, indicates the use of these locations beginning in the Late Pleistocene/Early Holocene (Acosta Ochoa 2010, 2012; Acosta Ochoa et al. 2019: 99; García-Bárcena and Santamaría 1982; Santamaría 1981). In southern Belize, three rockshelters south of the Maya Mountains indicate human occupation in the Late Pleistocene/Early Holocene (Prufer and Kennett 2020; Prufer et al. 2017, 2019, 2021). In Honduras, occupation in the Holocene is demonstrated in El Gigante rockshelter (Scheffler 2008; Scheffler et al. 2012). It is also possible that Actun Halal in central Belize was used in the Terminal Pleistocene, based on the presence of faunal remains and some informal chert tools (Lohse 2007; Lohse et al. 2006). It is difficult to know whether a pattern of rockshelter use at this time suggests preferential selection of these locations by early hunter-gatherers or if, instead, preservation is simply better in rockshelters. Clearly, the karst geology of these regions is a significant factor in the discovery of early human occupations there. The use of rockshelters into the Early Archaic and, eventually, the Late Archaic continues to be demonstrated in these same locations; however, occupation is not continuous (Lohse 2007, 2010; Lohse et al. 2006; Prufer and Kennett 2020; Prufer et al. 2017, 2019, 2021; Scheffler 2008; Scheffler et al. 2012).

Although exceptionally rare, the use of open-air sites in the Archaic period can be demonstrated in northern Belize. At Caye Coco, patinated stone tools and debitage are associated with a possible living floor, including two pits and a posthole, dated to the Early Archaic to Middle Preclassic periods (Rosenswig 2004, 2021; Rosenswig and Masson 2001; Rosenswig et al. 2014). The recovery of patinated lithics, including two Lowe points near a hearth feature dated to the Late Archaic, suggests the existence of a campsite of some sort at Ladyville 1; however, the contextual association of the hearth and the points is questionable (Kelly 1993:215). A pit feature has been reported from aceramic deposits in Puerto Escondido, Honduras (Joyce and Henderson 2001). The rarity of preceramic sites across the central Maya lowlands, notably in Guatemala, has been addressed in a number of ways. It may be that these regions were not inhabited until the preceramic/ceramic transition or that, in dense tropical forest environments, preceramic occupation sites have just not been found yet. Alternatively, the lack of data may simply reflect the lack of projects targeting preceramic human occupation.

Preceramic tool production workshops also have been identified in northern Belize. At Colha, aceramic deposits dated to the Late Archaic contained large quantities of patinated chert, indicating *in situ* production of macroblades and small blades, as well as

constricted unifaces, pointed unifaces, and bifacial celts (Hester et al. 1996; Iceland 1997, 2005). At the Kelly site, lithic evidence suggests specialized quarry production of constricted unifaces and small blades (Iceland 1997, 2005). Furthermore, Kelly (1993:216) noted small, finely flaked end-scrapers in association with Sawmill points and knapping debris at Ladyville 32 in northern Belize. However, none of these locations has evidence for any human settlement. In central Belize, use of a quarry near the end of the Late Archaic period is suggested by the recovery of patinated lithics in an aceramic paleosol at the site of Callar Creek (Horowitz 2015, 2017).

Ritual Activity

There is little evidence for clearly demonstrated ritual activity among preceramic people in the central Maya lowlands. What appears, in some instances, to be the deliberate placement of individuals in caves and rockshelters may be connected to mortuary ritual of some kind based on interment or body position (González González et al. 2008a, 2013; Kennett et al. 2020; Prufer et al. 2019, 2021; Stinnesbeck et al. 2018; Wrobel et al. 2021a). This practice is difficult to confirm given the few examples recovered and the overall conditions of the remains themselves.

THE EARLY CERAMIC PERIODS

As noted by Lohse (2020:12): “In the Maya world, the co-occurrence of ceramics, permanent construction (in the sense that the physical traces are lasting even if the duration of occupation remains unknown), and farming together commonly signals the end of the Archaic.” However, significant shifts in subsistence, settlement, and technology were occurring neither simultaneously nor consistently across the central Maya lowlands. Rosenswig (2015: 120–121) reminds us that, throughout Mesoamerica, food production, sedentism, and ceramics developed by degrees and cannot be documented simply as present or absent. However, a consequential global climatic “drying” event may have served as a significant ultimate cause for these kinds of adaptations near the end of the Archaic period (Rosenswig 2015, 2021). From the end of the preceramic into the earliest ceramic periods (ca. 1200–900 B.C.) in Belize, Guatemala, and southern Mexico, aceramic hunter-gatherers had already developed some reliance on domesticates. Subsequently, communities of pottery-making people began to appear in the archaeological record at sites dating to slightly different times; however, few Early Preclassic settlement locations are known in the central Maya lowlands. In these same areas, such as Ceibal (formerly Seibal) (Inomata et al. 2015), some of the earliest ceremonial architecture began to be built by the Middle Preclassic. In some cases, such as at Aguada Fénix, Tabasco (Inomata et al. 2020), the construction of public or monumental architecture appears to precede the development of many other hallmarks of the early Maya. Sociopolitical, socioeconomic, and subsistence changes, including evidence for increasing population, higher maize yields, the appearance of non-domestic or ceremonial structures, exotic trade goods, and the beginnings of a centralized ideology and ritual, can be seen in the Middle Preclassic (1000–400 B.C.) (Inomata et al. 2015; Lohse 2010).

Early Maya Food and Farming

The disappearance of stemmed stone points, the appearance of constricted unifaces, and a reliance on expedient flake technology likely

reflect changes in both mobility patterns and subsistence requirements from hunting to early horticulture (Abbott et al. 1998; Nelson 1991:76; Parry and Kelly 1987:285; Shott 1986:19–34; Tomka 2001:222–223; Torrence 1983:13). Similar trends have been noted in North America (Koldehoff 1987; Odell 1985; Sullivan and Rozen 1985) and Mesoamerica (Awe et al. 2021a; Kennett et al. 2017; Marcus 1995:6–7; Prufer and Kennett 2020; Prufer et al. 2021; Stemp et al. 2018a), as mobile hunting and gathering gave way to horticulture. By the end of the Late Archaic, a horticultural lifestyle can be observed archaeologically in Belize and the wider central Maya lowlands, with evidence for cultivation based on pollen, starch grain, phytolith, and charcoal evidence for domesticated plants, such as maize, manioc, beans, chili pepper, bottle gourds, and squash, and increasing deforestation to create *milpas* for planting (Awe et al. 2021a; Blake 2015; Cagnato 2021; Castellanos and Foias 2017; Iceland 1997; Lohse 2010; Pohl et al. 1996; Rosenswig 2015, 2021; Rosenswig et al. 2015; Valdez et al. 2021). During the development of the Preclassic, we see much more evidence of landscape modification in the form of canals, raised fields, and terraces (Cagnato 2021). Although initial ditching for wetland cultivation in northern Belize appears to begin in the Middle Preclassic (ca. 1000 B.C.), dating these landscape modifications and agricultural features has proven to be a difficult task (Pohl et al. 1996). The dates are often skewed to the Classic, but whether the late date is the date of reuse, major reclamation, or initial use remains to be determined, case by case, canal by canal.

Early Maya villagers continued to employ diverse subsistence strategies—relying on wild plants and wild animals, as well as incorporating domesticates such as maize, manioc, and a range of fruit and orchard crops (Cagnato 2021; Marcus 1982; Pohl et al. 1996; Wrobel et al. 2021b). As new data suggest that semi-sedentary groups coexisted for centuries with mobile hunter-gatherers (Inomata et al. 2015), rather than a rapid agricultural revolution characterizing the end of the Archaic and the beginning of village life in the Preclassic period, it was more likely a longer and gradual shift that occurred at different times at various sites. This sequence suggests that plant remains alone cannot be used to distinguish between mobile and sedentary populations. Food-producing and attendant social practices are more complex than is often assumed and subsistence systems are generally additive (i.e., wild plant collecting is not abandoned, but augmented by the growing reliance on domesticates).

Although Late Early Preclassic villagers at Cuello and Cob Swamp clearly consumed maize, isotopic data from their skeletons suggest that maize was not yet an important component of their diet (Pohl et al. 1996; Tykot et al. 1996; van der Merwe et al. 2000; Wrobel et al. 2021b). By the Middle Preclassic, maize increasingly became a significant cultigen, but a mixed diet with differing reliance on wild resources occurred at different times throughout the lowlands. For example, isotopic data demonstrate that maize constituted only about 30 percent of the diet at Cuello; whereas, at Cahal Pech, there were differences in the amount of maize consumed by people living in the site core versus those in the periphery (Ebert et al. 2019).

There was still a major reliance on wild plant and animal foods (Pohl et al. 1996), yet, as noted above, pollen and starch grains from northern Belize and isotopic data from skeletons from southern Belize, as well as dated maize cobs from Honduras, point to an earlier intensification of and dietary reliance on maize as a domesticated crop prior to the appearance of ceramics (Kennett et al. 2020; Kistler et al. 2020; Prufer et al. 2021; Rosenswig 2014, 2015, 2021).

Nevertheless, ceramics suggest the use of maize in association with a special preparation technique (Blake 2015). As such, evidence for consumption of maize may be demonstrated by the appearance of ceramic colanders in the Early to Middle Preclassic period at sites such as Blackman Eddy and Cahal Pech (Awe et al. 2021a; Brown 2003:Figure 5.3; Cagnato 2021; Cheetham 2010; Garber et al. 2004:36, Figure 3.5b). These colanders were used to drain and rinse softened corn kernels in the process of making *nixtamal* (boiled, lime-treated maize).

By the Middle Preclassic, the presence of domesticates (maize, beans, squash), wild fruits (nance, hogplum, guava, soursop), tubers (manioc, sweet potato), and cacao (Cagnato 2021) is documented in many locations; however, maize may still not have been a dietary staple in all parts of the Maya lowlands (Cagnato 2021; Healy et al. 2004; Powis et al. 1999; Wrobel et al. 2021b). Reliance on a wide variety of both local land and aquatic animals, such as deer, dog, peccary, armadillo, agouti, rabbit, turtles, birds, reptiles, fish, and freshwater mollusks, is also widely demonstrated in the Early Middle Preclassic at sites in northern and central Belize (Awe 1992; Garber et al. 2004; Masson 2004; Pohl et al. 1996; Powis et al. 1999; Shaw 1999; Stanchly 1995, 1999; Stanchly and Burke 2018; Wing and Scudder 1991), although specific species consumed varied from location to location. It is possible that certain species, such as deer and dog, may have served ritual purposes given associations with the Maya elite in later times (Pohl 1983; Stanchly and Awe 2015).

Early Pottery

Although pottery developed earlier in the Soconusco and Oaxaca regions of Mexico, as well as along the Caribbean coast of Honduras (see above), there were differences between sites and regions in terms of when pottery appeared and people committed to a fully sedentary life. While the dating of the first appearance of pottery is still controversial (Ball and Taschek 2003; Castellanos and Foias 2017; Clark and Cheetham 2002; Inomata et al. 2013, 2015; Lohse 2010), most scholars agree that pre-Mamom pottery begins to appear intermittently across the central Maya lowlands by at least 1000 B.C., if not earlier, with deposits recovered from sites in Belize, the Peten of Guatemala, and neighboring areas (Figure 4; Supplementary Material 2). By this time, several ceramic complexes had appeared, including Xe and Real in the Pasión River Valley (Adams 1971; Willey 1970; Willey et al. 1967) and the Middle Usumacinta (Inomata et al. 2020), Eb in the north and central Peten (Culbert 1993; Culbert and Kosakowsky 2019), Swasey and Bolay in northern Belize (Kosakowsky 1987; Kosakowsky and Pring 1998; Kosakowsky et al. 2018; Valdez 1987, 1994; Valdez et al. 2021), Cunil (Awe 1992; Sullivan and Awe 2013; Sullivan et al. 2009), Kanocha (Garber et al. 2004), and early facet Jenney Creek in the Belize River Valley (Gifford 1976; Sharer and Kirkpatrick 1976), as well as Ek and Ch'oh Ek in the Yucatan (Andrews et al. 2018), Ch'ok in Campeche (Robert M. Rosenswig, personal communication 2020; see Ek 2015 for Champotón 1A), and Macal in the central Karstic uplands (Debra S. Walker, personal communication 2021; Walker et al. 2017). Rice (2019:2) has recently identified two “Pre-Mamom” complexes at Nixtun-Ch'ich' in the Peten, with the earliest, K'as, dating to 1300/1200–1100 B.C. based on two AMS radiocarbon assays.

The first pre-Mamom ceramic sequence to be defined and discussed in detail was the Xe complex (900–600 B.C.) at Altar de

Sacrificios (Adams 1971), followed by the Real complex at Ceibal (Sabloff 1975; Willey 1970). The Eb complex at Tikal was first recorded during the University of Pennsylvania excavations and was originally found at only two locations: from the lowest level of cultural materials in a pit cut into bedrock located in a north–south trench that bisected the North Acropolis, and in the fill at the bottom of a chultun in the southeast quadrant of the site (Coe 1965; Culbert and Kosakowsky 2019). Ceramic data from Cuello (Andrews 1990; Andrews and Hammond 1990; Kosakowsky 1987; Kosakowsky and Pring 1998; Pring 1977) have played a significant role in our understanding of Early Middle Preclassic pottery in northern Belize. While the Swasey complex was originally defined based on flawed radiocarbon dates (Andrews 1990; Andrews and Hammond 1990; Hammond et al. 1979; Marcus 1983), subsequent calibrated AMS dates put Swasey “between 1000–800 BCE” (Kosakowsky et al. 2018:131). Early Middle Preclassic pre-Mamom pottery was reported for the Maya site of Colha in northern Belize as well. As originally conceived by Adams, the Early Middle Preclassic pottery was given Xe type names. The initial term used to refer to this early pottery at Colha was “Xe-sey,” a term combining Xe and Swasey. As the analysis progressed, it was decided to use type names from locally established analyses. Upon establishing the Bolay complex, it was placed in the Swasey sphere based on named types. An intriguing aspect of Colha is in Archaic activity, perhaps occupation, near the site center and Cobweb Swamp. With an Archaic presence, some dates from the Early Preclassic (ca. 1127 B.C.) (Aebersold 2018; Valdez et al. 2021), and an Early Middle Preclassic occupation, Colha may eventually serve to confirm some of the earliest Maya pottery production in the region.

The Cunil ceramic complex was first reported by Awe at Cahal Pech, based on a sample of approximately 250 sherds, two partial vessels, and a set of radiocarbon dates that placed the Cunil phase between 1200 and 900 B.C. (Awe 1992; see also Ebert et al. 2016). The original excavations recovered Cunil pottery from the lowest levels of Structure B4 in sealed deposits, from mixed deposits in the site core, and from the peripheral Tolok and Tzinik settlement groups. Later excavations (Healy and Awe 1995, 1996) recovered additional ceramic evidence from Structure B4, as well as in Plaza B at Cahal Pech (Cheetham and Awe 1996; Clark and Cheetham 2002; Ebert 2017; Garber et al. 2004; Horn 2015; Peniche May 2014; Sullivan and Awe 2013; Sullivan et al. 2009). Common Cunil forms include flat-bottom plates, and dishes with outslipping walls and wide, everted rims, as well as bowls. These everted rims are typically decorated with grooved post-slip and sometimes zoned-incised lines that depict different motifs (Figures 5a–5c). Finer post-fired incised lines on incurving bowls are also observed in the assemblage on Kitam Incised sherds (Figure 5d). Since Awe’s original identification and description of Cunil pottery, other pre-Mamom complexes have been documented at lowland Maya sites, including Kanocha at Blackman Eddy (Garber et al. 2004), Muyal at Xunantunich (M. K. Brown et al. 2011; LeCount et al. 2002; Strelow and LeCount 2001; Sullivan et al. 2018), K’awil at Holmul (Callaghan and Neivens de Estrada 2016), Macal at Yaxnohcah (Debra S. Walker, personal communication 2021; Walker et al. 2017), Real I at Ceibal (Inomata et al. 2015), Buenavista at Buenavista-Nuevo San José (Castellanos and Foias 2017), Ek at Komchen, Ch’oh Ek at Kiuic (Andrews et al. 2018), and Ch’ok along the Río Champotón drainage (Ek 2015; Robert M. Rosenswig, personal communication 2020), ushering in a whole new wave of research into the origin of pottery-making

communities and early Maya villages (Brown and Bey 2018; Lohse 2010; Sullivan and Awe 2013; Sullivan et al. 2009, 2018). While these pre-Mamom ceramic complexes share some attributes, it is important to note that several of them reflect significant regional differences.

Settlements and Villages

By the beginning of the Terminal Early to Early Middle Preclassic, there is more evidence for open-air occupation locations than in the preceramic. In general, the structures appear quite simple in design and construction. This raises questions about the degree of sedentism versus mobility in the central Maya lowlands at this time. At sites in northern and central Belize, including Cuello, Colha, Blackman Eddy, Cahal Pech, Barton Ramie, K’axob, and Pacbitun, postholes in bedrock, associated with tamped floors, or low earth and marl platforms indicate the existence of long-since vanished apsidal pole-and-thatch houses (Awe 1992; Cheetham 1995; Garber et al. 2004; Gerhardt and Hammond 1991; Healy et al. 2004; Hohmann and Powis 1999; Hohmann et al. 1999; McAnany 2004a; Potter et al. 1984; Powis et al. 2009; Sullivan 1991; Valdez et al. 2021; Willey et al. 1965). Fragments of pole-impressed daub from house walls have been recovered at some sites (Awe 1992; Garber et al. 2004). Clay-lined hearths and low stone retaining walls point to increased investment in place at some sites. Subsequent construction atop these living floors included plastered architecture and platforms, demonstrating more social complexity, increased ceremonialism, as well as possible changes in function (Awe 1992; Coe and Coe 1956; Garber et al. 2004; Gerhardt and Hammond 1991; Healy et al. 2004; Powis et al. 2009; Valdez et al. 2021).

In northeastern Guatemala, Nakbe provides evidence for early structures in the form of packed earthen floors and postholes in bedrock, which are similar to examples from northern Belize (Hansen 1998, 2005). Postholes and plaster floors have been reported at Middle Preclassic Altar de Sacrificios as well (Willey 1973). However, the sites of Buenavista-Nuevo San José, Caobal, Ceibal, El Mirador, El Palmar, and Nixtun Ch’ich’ possess evidence for sedentary occupation that is more ephemeral. At these sites, early surface preparation atop cleared bedrock consisted of layers of clay/clayey soil and crushed limestone that was eventually covered by plaster surfaces (Castellanos and Foias 2017; Doyle 2017; Hansen 2016; Inomata et al. 2013, 2015; Rice 2009, 2019; Rice et al. 2019). Although lacking the evidence for actual houses, radiocarbon dates or ceramics from the clay deposits at these sites in Guatemala suggest occupation around the beginning of the early ceramic period. Moreover, Early Middle Preclassic (ca. 1000–700 B.C.) ceramics from other Guatemalan sites, such as Cival, Holmul, Tikal, Uaxactun, and Yaxha (Callaghan and Neivens de Estrada 2016; Culbert 1993; Culbert and Kosakowsky 2019; Rice 1979; Smith 1955) indicate an early Maya presence, despite the absence of excavated dwellings.

Notably, in Guatemala, Ceibal demonstrates the use of formal architecture for the construction of a ceremonial complex (an early E-group) in the absence of a recognizable residential settlement at the site (cf., Platform Sulul). Inomata et al. (2015) note that this pattern might suggest that a mobile lifestyle may have persisted longer than previously thought and that the construction of communal architectural structures may be associated with populations with different levels of mobility. Alternatively, it may mean that less complex and ephemeral residential architecture, such as

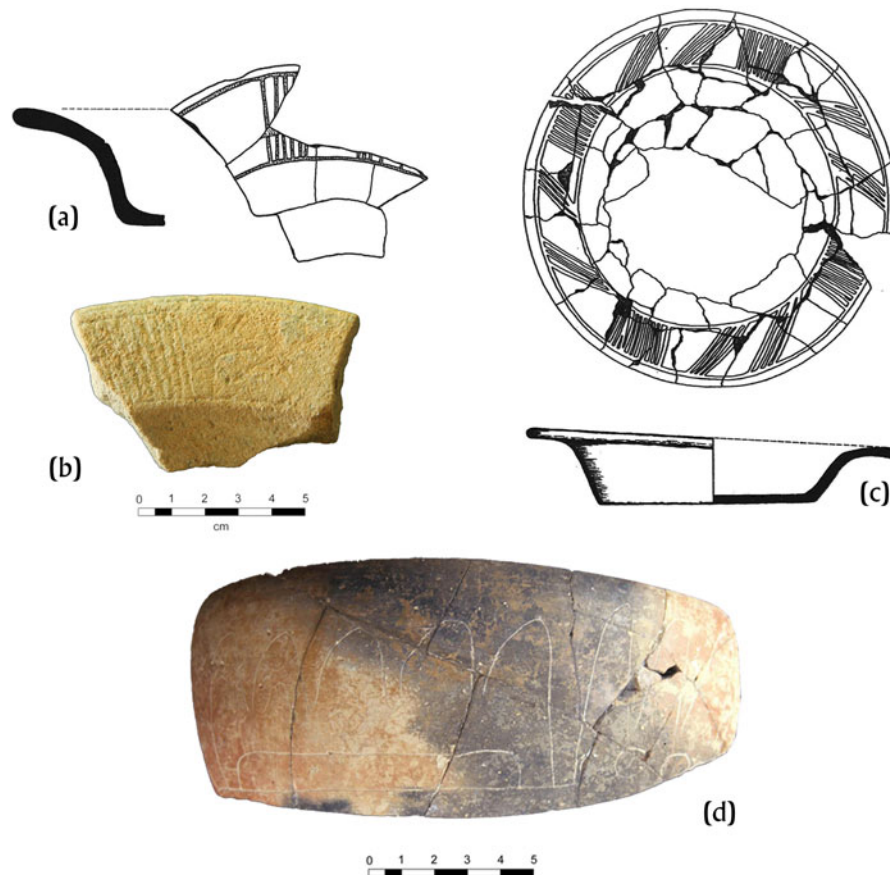


Figure 5. Cunil flat-bottom plates and dishes with outsloping walls and wide everted rims, including (a) Baki Red (Awe 1992:229); (b) Uck Red Group from Kaxil Uinic (courtesy of Brett Houk); (c) Zotz Zoned Incised: Zotz Variety (Awe 1992:231); and incurved-rim bowls, including (d) Kitam Incised. Drawings and photographs courtesy of Awe.

that reported at Puerto Escondido, Honduras, has yet to be discovered at the site. At Nixtun Ch'ich', the construction of early formal architecture, such as platforms and, later, an E-group, in the Early Middle Preclassic is documented above the clay “residential” surfaces (Rice 2019; Rice et al. 2019). Early formal architecture is further demonstrated at the site of Aguada Fénix in southern Mexico, where Inomata et al. (2020) discovered a large artificial plateau/platform with associated causeways, dated to approximately 1000–800 B.C. The monumental architecture at Aguada Fénix suggests communal construction in the absence of other indicators of inequality or centralized authority that developed later in the Middle to Late Preclassic periods (ca. 800–350 B.C.).

In Honduras, the site of Puerto Escondido demonstrates the development of early village life based on evidence for ephemeral structures and early pottery dating to around 1400 B.C. Subsequently, the use of ovens for pottery production is documented around 1150–1100 B.C. (Joyce and Henderson 2001, 2007).

Socioeconomic and Ideological Complexity

Based on current evidence, there is still much that is unknown about the socioeconomies and ideologies of the early Maya. Nevertheless, the development of greater socioeconomic and ideological complexity in Belize and the central Maya lowlands can be

demonstrated by craft production, trade in exotic materials, and different forms of ritual activities, as some examples. Some lithic craft production in the Middle Preclassic likely occurred at Colha, based on the distribution of its tools, such as macroblades, bifacial celts, wedge-form adzes, and T-shaped adzes, to nearby sites in northern Belize (Potter 1991; Shafer and Hester 1991). The biface and adze forms reflect an increased need for tools used for land clearance and field maintenance associated with horticulture. Lack of standardization within tool forms and the absence of identifiable workshops suggest toolmaking occurred within residences alongside other domestic activities (Potter 1991:28). However, stone tool production exceeded the needs of the local community and production was likely organized as a “cottage industry” (Shafer and Hester 1991:82).

The use of drills made from burin spalls, debris from marine shell bead manufacture, and shell beads and other ornaments are represented at a number of Middle Preclassic sites throughout northern and central Belize, including Colha, Blackman Eddy, Cahal Pech, K'axob, and Pacbitun (Awe et al. 2021a; Buttles 1992; Cochran 2009; Garber et al. 2004; Healy et al. 2004; Hester and Shafer 1984; Hohmann 2002; Isaza Aizpurúa and McAnany 1999; Lee and Awe 1995; Micheletti et al. 2018; Powis et al. 2009; Valdez et al. 2021). Marine shell beads have been excavated from the Middle Preclassic at sites in Guatemala, such as Tikal (Moholy-Nagy 1985, 1989) and Ceibal (Sharpe 2019). The

presence of marine shell at inland sites clearly indicates a long-distance exchange system of some kind in the Middle Preclassic.

Along with marine shell, other items made from exotic materials begin to appear in the early ceramic periods, including greenstone and obsidian. Greenstone appears in the form of polished celts, beads, triangulates, and in other symbolic or ritual forms in the Early to Middle Preclassic in Belize (Awe 1992; Awe et al. 2021a; Garber et al. 2004; Hammond 1991a; Healy et al. 2004; Micheletti et al. 2018; Powis et al. 2016) and in the Middle Preclassic in Guatemala (Aoyama et al. 2017a; Estrada-Belli 2006; Inomata et al. 2015). The earliest Maya obsidian tools in Belize, appearing first as hard-hammer flakes, then as prismatic blades, date to the transition from the Early to Middle Preclassic (ca. 1000 B.C.) (Awe et al. 2021a; Awe and Healy 1994; Ebert and Awe 2018; Johnson 1991), with similarly early obsidian appearing as flakes and blades in northeastern Guatemala (Aoyama 2017; Aoyama and Munson 2012). In Early to Middle Preclassic Belize and Guatemala, the obsidian originated in highland Guatemala, with the El Chayal and San Martín Jilotepeque sources being dominant (Aoyama 2017; Aoyama and Munson 2012; Aoyama et al. 2017b; Awe and Healy 1994; Awe et al. 2021a; Brown et al. 2004; Castellanos and Foias 2017; Ebert and Awe 2018; Hammond 1991b; Inomata et al. 2020: Supplementary Material 3; Kersey 2007; McAnany 2004b; Rice et al. 2019; Stemp et al. 2018a). Many of these trade items made from exotic materials have been recovered from some of the earliest dedicatory and termination deposits/caches in the central Maya lowlands, often in association with one another (Awe 1992; Aoyama et al. 2017a, 2017b; Brown et al. 2018; Garber et al. 2004; Healy et al. 2004; Powis et al. 2016). Deposits like these speak to an increase in the complex cultural customs among the early Maya associated with emerging socioeconomic or ideological practices that seem to presage more developed social inequality, accumulation of wealth, and power among emerging elites.

Finely made *tecomates* and non-utilitarian ceramics with symbolic or ritual functions, specifically figurines and ocarinas, also appear around the time of the first settled villages in the lowlands (Awe 1992; Awe et al. 2021a; Brown et al. 2018; Garber et al. 2004; Hansen 2005; Healy et al. 2004; Joyce and Henderson 2001; Rice 2009). Non-utilitarian ceramics are associated with practices that are both ritualized and sociopolitical, such as feasting and burials (see below).

One final example of ritual activity among the earliest Maya involves deliberate interments. As noted by Wrobel and colleagues (2021a), there are relatively few Maya burials assigned to the transition from the Early to Middle Preclassic and they may reflect variation, sometimes regional, in sociopolitical and economic organization. For example, burial of the deceased in residential architecture, such as below house floors, is among the early mortuary practices of the Maya (Hammond 1995; McAnany 1995; McAnany et al. 1999; Robin and Hammond 1991; Storey 2004); however, it is not documented everywhere in the central Maya lowlands. Most early burials were primary interments in simple pits or cist graves (Wrobel et al. 2021b). In the Middle Preclassic, the dead also were buried in public architecture, including round structures, E-groups, and platforms (Aimers et al. 2000; Chase and Chase 2006; Hammond et al. 1991, 1992; Palomo et al. 2017; Pendergast 1982). Early burials contained few grave goods, often ceramics and shell (Isaza Aizpurúa and McAnany 1999; Robin and Hammond 1991; Storey 2004). These few items were made primarily from

locally available materials (Hammond et al. 1991; Wrobel et al. 2021b). In the Early Preclassic, possible evidence for early cremation practices likewise may be present in the lowlands (Awe 1992). However, a pattern of more standardization, in terms of grave contents, the inclusion of exotics, and the locations of items in graves, clearly develops in the Middle Preclassic (Chase and Chase 2006; Hammond et al. 1992; McAnany and López Varela 1999; Palomo et al. 2017). Differentiation of individuals based on grave type and grave goods once again suggests developing socioeconomic inequality among early Maya communities; however, the specific nature of variation in interment was likely influenced by other ritual and ideological practices.

One of the hallmarks of the pre-Mamom ceramic assemblages is the incised decorations that most likely served as a way to unite these early communities. In the Cunil ceramic assemblage, the incised motifs on Belize Valley Dull ware serving vessels include depictions that range from simple geometric designs to more pan-Mesoamerican motifs that represent supernatural forces and include the Kan Cross, Avian Serpent, lightning designs, gum brackets, and flame eyebrows (Awe 1992; Awe et al. 2021a; Garber and Awe 2009). These shared iconographic designs reflect interregional interaction and suggest the development of social hierarchies across the Maya lowlands that were associated with the production of vessels for prestige or communal rituals. Interestingly, these incised symbols are largely absent in the Ek and Ch'oh Ek assemblages in the Yucatan (Andrews et al. 2018) and are not associated with later Mamom assemblages in central Belize (Awe 1992). Andrews and colleagues (2018) suggest that the absence of incised decoration might be due to the fact that the Ek and Ch'oh Ek samples are somewhat later than other pre-Mamom complexes. Other explanations include “multiple waves of ideas—and even perhaps of some people—coming in from different places at different times” (Braswell 2015:7). Garber and Awe (2008, 2009) proposed that the early inhabitants of Cahal Pech were participants in a “Pan Mesoamerican ideological interaction sphere,” using a shared set of symbols found across several regions of Mesoamerica, including the Gulf Coast, Chiapas, Oaxaca, Valley of Mexico, and El Salvador (Awe 1992; Brown 2007; Cheetham 1998, 2005). They further suggest that the symbols associated with Cunil pottery are uniquely Maya in their execution and indicate that local design innovations were a critical part of developing pan-Mesoamerican iconography and increasing competition between the elite. Hansen (2005:51) agrees with this point of view, stating that it was “competitive ideology that propelled important innovations and notable variations among both the Maya and the Olmec.” Inomata and colleagues (2013:410) point out that the construction of an E-group at Ceibal around 950 B.C. occurs after the fall of San Lorenzo at 1000 B.C. and before the rise of La Venta at 800 B.C., supporting the idea that the site was “not a passive recipient of an idea established elsewhere, but most likely participated actively in the process of this innovation,” with “interregional interactions, primarily involving groups in the southwestern Maya lowlands, Chiapas, the Pacific Coast, and the southern Gulf Coast.”

Social Status and Inequality

Status differentiation among the Early to Middle Preclassic Maya is difficult to document. It is possible that some sense of it can be gleaned from buildings, burials, and material culture, as previously

noted in some instances. The construction of specialized domestic structures is demonstrated at the beginning of the Middle Preclassic (ca. 900 B.C.) at Cahal Pech and Blackman Eddy (Awe 1992; Garber et al. 2004). At Cuello, Middle Preclassic burials (ca. 900–600 B.C.), especially those of children, with exotic items, such as pottery, marine shell, and greenstone, suggest status differences resulting from ascribed status (Hammond et al. 1991, 1992; Isaza Aizpurúa and McAnany 1999; Robin and Hammond 1991). Increasingly, “wealthy” graves make a notable appearance by the end of the Middle Preclassic (Chase and Chase 2006; McAnany and López Varela 1999; Palomo et al. 2017). At Cahal Pech, artifacts associated with Cunil pottery include jadeite objects, slate plaques, drilled animal teeth, marine shell discs, and pottery figurines, which support the idea of emerging social inequality and political relationships in these early communities (Awe et al. 2021a; Sullivan et al. 2018). Awe and colleagues (2021b) argue that, much like their Soconusco counterparts (Clark and Blake 1994), emerging Cunil phase aggrandizers began to sponsor the construction of special function structures, the acquisition and distribution of exotic goods, and the celebration of public rituals. As part of this process, central Belizean aggrandizers may have appropriated iconographic motifs displayed on fine ware ceramics, which served to demonstrate special knowledge of a sacred cosmos. Together, these various activities may have contributed significantly to the establishment of status differences in these incipient communities.

Additional evidence for suspected feasting, possibly associated with the establishment of communal socioeconomic relationships or with the self-aggrandizement of emerging elite status, can be documented archaeologically by a midden deposit containing tens of thousands of freshwater shells at Blackman Eddy, and the appearance of finely decorated “feasting” wares in the Early Middle Preclassic (Brown et al. 2018; Clark and Blake 1994; for the Soconusco, see Rosenswig 2015, also Rosenswig 2021). Early feasting may also have involved public preparation, presentation, and consumption of nonalcoholic cacao at Puerto Escondido (Joyce and Henderson 2007). Together with early caching behavior, feasting is a harbinger of public ritual in connection with Preclassic elites (Aoyama et al. 2017a; Garber et al. 2004; Hayden 1990, 2001; Joyce and Henderson 2007; Rosenswig 2007). Further discussion of increasing cultural complexity among the Preclassic Maya will be presented in an upcoming Special Section in *Ancient Mesoamerica*, titled “Sociopolitical and Economic Transformations in the Maya Lowlands During the Middle Preclassic Period (1000–300 B.C.),” co-organized by Kathryn Reese-Taylor and Verónica Vázquez López.

The transition from the preceramic Late Archaic to the earliest ceramics is a period of great interest, and a central consideration involves the continuities and discontinuities between these two periods, ranging from material culture and cultural practices to populations and language. It is in this respect that language figures as an key cultural feature since it is a salient and primary marker of Maya cultural identity. Concomitant to this, we should likewise gauge whether the appearance of subsistence practices focused on the cultivation of maize and other domesticates in ceramic-using cultures is contemporaneous with the appearance of the earliest speakers of Mayan languages, as well as the “where” and the “when.” The bridge between archaeological cultures and languages is evidently fraught with obstacles, yet an exploration of the lexicon of proto-Mayan, the ancestral language from which all Mayan languages descend, provides an informative means of probing the

linguistic referents—that is to say, the material correlates—which are liable to archaeological scrutiny.

PROTO-MAYAN AND THE EARLIEST SPEAKERS OF MAYAN LANGUAGES

Proto-Mayan, the ancestral form of the Mayan languages, has been reconstructed since the 1960s and its features are now relatively well-accepted among specialists. The history of its diversification (Campbell 1997:162–166; Kaufman 1976, 1994), the phonology of this proto-language (England 1994:35–40; Fox 1978; Jackson 1972; Kaufman 1976:106), its syntax and grammar (Kaufman 1990; Norman and Campbell 1978; see also Kaufman and Norman 1984:90–94), as well as its lexicon (Kaufman 2017; Kaufman with Justeson 2003), have now been worked out in great detail. From the onset, it has also recognized that Mayan languages exhibit a range of loanwords from proto-Mije-Sokean—the language likely associated with the archaeologically attested Locona ceramic tradition of the Gulf, Isthmus, and Soconusco regions—words that in most cases trace their introduction back to proto-Mayan (Campbell and Kaufman 1976:84–87; Wichmann et al. 2008; see also Blake 1991). This evidence demonstrates close cultural connections between these two groups following the domestication of maize and the advent of ceramics, during the Formative period.

Of great significance is the place of proto-Mayan in relation to the archaeological cultures that we have been documenting in the Maya area for decades. What really concerns us here is the temporal placement of proto-Mayan—precisely when this ancestral language was spoken and on what basis dates have been put forth. In linguistics the method in question has been glottochronology, although now largely abandoned, given its many difficulties and its uncorroborated founding assumptions—that is, (a) an even rate of phonetic and semantic change, and (b) use of a fixed and thereby static and unadaptive word list. Nevertheless, an oft-cited date, offered by leading linguist Kaufman (1976:104–105, 2017:65–68), is that proto-Mayan was spoken approximately 42 centuries ago, which is to say that the first branching of this language occurred around 2200 B.C.

In response to critiques of glottochronology, more recent attempts to date proto-Mayan have employed alternate methods, yielding widely disparate results. At one extreme is the proposal of Eric Holman and his many colleagues (Holman et al. 2011: 859, 862, 872), who, using a computerized Automated Similarity Judgment Program, place the initial break-up of the proto-language as late as 2220 years ago, or around 209 B.C. The difficulty with this proposal is that the linguistic diversification of all the Mayan languages would be extremely compressed and would have had to occur at an unprecedented pace, making this model implausible. The other extreme is the model of Atkinson (2006:Chapter 6), who, using a gamut of computational analyses and phylogenetic methods (none of which, he stresses, constitute glottochronology in the traditional sense), has obtained a range of dates between 6600 and 6500 B.C. for the initial division of proto-Mayan. This date is evidently much too early, given what is known of the material culture of proto-Mayan speakers, as revealed by the lexical inventory of the language (Kaufman 2017:78–106; Kaufman with Justeson 2003). Were the Atkinson model viable, this would imply that proto-Mayan speakers had domesticated maize and used ceramics as early as the seventh millennium B.C., which is as much as four millennia too early in comparison to the earliest

known ceramics in Mesoamerica (i.e., ca. 1850 B.C.; Clark 1991). Therefore, the dates offered by Kaufman remain the most widely accepted, as these are the most balanced and compatible with the available archaeological and chronometric evidence.

This then also raises the question of where proto-Mayan speakers were originally settled, before the speakers of divergent dialects moved and settled farther afield and began to populate what is now known as the Maya area. Again, a relatively wide range of hypotheses have been offered in recent decades, and in large measure this has also to do with the perceived genetic affinity of Mayan languages to other larger language families. To be clear, at present there is no good evidence that Mayan languages can be grouped with any of the other known Native American language families (Campbell 1997), despite repeated attempts by researchers. Some hypotheses have suggested affinity to languages in northern South America (for a review, see Campbell 1997:324; Campbell and Kaufman 1980:854), whereas others have attempted to group Mayan with Penutian languages, once widely spoken along the Pacific Coast of North America (for criticisms, see Campbell 1997:309–320). Others still suggest that most Mesoamerican language families can be grouped together with Mije-Sokean and Totonakan into a macrofamily (McQuown 1942; see also Brown and Witkowski 1979; C. H. Brown et al. 2011). These proposals have not met with widespread approval either, and for the most part have been refuted on the basis of a range of criteria (Campbell 1997:323–324; Campbell and Kaufman 1980:854).

Formulating criteria for the *Urheimat*, or the linguistic homeland, of proto-Mayan has to consider both the areal distribution of Mayan languages and the degree of linguistic diversity spatially, as well as accounting for features of the lexicon that reveal knowledge of plants and animals that are found in specific biological habitats. In the present case, the highest concentration of Mayan languages can help to pinpoint the epicenter of this linguistic diversity. Glancing at a map of the distribution of Mayan languages, we might look to northwestern Guatemala, and specifically the Quiche region, as the nodal place with the highest concentration and division of distinct Mayan languages. To Kaufman, the *Urheimat* of proto-Mayan is actually just slightly to the west, and specifically around Soloma in Huehuetenango in the Sierra Cuchumatanes (Kaufman 1976:105, 2017:71), although the area is rather cold and high in elevation. In contrast, the central valley of El Quiche is less broken, more amenable to agriculture, and close to the head of three large rivers, which may have acted as arteries for the dispersal of early Maya groups, and adjoins the cloud forests, the gateway to the lowlands (Kaufman 2017:71; Law 2013:150). In fact, as we will see, proto-Mayan speakers had good knowledge of plants and animals of the lowlands, and thereby the *Urheimat* has to be located in an area adjoining the lowlands to have a knowledge of both highland and lowland species.

Given this model, we can see that it is more likely that proto-Mayan speakers originally thrived in the highlands of Guatemala, and it is only later that descendant groups gradually began to populate the lowlands. In fact, one of the very first separations is the Yukatekan branch of Mayan languages, which separated from proto-Mayan around 1900 B.C. (Kaufman 2017:65). Despite this early date, linguistic evidence suggests that the speakers of what would become Yukatekan remained in the highlands for several centuries and only slowly began to explore and migrate into the lowlands. According to this picture, these early speakers of Mayan would have encountered the Late Archaic peoples who

had roamed the lowlands for millennia. In this connection it should be remarked that all the lowland Mayan languages have undergone phonetic changes (including the loss of proto-Mayan phonemes *r, *ŋ and *q) and that non-Mayan languages on the eastern margin of Mesoamerica (i.e., Xincan, Lenkan and Tol [Jicaque]) have phonemes that resemble those of Mayan (Campbell 1997:160, 166–167). As such, we can wonder whether it is the original interactions between these languages that have affected their phonemic register. Further, whereas Lenkan languages do feature a minority of what can be described as vowel-initial lexemes (Arguedas Cortés 1988), proto-Tol exhibits several Mesoamerican loanwords, including 14 from Mayan languages (of which most are from proto-Mayan), which also include the names of lowland animals and items pertaining to plant domesticates and maize beverages (Campbell and Oltrogge 1980:221–222). Likewise, Xincan borrowed words from Mayan languages pertaining especially to agriculture and cultigens, suggesting that Xincan speakers had not been agriculturalists prior to the encounter of the two cultures (Campbell 1972). In turn, we can thereby suggest that some of the lexical items that distinguish lowland Mayan languages from their highland counterparts may have been loaned, shaped, or calqued from the original Archaic language(s) of the lowlands. On this point, Kaufman aptly remarks (2017:72): “Some of the distinctively Yukatekan and lowland vocabulary might be owing to one or more of these substratum languages.”

In sum, the linguistic evidence connects the earliest speakers of a Mayan language with agriculture, particularly the planting of maize, beans, squash, and chiles, as they settled in cultivated areas with their dogs and domesticated turkeys (Kaufman 2017; Law 2013:145). They made use of all the items of material culture associated with the Formative cultures of Mesoamerica (Supplementary Material 3). From the limited, but important, set of loanwords that proto-Mayan obtained during the Formative, we can see that proto-Mije-Sokean peoples transmitted knowledge concerning cacao, a selection of cucurbits and bottle gourds, as well as certain items pertaining to maize preparation (Campbell and Kaufman 1976:84–86). Based on the timing and linguistic chronology at hand, the scenario that emerges is one wherein ceramic-producing agriculturalists from the highlands encountered hunter-gatherer horticulturalists in the lowlands, at least in some regions. Although poorly understood, this remains one of the most critical chapters of lowland (pre)history—the time when the early Mayan speakers encountered and interacted with the Archaic populations of the lowlands.

THE FIRST MAYA: WHO WERE THEY?

Two long-standing questions about early Maya origins and identity include: (1) whether the early pottery-making villagers we call “Maya” are the direct descendants of preceramic people who lived in the same regions before them; and (2) whether it is possible to identify subgroups or “ethnicities” within early Maya culture, knowing full well that what is culturally “Maya” changed over time (Clark and Cheetham 2002; Iceland 2005; Inomata et al. 2015; Lohse 2010; Valdez et al. 2021). In the case of the first question, what archaeologists are really seeking, in most cases, is the combination of cultural traits (in the form of material culture) that can be used either to distinguish pre-Maya from the first Maya people or to indicate continuity between the two. Increasingly, it seems that what is culturally deemed “Maya” in the Preclassic is

likely an amalgam of traits spread throughout the lowlands that are incorporated into local or regional traditions in slightly different ways, with their own variations, but that somehow still demonstrate some common cultural foundation that may have linked some pre-ceramic populations in Belize and the central Maya lowlands, but not necessarily all. Thus, any material culture connections between pre-Maya people should be sought in the Early to Middle Preclassic era. As regards the second question, Marcus (2003:77) raised the issue of “Maya ethnicity” of preceramic people 20 years ago, and today this topic is still considered controversial in terms of what is meant by ethnicity in this context and how ethnicity could be observed and distinguished from regional variation within a common “Maya” cultural complex.

Different types of evidence may provide a variety of explanations for the origins of the first Maya, and it may be that some pre-ceramic peoples were direct ancestors of the Maya, whereas others were not. By the beginning of the ceramic period in Belize, no stemmed points are known to exist, suggesting a break from some of the stone tool traditions of the preceramic possibly as recently as around 1900 B.C. (Awe et al. 2021a; Lohse 2010; Lohse et al. 2006; Kelly 1993; Stemp et al. 2018a:85, Table 4). Moreover, complex production techniques associated with preceramic stemmed biface production, such as soft-hammer flaking and pressure-flaking, appear to have vanished at least by the onset of the ceramic period (Potter 1991:27; Stemp et al. 2018a), if not earlier (Prufer and Kennett 2020; Prufer et al. 2021). In order to address some issues of lithic technological change, the reliable dating of all types of preceramic stemmed points is needed given the radiocarbon dates associated with Lowe points from southern Belize (Lohse 2020; Prufer et al. 2019, 2021).

As of the time of writing, in central Belize, there is no convincing evidence for cultural continuity between preceramic peoples and the first Maya based on the absence of points and macroblade technology in the Early Preclassic (Awe et al. 2021a; Stemp et al. 2018a). As previously noted by Kelly (1993:225), this may mean that Archaic “non-Maya” people were replaced by Mayan speakers, at least in this region. In contrast, Iceland (1997, 2005; see also Clark and Cheetham 2002; Lohse 2010) argues for continuity in chipped chert tools between the Late Archaic and the Middle Preclassic in northern Belize, primarily based on macroblade/blade technology at Colha, in addition to some bifacial technology and the replacement of constricted unifaces with beveled T-form and wedge-shaped adzes in the early part of the “Colha Lithic Tradition.” This begs the question of whether or not lithic technology is an indicator of cultural continuity in northern Belize (Rosenswig 2021).

Current evidence indicates that the development of horticulture and the relationship between hunter-gatherers and early horticulturalists varied regionally during a period that Lohse (2020:22) has called an “epi-Archaic,” which existed at a time that Rosenswig (2011; see also Rosenswig 2015) describes as an “archipelago of complexity” (or a mosaic of diverse adaptations) in Mesoamerica. If Iceland’s (1997, 2005) notion of cultural continuity is correct, based on macroblade technology, then maybe in northern Belize local hunter-gatherers became the first settled, ceramic-using horticultural Maya populations there (Valdez et al. 2021). However, it may be that hunter-gatherers in central Belize were replaced by horticultural populations who arrived from outside the region, based on the disappearance of biface technology, the lack of macroblade technology, and the reliance on expedient tools in the Terminal Early Preclassic (Awe et al. 2021a; Stemp et al. 2016, 2018a; see also

Aoyama 1999, 2017). Replacement of one group by another would seem to suggest that mobile aceramic people and sedentary populations likely had limited social integration with each other (Rosenswig 2011). Rather than continuity versus replacement, it is possible that mobile populations co-existed with sedentary ones, as suggested at Ceibal, where Inomata et al. (2015:4273) believe “that diverse groups with different levels of sedentism frequently gathered and collaborated, possibly forming communities.”

In addition to lithic technology, pre-Mamom pottery has been used to interpret the origins of the Maya. Were the first ceramic traditions of the central Maya lowlands intrusive developments that originated elsewhere or were they primarily incipient indigenous developments by people who were variably tied together through a common “Maya” cultural tradition with territorial or “tribal” variants (Andrews 1990; Ball and Taschek 2003; Clark and Cheetham 2002; Culbert 2003; Lohse 2010; Sharer and Gifford 1970)? A number of diffusionist models have been proposed to explain the origins of Maya pottery. Andrews (1990) emphasized the similarities between Xe ceramics at Altar de Sacrificios and examples from the Isthmus region of southern Mexico. Sharer and Gifford (1970) argued that the Xe tradition was similar to pottery from Chalchuapa, Honduras. Ball and Taschek (2003) have proposed that the Cunil and Jenney Creek ceramics from the Upper Belize River Valley originate with Mixe-Zoquean language speakers from Honduras. In contrast, Clark and Cheetham (2002; see also Cheetham 1998, 2005; Cheetham et al. 2003) and Culbert (2003) believe that the earliest ceramics in the central Maya lowlands were indigenous developments with few or no connections to previously existing ceramic traditions outside the Maya area. Although Clark and Cheetham (2002) acknowledge differences between the four earliest pottery traditions in the central Maya lowlands, they argue that they are all precursors to later Mamom pottery that represent different tribal/territorial groups that were collectively culturally and linguistically Maya, based on shared technological and stylistic similarities. However, Culbert (2003) disagrees with the idea that Xe, Eb, Swasey, and Cunil pottery complexes are connected to one another.

By the end of the Middle Preclassic, growing populations and interregional interaction connected these early villages, eventually leading to a more uniform ceramic horizon. By 600 B.C. or earlier, we see the first widespread ceramic style—the Mamom sphere—to feature red-slipped bowls (Juventud Red). The lack of uniformity in pre-Mamom complexes strongly suggests that either the original settlers of the lowlands entered from different directions and at somewhat different times, perhaps from Guatemala, Chiapas, and Honduras (Lohse 2010), or that local hunter-gatherers emulated the pottery being made by their exchange and trade partners in different regions.

Although lithic and ceramic technologies provide some guidance for understanding the early Maya in the lowlands, another fruitful path may be language (Marcus 1983:480; see also Awe et al. 2021a; Ball and Taschek 2003:181–182; Lohse 2010:316–317, 319; Stemp et al. 2016:295). Despite its centrality in defining the presence of early Maya populations, language is evidently an elusive topic that typically falls outside the purview of archaeological inquiry. Yet recourse to historical linguistic data, focused, in particular, on the reconstruction of proto-Mayan, provides an important gateway. Of great significance is the place of proto-Mayan in relation to the archaeological cultures that we have been documenting in the Maya area for decades. Linguistic data suggest it is unlikely that early Maya culture developed independently in situ in the lowlands, but

rather that it was initiated or influenced by the arrival of Mayan-speaking peoples from the highlands.

CONCLUSION

The contributions of the seven articles in this Special Section provide significant, up-to-date information about the origins and early lives of the first humans in what eventually became the central Maya lowlands. Genetic connections to North and South America and the complex relationships and influences of both North and South American lithic technology are important aspects of the research presented herein that still require further clarification and contextualization. Given the new excavation data from the southern Belize rockshelters, the preceramic chronology for Belize deserves serious reconsideration (see Lohse 2020:12, Figure 2.2). Despite recent discoveries of more preceramic stone tools (e.g., Pruffer et al. 2021; Stemp et al. 2016, 2018b; Valdez et al. 2021) and the excavation of sites with dated preceramic components (e.g., M. K. Brown et al. 2011; Horowitz 2017; Lohse 2007, 2010; Pohl et al. 1996; Pruffer 2018; Pruffer et al. 2019, 2021; Rosenswig 2015, 2021; Rosenswig and Masson 2001; Rosenswig et al. 2014), our understanding of the Paleoindian and Archaic periods in the Maya lowlands is still “beset by stratigraphic and processual questions” (Marcus 1983:459), requires more

“systematic survey data from large sectors of the Lowlands” (Marcus 1995:8), and lacks “the kind of intensive and long-term regional study conducted in the highland Mexican valleys of Tehuacán and Oaxaca” (Marcus 2003:73).

The spread of a hunting and gathering lifestyle throughout most of Belize, and migration into its tropical ecosystem, consisting of various microenvironments, are testaments to the adaptability and versatility of these mobile people. Dietary shifts, particularly to early cultigens, documented in the research in this Special Section mark significant changes in the lifestyles of Archaic people and serve as an early harbinger of an increasing reliance on domesticated food and all the sociopolitical and socioeconomic organizational trappings that this entails. Questions about resource exploitation, exchange relationships, and landscape use are provided, with more answers than were available a couple of decades ago. With the appearance of the first people who can be truly called Maya, based primarily on material culture, such as pottery, early examples of ideological/symbolic expression, and language, this nascent complex society is revealed to archaeologists. Together, the articles in this Special Section highlight both the opportunities and challenges presented to archaeologists focusing on two critical periods in early Mesoamerican prehistory—the arrival of the first humans in Belize and the central Maya lowlands and the appearance of the first people who can be culturally called “Maya.”

RESUMEN

La introducción a la Sección especial: El período precerámico y cerámico temprano en Belice y las tierras bajas mayas centrales proporciona un resumen de nuestro entendimiento actual acerca de los primeros humanos y los primeros mayas en estas regiones (ca. 11,500–400 a.C.) y presenta siete artículos que examinan estos períodos críticos desde perspectivas variadas y secantes. La introducción empieza con una breve historia de las primeras investigaciones precerámicas, principalmente en el norte de Belice, y proporciona una cronología actual para el período paleoindio, el arcaico y el preclásico temprano. El paleoindio y arcaico (ca. 11,500–900 a.C.) se discuten en términos de los orígenes de las primeras poblaciones en la región, la tecnología lítica, las estrategias de subsistencia, y los rituales

tempranos. A continuación, se proporciona un resumen de la evidencia arqueológica de la transición a los primeros mayas (ca. 1200–800 a.C.), con exámenes de un estilo de vida hortícola, las primeras cerámicas, las primeras aldeas, un aumento en la complejidad socioeconómica, una ideología naciente, las prácticas rituales y el desarrollo de la desigualdad social. Las lenguas mayas y proto-maya, sus dataciones y orígenes se introducen y discuten en relación con los primeros mayas, así como las relaciones entre el léxico temprano y los correlatos materiales, incluidas las prácticas agrícolas, y la vida vegetal y animal. La cultura material se explora más a fondo con respecto a las tecnologías líticas y cerámicas y las relaciones con las conceptualizaciones de la cultura maya.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit <https://doi.org/10.1017/S0956536121000444>

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REFERENCES

- Abbott, Alysia L., Robert D. Leonard, and George T. Jones
1998 Explaining the Change from Biface to Flake Technology: A Selectionist Application. In *Darwinian Archaeologies*, edited by Herbert D.G. Maschner, pp. 33–42. Plenum Press, New York.
- Acosta Ochoa, Guillermo
2010 Late Pleistocene/Early Holocene Tropical Foragers of Chiapas, Mexico: Recent Studies. *Current Research on the Pleistocene* 27:1–5.
- 2012 Ice Age Hunter-Gatherers and the Colonization of Mesoamerica. In *The Oxford Handbook of Mesoamerican Archaeology*, edited by Deborah L. Nichols and Christopher A. Pool, pp. 129–140. Oxford University Press, New York.
- Acosta Ochoa, Guillermo, Patricia Pérez-Martínez, and Ximena Ulloa-Montemayor
2019 The Clovis-Like and Fishtail Occupations of Southern Mexico and

- Central America: A Reappraisal. In *People and Culture in Ice Age Americas: New Dimensions in Paleoamerican Archaeology*, edited by Rafael Suárez and Ciprian F. Ardelean, pp. 93–107. University of Utah Press, Salt Lake City.
- Adams, Richard E.W.
1971 *The Ceramics of Altar de Sacrificios*. Papers of the Peabody Museum of Archaeology and Ethnology 63, No. 1. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
- Aebersold, Luisa
2018 *Getting to the Bottom of It: Geoarchaeological and Paleobotanical Investigations for Early Transitions in the Maya Lowlands*. Unpublished Ph.D. dissertation, Department of Anthropology, University of Texas at Austin, Austin.
- Aimers, James, Terry Powis, and Jaime Awe
2000 Preclassic Round Structures of the Upper Belize River Valley. *Latin American Antiquity* 11:71–86.
- Andrews, E. Wyllys, V.
1990 Early Ceramic History of the Lowland Maya. In *Vision and Revision in Maya Studies*, edited by Flora S. Clancy and Peter D. Harrison, pp. 1–19. University of New Mexico Press, Albuquerque.
- Andrews, E. Wyllys, V. and Norman Hammond
1990 Redefinition of the Swasey Phase at Cuello, Belize. *American Antiquity* 55:570–584.
- Andrews, E. Wyllys, V., George J. Bey III, and Christopher M. Gunn
2018 The Earliest Ceramics of the Northern Maya Lowlands. In *Pathways to Complexity*, edited by M. Kathryn Brown and George J. Bey III, pp. 49–86. University Press of Florida, Gainesville.
- Aoyama, Kazuo
1999 *Ancient Maya State, Urbanism, Exchange and Craft Specialization: Chipped Stone Evidence from the Copan Valley and the La Entrada Region, Honduras*. University of Pittsburgh Memoirs in Latin American Archaeology 12. University of Pittsburgh, Pittsburgh.
2017 Ancient Maya Economy: Lithic Production and Exchange Around Ceibal, Guatemala. *Ancient Mesoamerica* 28:279–303.
- Aoyama, Kazuo, and Jessica Munson
2012 Ancient Maya Obsidian Exchange and Chipped Stone Production at Caobal, Guatemala. *Mexicon* 34:34–42.
- Aoyama, Kazuo, Takeshi Inomata, Daniela Triadan, Flory Pinzón, Juan Manuel Palomo, Jessica MacLellan, and Ashley Sharpe
2017b Early Maya Ritual Practices and Craft Production: Late Middle Preclassic Ritual Deposits Containing Obsidian Artifacts at Ceibal, Guatemala. *Journal of Field Archaeology* 42:408–422.
- Aoyama, Kazuo, Takeshi Inomata, Flory Pinzón, and Juan Manuel Palomo
2017a Polished Greenstone Celt Caches from Ceibal: The Development of Maya Public Rituals. *Antiquity* 91:701–717.
- Arguedas Cortés, Gilda Rosa
1988 Los fonemas segmentales del protolengua: Reconstrucción comparativa. *Filología y Lingüística* 14(2):89–109.
- Arroyo, Joaquín, Pilar Luna, James Chatters, Dominique Rissolo, Roberto Chávez, Alberto Nava, and Helena Barba
2015 Underwater Archaeology and Prehistory: The Case of the Cenotes in Mexico. *Human Origin Sites and the World Heritage Convention in the Americas* 42(1):54–60.
- Atkinson, Quentin D.
2006 *From Species to Languages: A Phylogenetic Approach to Human Prehistory*. Unpublished Ph.D. dissertation, Department of Psychology, University of Auckland, Auckland.
- Awe, Jaime J.
1992 *Dawn in the Land Between the Rivers: Formative Occupation at Cahal Pech, Belize and Its Implications for Formative Occupation in the Central Maya Lowlands*. Unpublished Ph.D. dissertation, Department of Archaeology, University of London, London.
- Awe, Jaime J., and Paul F. Healy
1994 Flakes to Blades? Middle Formative Development of Obsidian Artifacts in the Upper Belize River Valley. *Latin American Antiquity* 5:193–205.
- Awe, Jaime J., Claire E. Ebert, W. James Stemp, M. Kathryn Brown, Lauren A. Sullivan, and James F. Garber
2021a Lowland Maya Genesis: The Late Archaic to Late Early Formative Transition in the Upper Belize River Valley. *Ancient Mesoamerica* 32:519–544.
- Awe, Jaime J., Christophe Helmke, Claire E. Ebert, and Julie A. Hoggarth
2021b *Le Roi est mort, vive le roi*: Examining the Rise, Apogee, and Decline of Maya Kingship in Western Belize. Paper presented at the Dumbarton Oaks Pre-Columbian Studies Symposium, Faces of Rulership in the Maya Region, March 25–27, Washington, DC.
- Ball, Joseph W., and Jennifer T. Taschek
2003 Reconsidering the Belize Valley Preclassic: A Case for Multiethnic Interactions in the Development of a Regional Culture Tradition. *Ancient Mesoamerica* 14:179–217.
- Bermingham, Adam, Bronwen S. Whitney, Nicholas J.D. Loughlin, and Julie A. Hoggarth
2021 Island Resource Exploitation by the Ancient Maya During Periods of Climate Stress, Ambergris Caye, Belize. *Journal of Archaeological Science: Reports* 37:103000.
- Blake, Michael
1991 An Emerging Early Formative Chiefdom at Paso de la Amada, Chiapas, Mexico. In *The Formation of Complex Society in Southeastern Mesoamerica*, edited by William R. Fowler, pp. 27–46. CRC Press, Boca Raton.
2015 *Maize for the Gods: Unearthing the 9,000-year History of Corn*. University of California Press, Oakland.
- Braswell, Geoffrey E.
2015 The Ancient Maya of Mexico: Reinterpreting the Past of the Northern Maya Lowlands. In *The Ancient Maya of Mexico: Reinterpreting the Past of the Northern Maya Lowlands*, edited by Geoffrey E. Braswell, pp. 1–40. Routledge, New York.
- Brown, Cecil H., and Stanley Witkowski
1979 Aspects of the Phonological History of Mayan-Zoquean. *International Journal of American Linguistics* 45(1):34–47.
- Brown, Cecil H., David Beck, Grzegorz Kondrak, James K. Watters, and Søren Wichmann
2011 Totozoquean. *International Journal of American Linguistics* 77(3):323–372.
- Brown, David O., Meredith L. Dreiss, and Richard E. Hughes
2004 Preclassic Obsidian Procurement and Utilization at the Maya Site of Colha, Belize. *Latin American Antiquity* 15:222–240.
- Brown, Kenneth L.
1980 A Brief Report on Paleoindian-Archaic Occupation in the Quiche Basin, Guatemala. *American Antiquity* 45:313–324.
- Brown, M. Kathryn
2003 *Emerging Complexity in the Maya Lowlands: A View from Blackman Eddy Belize*. Ph.D. dissertation, Department of Anthropology, Southern Methodist University, Dallas.
2007 Ritual Ceramic Use in the Early and Middle Preclassic at the Sites of Blackman Eddy and Cahal Pech, Belize. FAMSÍ report. Electronic document, www.famsi.org/reports/02066/02066Brown01.pdf, accessed October 14, 2021.
- Brown, M. Kathryn, and George J. Bey III (editors)
2018 *Pathways to Complexity: A View from the Maya Lowlands*. University Press of Florida, Gainesville.
- Brown, M. Kathryn, Jaime J. Awe, and James F. Garber
2018 Ideology, Religion, and Ritual in Social Complexity in the Belize River Valley. In *Pathways to Complexity: A View from the Maya Lowlands*, edited by M. Kathryn Brown and George J. Bey III, pp. 87–116. University Press of Florida, Gainesville.
- Brown, M. Kathryn, Jennifer Cochran, Leah McCurdy, and David Mixer
2011 Preceramic to Postclassic: A Brief Synthesis of the Occupation History of Group E, Xunantunich. *Research Reports in Belizean Archaeology* 8:209–219.
- Bullen, Ripley P., and William W. Plowden
1963 Preceramic Archaic Sites in the Highlands of Honduras. *American Antiquity* 28:382–385.
- Buttles, Palma J.
1992 Small Finds in Context: The Preclassic Artifacts of Colha, Belize. Unpublished Master's thesis, Department of Anthropology, University of Texas at Austin, Austin.
- Cagnato, Clarissa
2021 Gathering and Sowing across the Central Maya Lowlands: A Review of Plant Use by Preceramic Peoples and the Early to Middle Preclassic Maya. *Ancient Mesoamerica* 32:486–501.
- Callaghan, Michael G., and Nina Neivens de Estrada
2016 *The Ceramic Sequence of the Holmul Region, Guatemala*. Anthropological Papers of the University of Arizona 77. University of Arizona Press, Tucson.
- Campbell, Lyle
1972 Mayan Loan Words in Xinca. *International Journal of American Linguistics* 38(3):187–190.

- 1997 *American Indian Languages: The Historical Linguistics of Native America*. Oxford Studies in Anthropological Linguistics. Oxford University Press, Oxford.
- Campbell, Lyle, and David Oltrogge
1980 Proto-Tol (Jicaque). *International Journal of American Linguistics* 46(3):205–223.
- Campbell, Lyle, and Terrence Kaufman
1976 A Linguistic Look at the Olmecs. *American Antiquity* 41:80–89.
1980 On Mesoamerican Linguistics. *American Anthropologist* 82: 850–857.
- Castellanos, Jeanette E., and Antonia E. Foias
2017 The Earliest Maya Farmers of Peten: New Evidence from Buenavista-Nuevo San José, Central Peten Lakes Region, Guatemala. *Journal of Anthropology* 2017:1–45. doi:10.1155/2017/8109137.
- Chase, Diane Z., and Arlen F. Chase
2006 The Dawn of Maya Civilization: Preclassic Archaeology from Santa Rita Corozal. *Research Reports in Belizean Archaeology* 3: 85–100.
- Chatters, James C., Douglas J. Kennett, Yemane Asmerom, Brian M. Kemp, Victor Polyak, Alberto Nava Blank, Patricia A. Beddows, Eduard Reinhardt, Joaquin Arroyo-Cabrales, Deborah A. Bolnick, Ripan S. Malhi, Brendan J. Culleton, Pilar Luna Erreguerena, Dominique Rissolo, Shanti Morell-Hart, and Thomas W. Stafford Jr.
2014 Late Pleistocene Human Skeleton and mtDNA Link Paleoamericans and Modern Native Americans. *Science* 344(6185): 750–754.
- Cheetham, David, and Jaime J. Awe
1996 The Early Formative Cunil Ceramic Complex at Cahal Pech, Belize. Paper presented at the 61st Annual Meeting of the Society for American Archaeology, April 10–14, New Orleans.
- Cheetham, David, Donald W. Forsyth, and John E. Clark
2003 La cerámica pre-Mamom de la cuenca del Río Belice y del Centro de Petén: Las correspondencias y sus implicaciones. In *XVI Simposio de Investigaciones Arqueológicas en Guatemala*, edited by Juan Pedro Laporte, Bárbara Arroyo, Héctor Escobedo, and Héctor Mejía, pp. 615–634. Museo Nacional de Arqueología y Etnología, Asociación Tikal, Guatemala.
- Cheetham, David T.
1995 Excavations of Structure B-4, Cahal Pech, Belize: 1994 Operations. In *Belize Valley Preclassic Maya Project: Report on the 1994 Field Season*, edited by Paul F. Healy and Jaime J. Awe, pp. 18–44. Occasional Papers in Anthropology 10. Trent University, Peterborough.
- 1998 Interregional Interaction, Symbol Emulation, and the Emergence of Socio-Political Inequality in the Central Maya Lowlands. Unpublished Master's thesis, Department of Anthropology, University of British Columbia, Vancouver.
- 2005 Cunil: A Pre-Mamom Horizon in the Southern Maya Lowlands. In *New Perspectives on Formative Mesoamerican Cultures*, pp. 27–38, edited by Terry G. Powis. BAR International Series 1377. Hadrian Books, Oxford.
- 2010 Corn, Colanders, and Cooking: Early Maize Processing in the Maya Lowlands and Its Implications. In *Pre-Columbian Foodways: Interdisciplinary Approaches to Food, Culture, and Markets in Mesoamerica*, edited by John E. Staller and Michael D. Carrasco, pp. 345–368. Springer, New York.
- Clark, John E.
1991 The Beginnings of Mesoamerica: Apologia for the Soconusco Early Formative. In *The Formation of Complex Society in Southeastern Mesoamerica*, edited by William R. Fowler, pp. 13–26. CRC Press, Boca Raton.
- Clark, John E., and David Cheetham
2002 Mesoamerica's Tribal Foundations. In *The Archaeology of Tribal Societies*, edited by William A. Parkinson, pp. 278–339. Archaeological Series 15. International Monographs in Prehistory, Ann Arbor.
- Clark, John E., and Michael Blake
1994 The Power of Prestige: Competitive Generosity and the Emergence of Rank Societies in Lowland Mesoamerica. In *Factional Competition and Political Development in the New World*, edited by Elizabeth M. Brumfiel and John W. Fox, pp. 17–30. Cambridge University Press, Cambridge.
- Cochran, Jennifer L.
2009 *A Diachronic Perspective of Marine Shell Use from Structure B1, Blackman Eddy, Belize*. Master's thesis, The University of Texas at Arlington, Arlington.
- Coe, Michael D.
1960 A Fluted Point from Highland Guatemala. *American Antiquity* 25: 412–413.
- Coe, William R.
1965 Tikal, Guatemala and Emergent Maya Civilization. *Science* 147: 1401–1419.
- Coe, William R., and Michael D. Coe
1956 Excavations at Nohoch Ek, British Honduras. *American Antiquity* 21:370–382.
- Cooke, Richard
1998 Human Settlement of Central America and Northernmost South America (14,000–8000 B.P.). *Quaternary International* 49–50: 177–190.
- Culbert, T. Patrick
1993 *The Ceramics of Tikal: Vessels from the Burials, Caches, and Problematical Deposits*. Tikal Report 25A. University Museum Monograph 81. University Museum, University of Pennsylvania, Philadelphia.
2003 The Ceramics of Tikal. In *Tikal: Dynasties, Foreigners, and Affairs of State*, edited by Jeremy A. Sabloff, pp. 47–81. School of American Research Advanced Seminar Series, Santa Fe.
- Culbert, T. Patrick, and Laura J. Kosakowsky
2019 *The Ceramic Sequence of Tikal*. Tikal Report 25B. University Museum, University of Pennsylvania, Philadelphia.
- Doyle, James A.
2017 A Tale of Two E Groups: El Palmar and Tikal, Petén, Guatemala. In *Maya E Groups: Calendars, Astronomy, and Urbanism in the Early Lowlands*, edited by David A. Freidel, Arlen F. Chase, Anne S. Dowd, and Jerry Murdock, pp. 253–292. University Press of Florida, Gainesville.
- Ebert, Claire E.
2017 *Preclassic Maya Social Complexity and the Origins of Inequality at Cahal Pech, Belize*. Unpublished Ph.D. dissertation, Department of Anthropology, Pennsylvania State University, University Park.
- Ebert, Claire E., and Jaime J. Awe
2018 Reconstructing Preclassic Maya Household Economies in the Belize River Valley. *Research Reports in Belizean Archaeology* 15:65–78.
- Ebert, Claire E., Brendan J. Culleton, Jaime J. Awe, and Douglas J. Kennett
2016 AMS ¹⁴C Dating of Preclassic to Classic Period Household Construction in the Ancient Maya Community of Cahal Pech. *Radiocarbon* 58:1–19.
- Ebert, Claire E., Julie A. Hoggarth, Jaime J. Awe, Brendan J. Culleton, and Douglas J. Kennett
2019 The Role of Diet in Resilience and Vulnerability to Climate Change: Stable Isotope Evidence from the Ancient Maya Community at Cahal Pech, Belize. *Current Anthropology* 60:589–601.
- Ek, Jerald D.
2015 *Resilience in the Midst of Collapse: A Regional Case Study of Socio-Ecological Dynamics in the Rio Champotón Drainage, Campeche, Mexico*. Unpublished Ph.D. dissertation, Department of Anthropology, State University of New York at Albany, Albany.
- England, Nora C.
1994 *La autonomía de los idiomas mayas: Historia e identidad*. Editorial Cholsamaj, Guatemala City.
- Estrada-Belli, Francisco
2006 Lightning Sky, Rain, and the Maize God: The Ideology of Preclassic Maya Rulers at Cival, Peten, Guatemala. *Ancient Mesoamerica* 17:57–78.
- Flannery, Kent V.
2009 *Guilá Naquitz: Archaic Foraging and Early Agriculture in Oaxaca, Mexico*. Updated ed. Left Coast Press, Walnut Creek.
- Flannery, Kent V., and Frank Hole
2019 *Cueva Blanca: Social Change in the Archaic of the Valley of Oaxaca*. Memoirs of the Museum of Anthropology 60. University of Michigan, Ann Arbor.
- Flannery, Kent V., and Joyce Marcus
2015 *Excavations at San José Mogote 2: The Cognitive Archaeology*. Memoirs of the University of Michigan Museum of Anthropology 58. University of Michigan, Ann Arbor.
- Fox, James A.
1978 *Proto-Mayan Accent, Morpheme Structure Conditions, and Velar Innovations*. Unpublished Ph.D. dissertation, Department of Linguistics, University of Chicago, Chicago.

- Garber, James F., and Jaime J. Awe
 2008 Middle Formative Architecture and Ritual at Cahal Pech. *Research Reports in Belizean Archaeology* 5:185–190.
 2009 A Terminal Early Formative Symbol System in the Maya Lowlands: The Iconography of the Cunil Phase (1100–900 B.C.) at Cahal Pech. *Research Reports in Belizean Archaeology* 6:151–159.
- Garber, James F., M. Kathryn Brown, Jaime J. Awe, and Christopher J. Hartman
 2004 Middle Formative Prehistory of the Central Belize Valley: An Examination of Architecture, Material Culture, and Sociopolitical Change at Blackman Eddy. In *The Ancient Maya of the Belize Valley: Half a Century of Archaeological Research*, edited by James F. Garber, pp. 25–47. University Press of Florida, Gainesville.
- García-Bárceña, Joaquín, and Diana Santamaría
 1982 *La Cueva de Santa Marta Ocozocoautla, Chiapas: Estratigrafía, cronología y cerámica*. Instituto Nacional de Antropología e Historia, Mexico City.
- Gerhardt, Juliette Cartwright, and Norman Hammond
 1991 The Community of Cuello: The Ceremonial Core. In *Cuello: An Early Maya Community in Belize*, edited by Norman Hammond, pp. 98–117. Cambridge University Press, Cambridge.
- Gibson, Eric C.
 1991 A Preliminary Functional and Contextual Study of Constricted Adzes from Northern Belize. In *Maya Stone Tools: Selected Papers from the Second Maya Lithic Conference*, edited by Thomas R. Hester and Harry J. Shafer, pp. 229–237. Monographs in World Archaeology 1. Prehistory Press, Madison.
- Gifford, James C.
 1976 *Prehistoric Pottery Analysis and the Ceramics of Barton Ramie in the Belize Valley*. Memoirs of the Peabody Museum of Archaeology and Ethnology 18. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
- González González, Arturo H., Carmen Rojas Sandoval, Alejandro Terrazas Mata, Martha Benavente Sanvicente, Wolfgang Stinnesbeck, Jerónimo O. Avilés, María Magdalena de los Ríos-Paredes, and Eugenio Aceve
 2008b The Arrival of Humans on the Yucatan Peninsula: Evidence from Submerged Caves in the State of Quintana Roo, Mexico. *Current Research in the Pleistocene* 25:1–24.
- González, Silvia, David Huddart, Isabel Israde-Alcántara, Gabriela Domínguez-Vázquez, James Bischoff, and Nicholas Felstead
 2015 Paleoindian Sites from the Basin of Mexico: Evidence from Stratigraphy, Tephrochronology and Dating. *Quaternary International* 363:4–19.
- González González, Arturo H., Alejandro Terrazas, Wolfgang Stinnesbeck, Martha E. Benavente, Jerónimo Avilés, Carmen Rojas, José Manuel Padilla, Adriana Velásquez, Eugenio Acevez, and Eberhard Frey
 2013 The First Human Settlers on the Yucatan Peninsula: Evidence from Drowned Caves in the State of Quintana Roo (South Mexico). In *Paleoamerican Odyssey*, edited by Kelly E. Graf, Caroline V. Ketron, and Michael R. Waters, pp. 323–337. Texas A&M University, College Station.
- González González, Arturo H., Carmen Rojas Sandoval, Eugenio Acevez Núñez, Jerónimo Avilés Olguín, Santiago Analco Ramírez, Octavio del Río Lara, Pilar Luna Erreguerena, Adriana Velázquez Morlet, Wolfgang Stinnesbeck, Alejandro Terrazas Maza, and Martha Benavente Sanvicente
 2008a Evidence of Early Inhabitants in Submerged Caves in Yucatan, Mexico. In *Underwater and Maritime Archaeology in Latin America and the Caribbean*, edited by Margaret E. Leshikar-Denton and Pilar Luna Erreguerena, pp. 127–142. Routledge, New York.
- Grauel, Anna-Lena, David A. Hodell, and Stefano M. Bernasconi
 2016 Quantitative Estimates of Tropical Temperature Change in Lowland Central America During the Last 42 ka. *Earth and Planetary Science Letters* 438:37–46.
- Griffith, Cameron, Reiko Ishihara, and Sarah Jack
 2002 Report on the 3rd Year of Archaeological Investigations in Actun Halal. In *The Western Belize Regional Cave Project: A Report of the 2001 Field Season*, edited by Jaime Awe, pp. 27–50. Department of Anthropology Occasional Paper 5. University of New Hampshire, Durham.
- Griffith, Cameron S., and Christopher T. Morehart
 2001 A Preliminary Report on the Excavations and Continued Investigation of Actun Halal, Macal River, Cayo District. In *The Western Belize Regional Cave Project: A Report of the 2000 Field Season*, edited by Jaime Awe, pp. 190–232. Department of Anthropology Occasional Paper 4. University of New Hampshire, Durham.
- Gruhn, Ruth, Alan L. Bryan, and Jack D. Nance
 1977 Los Tapiales: A Paleo-Indian Campsite in the Guatemalan Highlands. *Proceedings of the American Philosophical Society* 121:235–273.
- Hammond, Norman
 1982 The Prehistory of Belize. *Journal of Field Archaeology* 9: 349–362.
 1991a Jade and Greenstone Trade. In *Cuello: An Early Maya Community in Belize*, edited by Norman Hammond, pp. 169–172. Cambridge University Press, Cambridge.
 1991b Obsidian Trade. In *Cuello: An Early Maya Community in Belize*, edited by Norman Hammond, pp. 199–203. Cambridge University Press, Cambridge.
 1995 Ceremony and Society at Cuello: Preclassic Ritual Behavior and Social Differentiation. In *The Emergence of Classic Maya Civilization*, edited by Nicholas Grube, pp. 49–60. Acta Mesoamericana 8. Verlag von Fleming, Möckmühl.
- Hammond, Norman, Amanda Clarke, and Cynthia Robin
 1991 Middle Preclassic Buildings and Burials at Cuello, Belize: 1990 Investigations. *Latin American Antiquity* 2:352–363.
- Hammond, Norman, Amanda Clarke, and Francisco Estrada Belli
 1992 Middle Preclassic Maya Buildings and Burials at Cuello, Belize. *Antiquity* 66:955–964.
- Hammond, Norman, Duncan Pring, Richard Wilk, Sara Donaghey, Frank P. Saul, Elizabeth S. Wing, Arlene V. Miller, and Lawrence H. Feldman
 1979 The Earliest Lowland Maya? Definition of the Swasey Phase. *American Antiquity* 44:92–110.
- Hansen, Richard D.
 1998 Continuity and Disjunction: The Pre-Classic Antecedents of Classic Maya Architecture. In *Function and Meaning in Classic Maya Architecture*, edited by Stephen D. Houston, pp. 49–122. Dumbarton Oaks, Washington, DC.
- 2005 Perspectives on Olmec–Maya Interaction in the Middle Formative Period. In *New Perspectives on Formative Mesoamerican Cultures*, edited by Terry G. Powis, pp. 51–72. BAR International Series 1377. Hadrian Books, Oxford.
- 2016 Cultural and Environmental Components of the First Maya States: A Perspective from the Central and Southern Maya Lowlands. In *The Origins of Maya States*, edited by Loa P. Traxler and Robert J. Sharer, pp. 329–416. University of Pennsylvania Museum, Philadelphia.
- Hayden, Brian
 1980 A Fluted Point from the Guatemalan Highlands. *Current Anthropology* 21:702.
 1990 Nimrods, Piscators, Pluckers, and Planters: The Emergence of Food Production. *Journal of Anthropological Archaeology* 9(1):31–69.
 2001 Fabulous Feasts: A Prolegomenon to the Importance of Feasting. In *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*, edited by Michael Dietler and Brian Hayden, pp. 23–64. Smithsonian Institution Press, Washington, DC.
- Healy, Paul F., and Jaime J. Awe
 1995 *Belize Valley Preclassic Maya Project: Report on the 1994 Field Season*. Occasional Papers in Anthropology 10. Trent University, Peterborough.
 1996 *Belize Valley Preclassic Maya Project: Report on the 1995 Field Season*. Occasional Papers in Anthropology 12. Trent University, Peterborough.
- Healy, Paul F., Bobbi Hohmann, and Terry G. Powis
 2004 The Ancient Maya Center of Pacbitun. In *The Ancient Maya of the Belize Valley: Half a Century of Archaeological Research*, edited by James F. Garber, pp. 207–227. University Press of Florida, Gainesville.
- Hester, Thomas R., and Harry J. Shafer
 1984 Exploitation of Chert Resources by the Ancient Maya of Northern Belize, Central America. *World Archaeology* 16:157–173.
- Hester, Thomas R., Harry B. Iceland, Dale B. Hudler, and Harry J. Shafer
 1996 The Colha Preceramic Project: Preliminary Results from the 1993–1995 Field Seasons. *Mexicon* 18:45–50.
- Hester, Thomas R., Harry J. Shafer, and Thomas C. Kelly
 1980 Lithics from a Preceramic Site in Belize: A Preliminary Note. *Lithic Technology* 9:9–10.
- Hester, Thomas R., Thomas C. Kelly, and Giancarlo Ligabue
 1981 *A Fluted Paleo-Indian Projectile Point from Belize, Central America*. Working Papers in Archaeology 1. Center for Archaeological Research, University of Texas at San Antonio, San Antonio.

- Hodell, David A., Flavio S. Anselmetti, Daniel Ariztegui, Mark Brenner, Jason H. Curtis, Adrian Gilli, Dustin A. Grzesik, Thomas J. Guilderson, Andreas D. Müller, Mark B. Bush, Alexander Correa-Metrio, Jaime Escobar, and Steffen Kutterolf
2008 An 85-ka Record of Climate Change in Lowland Central America. *Quaternary Science Reviews* 27:1152–1165.
- Hohmann, Bobbi, and Terry Powis
1999 The 1996 Excavations of Plaza B at Pacbitun, Belize. In *Belize Valley Preclassic Maya Project: Report on the 1996 and 1997 Field Seasons*, edited by Paul F. Healy, pp. 1–18. Occasional Papers in Anthropology 13. Trent University, Peterborough.
- Hohmann, Bobbi, Terry Powis, and Carmen Arendt
1999 The 1997 Investigations at Pacbitun, Belize. In *Belize Valley Preclassic Maya Project: Report on the 1996 and 1997 Field Seasons*, edited by Paul F. Healy, pp. 19–29. Occasional Papers in Anthropology 13. Trent University, Peterborough.
- Hohmann, Bobbi M.
2002 *Preclassic Maya Shell Ornament Production in the Belize Valley, Belize*. Unpublished Ph.D. dissertation, Department of Anthropology, University of New Mexico, Albuquerque.
- Holman, Eric W., Cecil H. Brown, Søren Wichmann, André Müller, Viveka Velupillai, Harald Hammarström, Sebastian Saupe, Hagen Jung, Dik Bakker, Pamela Brown, Oleg Belyaev, Matthias Urban, Robert Mailhammer, Johann-Mattis List, and Dmitry Egorov
2011 Automated Dating of the World's Language Families based on Lexical Similarity. *Current Anthropology* 52:841–875.
- Hoopes, John W.
1994 The Tronadora Complex: Early Formative Ceramics in Northwestern Costa Rica. *Latin American Antiquity* 5:3–30.
- Horn, Sherman W., III
2015 *The Web of Complexity: Socioeconomic Networks in the Middle Preclassic Belize Valley*. Unpublished Ph.D. dissertation, Department of Anthropology, Tulane University, New Orleans.
- Horowitz, Rachel A.
2015 Production at the Source: Lithic Extraction and Production at Callar Creek Quarry, Belize. *Research Reports in Belizean Archaeology* 12:45–54.
2017 *Understanding Ancient Maya Economic Variability: Lithic Technological Organization in the Mopan Valley, Belize*. Unpublished Ph.D. dissertation, Department of Anthropology, Tulane University, New Orleans.
- Hudler, Dale B., and Jon C. Lohse
1994 A Functional and Contextual Study of Unifacial Chert Tools in Belize. Paper presented at the 59th Annual Meeting of the Society for American Archaeology, April 20–24, Anaheim.
- Iceland, Harry B.
1997 *The Preceramic Origins of the Maya: The Results of the Colha Preceramic Project in Northern Belize*. Unpublished Ph.D. dissertation, Department of Anthropology, University of Texas at Austin, Austin.
2005 The Preceramic to Early Middle Formative Transition in Northern Belize: Evidence for the Ethnic Identity of the Preceramic Inhabitants. In *New Perspectives on Formative Mesoamerican Cultures*, edited by Terry G. Powis, pp. 15–26. BAR International Series 1377. Hadrian Books, Oxford.
- Iceland, Harry B., and Kenneth G. Hirth
2021 The Paleoindian to Archaic Transition in Central America: Esperanza Phase Projectile Points Recovered at the El Gigante Rockshelter Site, Honduras. In *Preceramic Mesoamerica*, edited by Jon C. Lohse, Aleksander Borejsza, and Arthur A. Joyce, pp. 1–19. Routledge, London.
- Iceland, Harry B., and Thomas R. Hester
2001 Lowland Mesoamerican Archaic. In *Encyclopedia of Prehistory, Volume 5: Middle America*, edited by Peter N. Peregrine and Melvin Ember, pp. 292–302. Springer, New York.
- Inomata, Takeshi, Daniela Triadan, Kazuo Aoyama, Victor Castillo, and Hitoshi Yonenobu
2013 Early Ceremonial Constructions at Ceibal, Guatemala, and the Origins of Lowland Maya Civilization. *Science* 340:467–471.
- Inomata, Takeshi, Daniela Triadan, Verónica A. Vázquez López, Juan Carlos Fernández-Díaz, Takayuki Omori, María Belén Méndez Bauer, Melina García Hernández, Timothy Beach, Clarissa Cagnato, Kazuo Aoyama, and Hiroo Nasu
2020 Monumental Architecture at Aguada Fénix and the Rise of Maya Civilization. *Nature* 582:530–533.
- Inomata, Takeshi, Jessica MacLellan, Daniela Triadan, Jessica Munson, Melissa Burham, Kazuo Aoyama, Hiroo Nasu, Flory Pinzón, and Hitoshi Yonenobu
2015 Development of Sedentary Communities in the Maya Lowlands: Coexisting Mobile Groups and Public Ceremonies at Ceibal, Guatemala. *PNAS* 112:4268–4273.
- Isaza Aizpurúa, Ilean Isel, and Patricia A. McAnany
1999 Adornment and Identity: Shell Ornaments from Formative K'axob. *Ancient Mesoamerica* 10:117–127.
- Jackson, Donald, César Méndez, Michelle de Saint Pierre, Eugenio Aspíllaga, and Gustavo Politis
2015 Direct Dates and mtDNA of Late Pleistocene Human Skeletons from South America: A Comment on Chatters et al. (2014). *PaleoAmerica* 1:213–216.
- Jackson, Frances L. Ø.
1972 Proto-Mayan. *Comparative Studies in Amerindian Languages*, edited by Esther Mattheson, Alva Wheeler, Frances L. Jackson, Nathan E. Waltz, and Diana R. Christian, pp. 109–118. De Gruyter, The Hague.
- Jacob, John S.
1995 Ancient Maya Wetland Agricultural Fields in Cobweb Swamp, Belize: Construction, Chronology, and Function. *Journal of Field Archaeology* 22:175–190.
- Johnson, Jay K.
1991 Obsidian: A Technological Analysis. In *Cuello: An Early Maya Community in Belize*, edited by Norman Hammond, pp. 169–172. Cambridge University Press, Cambridge.
- Jones, John G.
1994 Pollen Evidence for Early Settlement and Agriculture in Northern Belize. *Palynology* 18:205–211.
- Joyce, Rosemary A., and John S. Henderson
2001 Beginnings of Village Life in Eastern Mesoamerica. *Latin American Antiquity* 12:5–24.
2007 From Feasting to Cuisine: Implications of Archaeological Research in an Early Honduran Village. *American Anthropologist* 10:642–653.
- Kaufman, Terrence
1976 Archaeological and Linguistic Correlations in Mayaland and Associated Areas of Meso-America. *World Archaeology* 8:101–118.
1990 Algunos rasgos estructurales de los idiomas mayances con referencia especial al k'iche'. In *Lecturas sobre la lingüística maya*, edited by Nora C. England and Stephen R. Elliott, pp. 59–114. Centro de Investigaciones Regionales de Mesoamérica, La Antigua.
1994 The Native Languages of Meso-America. In *Atlas of the World's Languages*, edited by Christopher Moseley and R.E. Asher, pp. 34–41. Routledge, New York.
2017 Aspects of the Lexicon of Proto-Mayan and Its Earliest Descendants. In *The Mayan Languages*, edited by Nora C. England, Roberto Závala Maldonado, and Judith Aissen, pp. 62–111. Routledge, London.
- Kaufman, Terrence, and John Justeson
2003 A Preliminary Mayan Etymological Dictionary. Foundation for the Advancement of Mesoamerican Studies, Inc. Electronic document, <http://www.famsi.org/reports/01051/pmed.pdf>, accessed March 21, 2020.
- Kelly, Thomas C.
1993 Preceramic Projectile-Point Typology in Belize. *Ancient Mesoamerica* 4:205–227.
- Kennett, Douglas J., Heather B. Thakar, Amber M. VanDerwarker, David L. Webster, Brendan J. Culleton, Thomas K. Harper, Logan Kistler, Timothy E. Scheffler, and Kenneth Hirth
2017 High-Precision Chronology for Central American Maize Diversification from El Gigante Rockshelter, Honduras. *PNAS* 114: 9026–9031.
- Kennett, Douglas J., Keith M. Prufer, Brendan J. Culleton, Richard J. George, Mark Robinson, Willa R. Trask, Gina M. Buckley, Emily Moes, Emily J. Kate, Thomas K. Harper, Lexi O'Donnell, Erin E. Ray, Ethan C. Hill, Asia Alsgaard, Christopher Merriman, Clayton Meredith, Heather J.H. Edgar, Jaime J. Awe, and Said M. Gutierrez
2020 Early Isotopic Evidence for Maize as a Staple Grain in the Americas. *Science Advances* 6:eaba3245.
- Kersey, Kimberly M.
2007 Emerging Elite Economies: Formative Period Obsidian Distribution in the Belize River Valley. *IAOS Bulletin: International Association for Obsidian Studies* 36:2–19.

- Kistler, Logan, Heather B. Thakar, Amber M. VanDerwarker, Alejandra Domic, Anders Bergström, Richard J. George, Thomas K. Harper, Robin G. Allaby, Kenneth Hirth, and Douglas J. Kennett
2020 Archaeological Central American Maize Genomes Suggest Ancient Gene Flow from South America. *PNAS* 117:33124–33129.
- Koldehoff, Brad
1987 The Cahokia Flake Tool Industry: Socioeconomic Implications for Late Prehistory in the Central Mississippi Valley. In *The Organization of Core Technology*, edited by Jay K. Johnson and Carol A. Morrow, pp. 151–185. Westview Press, Boulder.
- Kosakowsky, Laura J.
1987 *Preclassic Maya Pottery at Cuello, Belize*. Anthropological Papers 47. University of Arizona Press, Tucson.
- Kosakowsky, Laura J., and Duncan Pring
1998 The Ceramics of Cuello, Belize: A New Evaluation. *Ancient Mesoamerica* 9:55–66.
- Kosakowsky, Laura J., Kerry L. Sagebiel, and Duncan C. Pring
2018 Long Ago But Not Forgotten: The Early Preclassic Swasey Ceramic Sphere of Northern Belize. In *Research Reports in Belizean Archaeology* 15:131–140.
- Law, Danny
2013 Mayan Historical Linguistics in a New Age. *Language and Linguistics Compass* 7:141–156.
- LeCount, Lisa J., Jason Yaeger, Richard M. Leventhal, and Wendy Ashmore
2002 Dating the Rise and Fall of Xunantunich. *Ancient Mesoamerica* 13:41–63.
- Lee, David F., and Jaime J. Awe
1995 Preclassic Architecture, Burials, and Craft Specialization at the Cas Pek Group, Cahal Pech. In *Belize Valley Preclassic Maya Project: Report on the 1994 Field Season*, edited by Paul F. Healy and Jaime J. Awe, pp. 95–115. Occasional Papers in Anthropology No. 10. Trent University, Peterborough.
- Lohse, Jon C.
2010 Archaic Origins of the Lowland Maya. *Latin American Antiquity* 21:312–352.
2020 Archaic Maya Matters. In *Maya World*, edited by Scott R. Hutson and Traci Ardren, pp. 11–28. Routledge, New York.
- Lohse, Jon C., and Michael B. Collins
2004 Lithic Artifacts Recovered in Association with Pleistocene Fauna from Actun Halal Cave, Western Belize. Unpublished report submitted to the Western Belize Regional Cave Project and the Institute of Archaeology, National Institute of Culture and History, Belmopan.
- Lohse, Jon C., Jaime J. Awe, Cameron Griffith, Robert M. Rosenswig, and Fred Valdez Jr.
2006 Preceramic Occupations in Belize: Updating the Paleoindian and Archaic Record. *Latin American Antiquity* 17:209–226.
- Lohse, Jon C., Lisa LeCount, John G. Jones, Timothy Beach, and Ashley Hallock
2007 *In Search of the Preceramic: 2006 Season Investigations at Actun Halal, Belize*. FAMSI Report. Electronic document, www.famsi.org/reports/06019/06019Lohse01.pdf, accessed October 14, 2021.
- MacNeish, Richard S., and Antoinette Nelken-Terner
1983a The Preceramic of Mesoamerica. *Journal of Field Archaeology* 10:71–84.
1983b *Final Annual Report of the Belize Archaic Archaeological Reconnaissance*. R.S. Peabody Foundation for Archaeology, Andover.
- MacNeish, Richard S., Jeffery K. Wilkerson, and Antoinette Nelken-Terner
1980 *First Annual Report of the Belize Archaic Archaeological Reconnaissance*. R.S. Peabody Foundation for Archaeology, Andover.
- Marcus, Joyce
1982 The Plant World of the Sixteenth- and Seventeenth-Century Lowland Maya. In *Maya Subsistence: Studies in Memory of Dennis E. Puleston*, edited by Kent V. Flannery, pp. 239–273. Academic Press, New York.
1983 Lowland Maya Archaeology at the Crossroads. *American Antiquity* 48:454–488.
1995 Where Is Lowland Maya Archaeology Headed? *Journal of Archaeological Research* 3:3–53.
2003 Recent Advances in Maya Archaeology. *Journal of Archaeological Research* 11:71–148.
- Masson, Marilyn A.
2004 Fauna Exploitation from the Preclassic to the Postclassic Periods at Four Maya Settlements in Northern Belize. In *Maya Zooarchaeology: New Directions in Theory and Method*, edited by Kitty F. Emery, pp. 97–122. Monograph 51. Cotsen Institute of Archaeology, University of California, Los Angeles.
- McAnany, Patricia A.
1995 *Living with the Ancestors: Kinship and Kingship in Ancient Maya Society*. University of Texas Press, Austin.
2004a Domiciles and Construction Histories. In *K'axob: Ritual, Work, and Family in an Ancient Maya Village*, edited by Patricia A. McAnany, pp. 307–315. Monumenta Archaeologica 22. Cotsen Institute of Archaeology, University of California, Los Angeles.
2004b Obsidian Blades and Source Areas. In *K'axob: Ritual, Work, and Family in an Ancient Maya Village*, edited by Patricia A. McAnany, pp. 23–62. Monumenta Archaeologica 22. Cotsen Institute of Archaeology, University of California, Los Angeles.
- McAnany, Patricia, and Sandra López Varela
1999 Re-Creating the Formative Maya Village of K'axob: Chronology, Ceramic Complexes, and Ancestors in Architectural Context. *Ancient Mesoamerica* 10:147–168.
- McAnany, Patricia, Rebecca Storey, and Angela Lockard
1999 Mortuary Ritual and Family Politics at Formative and Early Classic K'axob, Belize. *Ancient Mesoamerica* 10:129–146.
- McQuown, Norman A.
1942 Una posible síntesis lingüística Macro-Mayance. In *Mayas y Olmecas, Segunda Mesa Redonda sobre Problemas Antropológicos de México y Centro América*, pp. 37–38. Sociedad Mexicana de Antropología, Tuxtla Gutiérrez.
- Méndez Salinas, Luis, and Jon C. Lohse
2010 Los primeros talladores y sus estrategias de producción: Artefactos paleoindios en el noroccidente de Guatemala. In *XXIII Simposio de Investigaciones Arqueológicas en Guatemala, 2009*, edited by Bárbara Arroyo, Adriana Linares Palma, and Lorena Paiz Aragón, pp. 919–933. Museo Nacional de Arqueología y Etnología, Guatemala City.
- Micheletti, George J., Kaitlin E. Crow, and Terry G. Powis
2018 Expanding Sub-Plaza Explorations of Middle Preclassic Architecture at the Site of Pacbitun, Belize. *Research Reports in Belizean Archaeology* 15:17–26.
- Miller, D. Shane, Vance T. Holliday, and Jordon Bright
2013 Clovis Across the Continent. In *Paleoamerican Odyssey*, edited by Kelly E. Graf, Caroline V. Ketron, and Michael R. Waters, pp. 207–220. Center for the Study of the First Americans, Texas A&M University, College Station.
- Moholy-Nagy, Hattula
1985 The Social and Ceremonial Uses of Marine Mollusks at Tikal. In *Prehistoric Lowland Maya Environment and Subsistence Economy*, edited by Mary Pohl, pp. 148–158. Papers of the Peabody Museum of Archaeology and Ethnology 77. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
1989 Formed Shell Beads from Tikal, Guatemala. In *Proceedings of the 1986 Shell Bead Conference*, edited by Charles F. Haynes III, Lynn Ceci, and Connie Cox Bodner, pp. 139–156. Research Records 20. Rochester Museum and Science Center, Rochester.
- Morrow Juliet E., and Toby A. Morrow
1999 Geographic Variation in Fluted Projectile Points: A Hemispheric Perspective. *American Antiquity* 64:215–230.
- Murata, Satoru
2011 *Maya Salters, Maya Potters: The Archaeology of Multicrafting on Non-Residential Mounds at Wits Cah Ak'al, Belize*. Unpublished Ph.D. dissertation, Department of Archaeology, Boston University, Boston.
- Nami, Hugo Gabriel
2021 Fishtailed Projectile Points in the Americas: Remarks and Hypotheses on the Peopling of Northern South America and Beyond. *Quaternary International* 578:47–72.
- Nelson, Margaret C.
1991 The Study of Technological Organization. *Journal of Archaeological Method and Theory* 3:57–100.
- Norman, William M., and Lyle Campbell
1978 Toward a Proto-Mayan Syntax: A Comparative Perspective on Grammar. In *Papers in Mayan Linguistics*, edited by Nora C. England, pp. 136–156. University of Missouri, Columbia.
- Ochoa-Lugo, Mirna Isabel, María de Lourdes Muñoz, Gerardo Pérez-Ramírez, Kristine G. Beaty, Mauro López-Armenta, Javiere Cervini-Silva, Miguel Moreno-Galeana, Adrián Martínez Meza, Eduardo Ramos, Michael H. Crawford, and Arturo Romano-Pacheco
2016 Genetic Affiliation of Pre-Hispanic and Contemporary Mayas through Maternal Linage. *Human Biology* 88:136–167.

- Odell, George H.
1985 Archaic Lithic Assemblages from the Stratified Napoleon Hollow Site in Illinois. *Wisconsin Archaeologist* 66:327–358.
- Palomo, Juan, Takeshi Inomata, and Daniela Triadan
2017 Mortuary Rituals and Cranial Modifications at Ceibal: From the Early Middle Preclassic to the Terminal Classic Period. *Ancient Mesoamerica* 28:305–327.
- Parry, William J., and Robert Kelly
1987 Expedient Core Technology. In *The Organization of Core Technology*, edited by Jay K. Johnson and Carol A. Morrow, pp. 285–313. Westview Press, Boulder.
- Pearson, Georges A.
2017 Bridging the Gap: An Updated Overview of Clovis Across Middle America and Its Techno-Cultural Relation with Fluted Point Assemblages from South America. *PaleoAmerica* 3:203–230.
- Pearson, Georges A., and Pete Bostrom
1998 A New Fluted Stemmed Point from Belize and Its Implications for a Circum-Caribbean Paleoindian Culture Area. *Current Research in the Pleistocene* 15:55–57.
- Pendergast, David M.
1982 *Excavations at Altun Ha, Belize, 1964–1970*, Vol. 2. Royal Ontario Museum, Toronto.
- Peniche May, Nancy
2014 Revealing Architectural Variability at Cahal Pech: Recent Excavations at Plaza B. *Research Reports in Belizean Archaeology* 11:205–212.
- Piperno, Dolores R., and Bruce D. Smith
2012 The Origins of Food Production in Mesoamerica. In *The Oxford Handbook of Mesoamerican Archaeology*, edited by Deborah L. Nichols and Christopher A. Pool, pp. 151–164. Oxford University Press, Oxford.
- Piperno, Dolores R., and Deborah M. Pearsall
1998 *The Origins of Agriculture in the Lowland Neotropics*. Academic Press, San Diego.
- Pohl, Mary
1983 Maya Ritual Faunas: Vertebrate Remains from Burials, Caches, Caves, and Cenotes in the Maya Lowlands. In *Civilization in the Ancient Americas*, edited by Richard M. Leventhal and Alan L. Kolata, pp. 55–103. University of New Mexico Press, Albuquerque.
- Pohl, Mary D., Kevin O. Pope, John G. Jones, John S. Jacob, Dolores R. Piperno, Susan D. deFrance, David L. Lentz, John A. Gifford, Marie E. Danforth, and J. Kathryn Josserand
1996 Agriculture in the Maya Lowlands. *Latin American Antiquity* 7: 355–372.
- Posth, Cosimo, Nathan Nakatsuka, Iosif Lazaridis, Pontus Skoglund, Swapan Mallick, Thiseas C. Lamnidis, Nadin Rohland, Kathrin Nägele, Nicole Adamski, Emilie Bertolini, Nasreen Broomandkoshbacht, Alan Cooper, Brendan J. Culleton, Tiago Ferraz, Matthew Ferry, Anja Furtwängler, Wolfgang Haak, Kelly Harkins, Thomas K. Harper, Tábita Hünemeier, Ann Marie Lawson, Bastien Llamas, Megan Michel, Elizabeth Nelson, Jonas Oppenheimer, Nick Patterson, Stephan Schiffels, Jakob Sedig, Kristin Stewardson, Saira Talamo, Chuan-Chao Wang, Jean-Jacques Hublin, Mark Hubbe, Katerina Harvati, Amalia Nuevo Delaunay, Judith Beier, Michael Francken, Peter Kaulicke, Hugo Reyes-Centeno, Kurt Rademaker, Willa R. Trask, Mark Robinson, Said M. Gutierrez, Keith M. Prufer, Domingo C. Salazar-García, Eliane N. Chim, Lisiane Müller Plumm Gomes, Marcony L. Alves, Andersen Liryo, Mariana Inglez, Rodrigo E. Oliveira, Danilo V. Bernardo, Alberto Barioni, Veronica Wesolowski, Nahuel A. Scheffler, Mario A. Rivera, Claudia R. Plens, Pablo G. Messineo, Levy Figuti, Daniel Corach, Clara Scabuzzo, Sabine Eggers, Paulo DeBlasis, Markus Reindel, César Méndez, Gustavo Politis, Elsa Tomasto-Cagigao, Douglas J. Kennett, André Strauss, Lars Fehren-Schmitz, Johannes Krause, and David Reich
2018 Reconstructing the Deep Population History of Central and South America. *Cell* 175:1185–1197.
- Potter, Daniel R.
1991 *Maya Stone Tools: Selected Papers from the Second Maya Lithic Conference*, edited by Thomas R. Hester and Harry J. Shafer, pp. 21–29. Monographs in World Archaeology No. 1. Prehistory Press, Madison.
- Potter, Daniel R., Thomas R. Hester, Stephen L. Black, and Fred Valdez Jr.
1984 Relationships Between Early Preclassic and Early Middle Preclassic Phases in Northern Belize: A Comment on “Lowland Maya Archaeology at the Crossroads.” *American Antiquity* 49: 628–631.
- Powis, Terry G., Norbert Stanchly, Christine D. White, Paul F. Healy, Jaime J. Awe, and Fred Longstaffe
1999 A Reconstruction of Middle Preclassic Maya Subsistence Economy at Cahal Pech, Belize. *Antiquity* 73:364–376.
- Powis, Terry G., Paul F. Healy, and Bobbi Hohmann
2009 An Investigation of Middle Preclassic Structures at Pacbitun. *Research Reports in Belizean Archaeology* 6:169–177.
- Powis, Terry G., Sherman Horn III, Gyles Iannone, Paul F. Healy, James F. Garber, Jaime J. Awe, Sheldon Skaggs, and Linda A. Howie
2016 Middle Preclassic Period Maya Greenstone “Triangulates”: Forms, Contexts, and Geology of a Unique Mesoamerican Groundstone Artifact Type. *Journal of Archaeological Science: Reports* 10:59–73.
- Pring, Duncan
1977 *The Preclassic Ceramics of Northern Belize*. Unpublished Ph.D. dissertation, Department of Archaeology, University of London, London.
- Prufer, Keith, Clayton Meredith, Asia Alsgaard, Timothy Dennehy, and Douglas Kennett
2017 The Paleoindian Chronology of Tzib Te Yux Rockshelter in the Rio Blanco Valley of Southern Belize. *Research Reports in Belizean Archaeology* 14:321–326.
- Prufer, Keith M.
2018 Preceramic Cultural History in Southern Belize and Its Environmental Context. *Research Reports in Belizean Archaeology* 15:241–251.
- Prufer, Keith M., and Douglas J. Kennett
2020 The Holocene Occupations of Southern Belize. In *Approaches to Monumental Landscapes of the Ancient Maya*, edited by Brett A. Houk, Bárbara Arroyo, and Terry G. Powis, pp. 16–38. University of Florida Press, Gainesville.
- Prufer, Keith M., Asia V. Alsgaard, Mark Robinson, Clayton R. Meredith, Brendan J. Culleton, Timothy Dennehy, Shelby Magee, Bruce B. Huckell, W. James Stemp, Jaime J. Awe, Jose M. Capriles, and Douglas J. Kennett
2019 Linking Late Paleoindian Stone Tool Technologies and Populations in North, Central and South America. *PLoS ONE* 14(7): e0219812.
- Prufer, Keith M., Mark Robinson, and Douglas J. Kennett
2021 Terminal Pleistocene through Middle Holocene Occupations in Southeastern Mesoamerica: Linking Ecology and Culture in the Context of Neotropical Foragers and Early Farmers. *Ancient Mesoamerica* 32:439–460.
- Rice, Prudence M.
1979 Ceramic and Non-Ceramic Artifacts of Lakes Yaxha-Sacnab, El Peten, Guatemala. Part I: The Ceramics, Section A: Introduction and Middle Preclassic Ceramics of Yaxha-Sacnab, Guatemala. *Cerámica de Cultura Maya* 10:1–35.
- 2009 Mound ZZ1, Nixtun-Ch’ich’, Petén, Guatemala: Rescue Operations at a Long-Lived Structure in the Maya Lowlands. *Journal of Field Archaeology* 34:403–422.
- 2019 Early Pottery and Construction at Nixtun-Ch’ich’, Petén, Guatemala: Preliminary Observations. *Latin American Antiquity* 30: 1–19.
- Rice, Prudence M., Timothy W. Pugh, and Evelyn M. Chan Nieto
2019 Early Construction of a Maya Sacred Landscape: The Sector Y “E-Group” of Nixtun-Ch’ich’ (Petén, Guatemala). *Journal of Field Archaeology* 44:550–564.
- Robin, Cynthia, and Norman Hammond
1991 Burial Practices. In *Cuello: An Early Maya Community in Belize*, edited by Norman Hammond, pp. 204–225. Cambridge University Press, Cambridge.
- Roca-Rada, Xavier, Yassine Souilmi, João C. Teixeira, and Bastien Llamas
2020 Ancient DNA Studies in Pre-Columbian Mesoamerica. *Genes (Basel)* 11:1346.
- Rosenmeier, Michael F., David A. Hodell, Mark Brenner, Jason H. Curtis, and Thomas P. Guilderson
2002 A 4000-Year Lacustrine Record of the Environmental Change in the Southern Maya Lowlands, Petén, Guatemala. *Quaternary Research* 57:183–190.
- Rosenswig, Robert M.
2004 The Late Archaic Occupation of Northern Belize: New Archaeological Excavation Data. *Research Reports in Belizean Archaeology* 1:267–277.
- 2006 Sedentism and Food Production in Early Complex Societies of the Soconusco, Mexico. *World Archaeology* 38:329–354.

- 2007 Beyond Identifying Elites: Feasting as a Means to Understand Early Middle Formative Society on the Pacific Coast of Mexico. *Journal of Anthropological Archaeology* 26(1):1–27.
- 2011 An Early Mesoamerican Archipelago of Complexity: As Seen from Changing Population and Human Depictions at Cuauhtémoc. In *Sociopolitical Transformation in Early Mesoamerica: Archaic to Formative in the Soconusco Region*, edited by Richard Lesure, pp. 242–271. University of California Press, Berkeley.
- 2015 A Mosaic of Adaptation: The Archaeological Record for Mesoamerica's Archaic Period. *Journal of Archaeological Research* 23:115–162.
- 2021 Opinions on the Lowland Maya Late Archaic Period with Some Evidence from Northern Belize. *Ancient Mesoamerica* 32:461–474.
- Rosenswig, Robert M., Amber M. VanDerwarker, Brendan J. Culleton, and Douglas J. Kennett
2015 Is It Agriculture Yet? Intensified Maize-Use at 1000 cal b.c. in the Soconusco and Mesoamerica. *Journal of Anthropological Archaeology* 40:89–108.
- Rosenswig, Robert M., and Marilyn A. Masson
2001 Seven New Preceramic Sites Documented in Northern Belize. *Mexicon* 23:138–140.
- Rosenswig, Robert M., Deborah M. Pearsall, Marilyn A. Masson, Brendan J. Culleton, and Douglas J. Kennett
2014 Archaic Period Settlement and Subsistence in the Maya Lowlands: New Starch Grain and Lithic Data from Freshwater Creek, Belize. *Journal of Archaeological Science* 41:308–321.
- Sabloff, Jeremy A.
1975 *Excavation at Seibal, No. 2, Ceramics*. Memoirs of the Peabody Museum of Archaeology and Ethnology 13. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
- Santamaría, Diana
1981 Preceramic Occupations at Los Grifos Rockshelter, Chiapas. In *Memorias Xo Congreso UISPP*, edited by Joaquín García-Bárcena and Francisco Sánchez, pp. 63–83. Instituto Nacional de Antropología e Historia, Mexico City.
- Santamaría, Diana, and Joaquín García-Bárcena
1989 *Puntas de proyectil, cuchillos y otras herramientas sencillas de los Grifos*. Instituto Nacional de Antropología e Historia, Mexico City.
- Scheffler, Timothy E.
2008 *The El Gigante Rock Shelter, Honduras*. Unpublished Ph.D. dissertation, Department of Anthropology, The Pennsylvania State University, University Park.
- Scheffler, Timothy E., Kenneth G. Hirth, and George Hasemann
2012 The El Gigante Rockshelter: Preliminary Observations on an Early to Late Holocene Occupation in Southern Honduras. *Latin American Antiquity* 23:597–610.
- Shafer, Harry J., and Thomas R. Hester
1991 Lithic Craft Specialization and Product Distribution at the Maya Site of Colha, Belize. *World Archaeology* 23:79–97.
- Shafer, Harry J., Thomas R. Hester, and Thomas C. Kelly
1980 Notes on the Sand Hill Site. In *The Colha Project: Second Season, 1980 Interim Report*, edited by Thomas R. Hester, Jack D. Eaton, and Harry J. Shafer, pp. 233–240. Center for Archaeological Research, University of Texas at San Antonio, and Centro Studi e Ricerche Ligabue, Venice.
- Sharer, Robert J., and James C. Gifford
1970 Preclassic Ceramics from Chalchuapa, El Salvador and Their Relationships with the Maya Lowlands. *American Antiquity* 35:441–462.
- Sharer, Robert J., and Muriel Kirkpatrick
1976 The Jenney Creek Ceramic Complex: Type Descriptions. In *Prehistoric Pottery Analysis and the Ceramics of Barton Ramie in the Belize River Valley*, edited by James C. Gifford, pp. 63–83. Memoirs of the Peabody Museum of Archaeology and Ethnology 18. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
- Sharpe, Ashley E.
2019 The Ancient Shell Collectors: Two Millennia of Marine Shell Exchange at Ceibal, Guatemala. *Ancient Mesoamerica* 30:493–516.
- Shaw, Leslie C.
1999 Social and Ecological Aspects of Preclassic Maya Meat Consumption at Colhá, Belize. In *Reconstructing Ancient Maya Diet*, edited by Christine D. White, pp. 83–100. University of Utah Press, Salt Lake City.
- Shott, Michael J.
1986 Technological Organization and Settlement Mobility: An Ethnographic Examination. *Journal of Anthropological Research* 42: 15–51.
- Smith, Robert E.
1955 *Ceramic Sequence at Uaxactun, Guatemala*. Middle American Research Institute Publication 20. Tulane University, New Orleans.
- Stanchly, Norbert, and Chrissina Coleen Burke
2018 Preclassic Animal Resource Use and the Origins of Ancient Maya Lifeways and Society: Contributions from Belize Zooarchaeology. *Research Reports in Belizean Archaeology* 15:93–104.
- Stanchly, Norbert, and Jaime J. Awe
2015 Ancient Maya Use of Dog (*Canis lupus familiaris*): Evidence from the Upper Belize River Valley Region. *Research Reports in Belizean Archaeology* 12:227–237.
- Stanchly, Norbert W.
1995 Formative Period Maya Faunal Utilization at Cahal Pech, Belize: Preliminary Analysis of the Animal Remains from the 1994 Field Season. In *Belize Valley Preclassic Maya Project: Report on the 1994 Field Season*, edited by Paul F. Healy and Jaime J. Awe, pp. 124–149. Occasional Papers in Anthropology 10. Trent University, Peterborough.
- 1999 Preliminary Report on the Preclassic Faunal Remains from Pacbitun, Belize: 1995–1996 Field Seasons. In *Belize Valley Preclassic Maya Project: Report on the 1996 and 1997 Field Season*, edited by Paul F. Healy and Jaime J. Awe, pp. 41–52. Occasional Papers in Anthropology 13. Trent University, Peterborough.
- Stemp, W. James, and Eleanor Harrison-Buck
2019 Pre-Maya Lithic Technology in the Wetlands of Belize: The Chipped Stone from Crawford Bank. *Lithic Technology* 44:183–198.
- Stemp, W. James, and Jaime J. Awe
2013 Possible Variation in the Late Archaic Period Bifaces in Belize: New Finds from the Cayo District of Western Belize. *Lithic Technology* 38:17–31.
- Stemp, W. James, Jaime J. Awe, Keith M. Prufer, and Christophe G.B. Helmke
2016 Design and Function of Lowe and Sawmill Points from the Preceramic Period of Belize. *Latin American Antiquity* 27:279–299.
- Stemp, W. James, Jaime J. Awe, M. Kathryn Brown, and James F. Garber
2018a Rock Bottom: Maya Lithic Technology in the Early Terminal to Late Middle Preclassic Periods at Cahal Pech and Blackman Eddy, Cayo District, Belize. *Research Reports in Belizean Archaeology* 15: 79–91.
- Stemp, W. James, Jaime J. Awe, M. Kathryn Brown, Eleanor Harrison-Buck, Christophe G.B. Helmke, Gabriel D. Wrobel, and Jason Yaeger
2018b Four Preceramic Points Newly Discovered in Belize: A Comment on Stemp et al. (2016:279–299). *Latin American Antiquity* 29:394–397.
- Stinnesbeck, Sarah R., Wolfgang Stinnesbeck, Alejandro Terrazas Mata, Jerónimo Avilés Olguín, Martha Benavente Sanvicente, Patrick Zell, Eberhard Frey, Susanne Lindauer, Carmen Rojas Sandoval, Adriana Velázquez Morlet, Eugenio Acevez Nuñez, and Arturo González González
2018 The Muknal Cave Near Tulum, Mexico: An Early-Holocene Funeral Site on the Yucatán Peninsula. *Holocene* 28:1992–2005.
- Stinnesbeck, Wolfgang, Julia Becker, Fabio Hering, Eberhard Frey, Arturo González González, Jens Fohlmeister, Sarah Stinnesbeck, Norbert Frank, Alejandro Terrazas Mata, Martha Elena Benavente, Jerónimo Avilés Olguín, Eugenio Acevez Nuñez, Patrick Zell, and Michael Deininger
2017 The Earliest Settlers of Mesoamerica Date Back to the Late Pleistocene. *PLoS ONE* 12(8):e0183345.
- Storey, Rebecca
2004 Ancestors: Bioarchaeology of the Human Remains of K'axob. In *K'axob: Ritual, Work, and Family in an Ancient Maya Village*, edited by Patricia A. McAnany, pp. 109–139. Monumenta Archaeologica 22. Cotsen Institute of Archaeology, University of California, Los Angeles.
- Strelow, Duane, and Lisa LeCount
2001 Regional Interaction in the Formative Southern Maya Lowlands: Evidence of Olmecoid Stylistic Motifs in a Cunil Ceramic Assemblage from Xunantunich, Belize. Poster presented at the 66th Annual Meeting of the Society for American Archaeology, April 18–21, New Orleans.
- Sullivan, Alan P., III, and Kenneth C. Rozen
1985 Debitage Analysis and Archaeological Interpretation. *American Antiquity* 50:755–779.
- Sullivan, Lauren A.
1991 Preclassic Domestic Architecture at Colha, Belize. Unpublished Master's thesis, Department of Anthropology, University of Texas at Austin, Austin.

- Sullivan, Lauren A., and Jaime J. Awe
 2013 Establishing the Cunil Ceramic Complex at Cahal Pech, Belize. In *Ancient Maya Pottery: Classification, Analysis, and Interpretation*, edited by James J. Aimers, pp. 107–120. University of Florida Press, Gainesville.
- Sullivan, Lauren A., Jaime J. Awe, and M. Kathryn Brown
 2009 Refining the Cunil Ceramic Complex at Cahal Pech Belize. In *Research Reports in Belizean Archaeology* 6:161–168.
 2018 The Cunil Complex: Early Villages in the Maya Lowlands. In *Pathways to Complexity*, edited by M. Kathryn Brown and George J. Bey III, pp. 35–48. University Press of Florida, Gainesville.
- Tomka, Steven A.
 2001 The Effect of Processing Requirements on Reduction Strategies and Tool Form: A New Perspective. In *Lithic Debitage: Context, Form, Meaning*, edited by William Andrefsky Jr., pp. 207–225. University of Utah Press, Salt Lake City.
- Torrence, Robin
 1983 Time Budgeting and Hunter-Gatherer Technology. In *Hunter Gatherer Economy in Prehistory: A European Perspective*, edited by G. Bailey, pp. 11–22. Cambridge University Press, Cambridge.
- Tykot, Robert H., Nikolaas J. van der Merwe, and Norman Hammond
 1996 Stable Isotope Analysis of Bone Collagen, Bone Apatite, and Tooth Enamel in the Reconstruction of Human Diet. In *Archaeological Chemistry: Organic, Inorganic, and Biochemical Analysis*, edited by Mary Virginia Orna, pp. 355–365. ACS Symposium Series 625. American Chemical Society, Washington, DC.
- Valdez, Fred, Jr.
 1987 *The Prehistoric Ceramics of Colha, Northern Belize*. Unpublished Ph.D. dissertation. Department of Anthropology, Harvard University, Cambridge.
 1994 The Colha Ceramic Complexes. In *Continuing Archaeology at Colha Belize*, edited by Thomas R. Hester, Harry J. Shafer, and Jack D. Eaton, pp. 6–19. Studies in Archaeology 16. Texas Archaeological Research Laboratory, University of Texas at Austin, Austin.
- Valdez, Fred, Jr., and Grant Aylesworth
 2005 A Fluted Paleoindian Point and Other Chipped Stone Tools from August Pine Ridge, Belize. *Mono y Conejo* 3:35–39.
- Valdez, Fred, Jr., Lauren A. Sullivan, Palma J. Buttles, and Luisa Aebersold
 2021 The Origins and Identification of the Early Maya from Colha and Northern Belize. *Ancient Mesoamerica* 32:502–518.
- van der Merwe, Nikolaas J., Robert H. Tykot, Norman Hammond, and Kim Oakberg
 2000 Diet and Animal Husbandry of the Preclassic Maya at Cuello, Belize: Isotopic and Zooarchaeological Evidence. In *Biogeochemical Approaches to Paleodietary Analysis*, edited by Stanley H. Ambrose and M. Anne Katzenberg, pp. 24–38. Plenum Publishers, New York.
- Wahl, David, Roger Byrne, Thomas Schreiner, and Richard Hansen
 2006 Holocene Vegetation Change in the Northern Peten and Its Implications for Maya Prehistory. *Quaternary Research* 65:380–389.
- Walker, Debra, Kathryn Reese-Taylor, and Armando Anaya Hernandez
 2017 Ceramic Spheres at the Crossroads: Trading Goods and Ceramic Ideas at Yaxnohcah, Campeche, Mexico. Paper presented at the 116th American Anthropological Association Meeting, November 29–December 3, Washington, DC.
- Waters, Michael R., Thomas Amorosi, and Thomas W. Stafford Jr.
 2015 Redating Fell's Cave, Chile and the Chronological Placement of the Fishtail Projectile Point. *American Antiquity* 80:376–386.
- Waters, Michael R., Thomas W. Stafford, and David L. Carlson
 2020 The Age of Clovis: 13,050 to 12,750 cal yr B.P. *Science Advances* 6(43):eaaz0455.
- Weintraub, Boris
 1994 Geographica. *National Geographic* 185(4):April.
- Wichmann, Søren, Dmitri Beliaev, and Albert Davletshin
 2008 Posibles correlaciones lingüísticas y arqueológicas involucrando a los olmecas. In *Olmeca: Balance y perspectivas. Memoria de la Primera Mesa Redonda*, edited by María Teresa Uriarte and Rebecca B. González Lauck, pp. 667–683. Universidad Nacional Autónoma de México, Consejo Nacional para la Cultura y las Artes, Fundación Arqueológica del Nuevo Mundo, Brigham Young University, Mexico City.
- Wiley, Gordon R.
 1970 Type Descriptions of the Ceramics of the Real Xe Complex, Seibal, Peten, Guatemala. In *Monographs and Papers in Maya Archaeology* 61, edited by William R. Bullard, pp. 313–355. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
 1973 *The Altar de Sacrificios Excavations: General Summary and Conclusions*. Papers of the Peabody Museum of Archaeology and Ethnology 64, No. 3. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
- Wiley, Gordon R., T. Patrick Culbert, and Richard E.W. Adams
 1967 Maya Lowland Ceramics: A Report from the 1965 Guatemala City Conference. *American Antiquity* 32:289–315.
- Wiley, Gordon R., William R. Bullard Jr., John B. Glass, and James C. Gifford
 1965 *Prehistoric Maya Settlements in the Belize Valley*. Papers of the Peabody Museum of Archaeology and Ethnology 54. Harvard University, Cambridge.
- Wing, Elizabeth S., and Sylvia J. Scudder
 1991 The Exploitation of Animals. In *Cuello: An Early Maya Community in Belize*, edited by Norman Hammond, pp. 84–97. Cambridge University Press, Cambridge.
- Winter, Amos, Davide Zanchettin, Matthew Lachniet, Rolf Vieten, Francesco S.R. Pausata, Fredrik Charpentier Ljungqvist, Hai Cheng, R. Lawrence Edwards, Thomas Miller, Sara Rubineti, Angelo Rubino, and Carla Taricco
 2020 Initiation of a Stable Convective Hydroclimatic Regime in Central America Circa 9000 Years B.P. *Nature Communications* 11(716):1–8. doi:10.1038/s41467-020-14490-y
- Wrobel, Gabriel D., Julie A. Hoggarth, and Aubree Marshall
 2021a Before the Maya: A Review of Paleoindian and Archaic Human Skeletons Found in the Maya Region. *Ancient Mesoamerica* 32:475–485.
- Wrobel, Gabriel D., Raúl Alejandro López Pérez, and Claire E. Ebert
 2021b Life and Death among the Earliest Maya: A Review of Early and Middle Preclassic Burials from the Maya World. *Ancient Mesoamerica* 32:545–557.
- Zeitlin, Robert N.
 1984 A Summary Report on Three Seasons of Field Investigations into the Archaic Period Prehistory of Lowland Belize. *American Anthropologist* 86:358–368.
- Zeitlin, Robert N., and Judith Francis Zeitlin
 2000 The Paleoindian and Archaic Cultures of Mesoamerica. In *The Cambridge History of Native Peoples of the Americas, Volume II: Mesoamerica*, edited by Richard E.W. Adams and Murdo J. MacLeod, pp. 45–121. Cambridge University Press, Cambridge.