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Research Article

Early Maya E Groups, the Milky Way, and creation

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Abstract

I propose a "Milky Way / creation hypothesis" for the elongated eastern structures in early Maya E Groups: they were modeled on the Milky Way galaxy. These architectural arrangements, beginning in the Preclassic period (c. 900 B.C.–A.D. 200) in the southern Maya Lowlands, were adopted from predecessors in the Early Preclassic neighboring Gulf Coast region. The widespread overall similarity of E Groups suggests a shared belief system centered on myths about creation, and many of the characters (e.g., Maize God) and events of creation in Maya myths are set in the Milky Way. The general north–south axial orientation of the eastern platform, frequently pivoted northeast–southwest, is proposed to be related to the rainy season position of the Milky Way overhead. E Groups were probably multifunctional ritual theaters, the eastern platforms serving as stages for nighttime performances of creation stories. Late modifications into a tripart edifice, with structures or superstructures in the center and at both ends, replicated the major asterisms of the visible galaxy and/or the creator gods.

Resumen

Propongo una "hipótesis de la Vía Láctea y la Creación" para las estructuras orientales alargadas en los Grupos E de los mayas tempranos: fueron modelados en la galaxia de la Vía Láctea. Estos arreglos arquitectónicos, que comenzaron en el período preclásico (c. 900 a.C.–200 d.C.) en las tierras bajas mayas del sur, fueron adoptados de los predecesores en la región vecina de la costa del Golfo del preclásico temprano. La similitud general de los Grupos E sugiere un sistema de creencias compartido centrado en los mitos sobre la Creación, y muchos de los personajes (por ejemplo, el Dios del Maíz) y los eventos de la Creación en los mitos mayas están situados en la Vía Láctea. Se propone que la orientación axial general de norte a sur de la plataforma oriental, con frecuencia girada de noreste a suroeste, está relacionada con la posición de la Vía Láctea en la estación lluviosa. Los Grupos E probablemente eran teatros rituales multifuncionales, las plataformas orientales sirvieron como escenarios para representaciones de cuentas de la Creación. Modificaciones tardías en un edificio tripartito, con estructuras o superestructuras en el centro y en ambos extremos, replicaron los principales asterismos de la galaxia visible y/o los dioses de la Creación.

Keywords: Lowland Maya; E-Groups; Milky Way; Preclassic; creation

> [C]osmological narratives were instantiated not only in iconographic programs, but also in architectural form. This ... suggests that structures often expressed fundamental cosmological concepts ... [resulting in] a highly symbolic architecture (Carrasco 2015:402).

Michael Carrasco's observation that lowland Maya architecture embodied cosmology is attested by the structural complex known as an E Group. I suggest that the elongated eastern structures, the earliest manifestations of what eventually became known as E Groups, originated as replicas of the Milky Way, the celestial setting for the events recounted in Maya creation, origin, or etiological myths. I propose that these assemblages were dedicated to Maya cosmogony: beliefs about cosmogenesis and the events and protagonists of creation. We know these myths from imagery and texts of the Classic period and later, but early E Groups provide glimpses into the seeds of their underlying oral traditions and practices. I elaborate this proposition by briefly reviewing elements of Maya creation stories, current scientific knowledge about the Milky Way, and data on the eastern structures of early E Groups, closing with some possibilities for "testing" this proposition. My focus is on sites in the Department of El Peten, northern Guatemala, dating primarily to the late Early through Late Preclassic periods (c. 1400 B.C. to A.D. 200).

By way of background, the earliest well-known occupation of the southern Maya Lowlands (Figure 1) is that of the Middle Preclassic (or Formative) period, circa 900/800–400/300 B.C. Little material evidence of earlier (Early Preclassic/Formative and Archaic) prehorticultural, hunter/gatherer/fisher occupation has been recovered in Peten, but this does not mean that the area was devoid of humans. Pollen, charcoal, and various geochemical proxy

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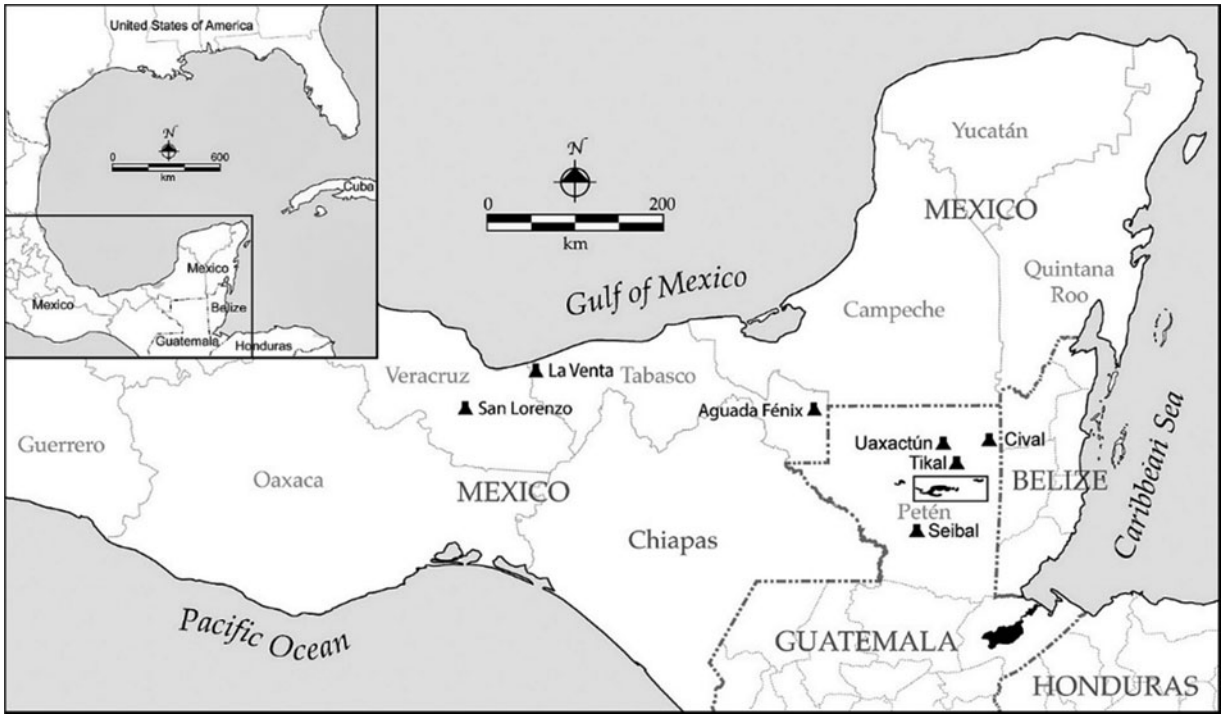


Figure 1. The Maya Lowlands of eastern Mesoamerica and adjacent areas, with modern political units and boundaries, and sites discussed in the text. Box shows central Peten lakes area (see Figure 5). Map by Don S. Rice.

indicators recovered in lake sediments have revealed forest clearing, maize grains, and other evidence of archaeologically invisible human settlement (e.g., Mueller et al. 2009; Schupbach et al. 2015). Insights into lifeways, including ritual/belief systems and changes accompanying transitions from mobile to sedentary life, must be sought through analogies to "middle range," "small scale," "tribal" (Clark and Cheetham 2002; Fowles 2002), traditional village, or other nonstate societies elsewhere.

At some point, early peoples throughout what is now called Mesoamerica realized that the changing positions of celestial bodies—the Sun, Moon, Milky Way, certain bright stars—served as notifications and predictors of alternating rainy and dry seasons (Milbrath 1999:56). For non- or semi-sedentary, incipient horticulturalists, this seasonality played a role in the availability of water and desirable foods throughout the seasonal/deciduous tropical forests of most of the Maya Lowlands. Certain individuals attuned to the skies—early "skywatchers" or "daykeepers," perhaps shamans—might have accumulated knowledge of these movements and interpreted them as signs to relocate encampments and/or shift foraging areas. Over time, efforts to explain these mysterious empyrean phenomena coalesced into origin or creation myths starring supernatural figures.

Maya creation myths

Lowland Maya creation/origin myths or fragments of them exist—pictorially or textually—in many media, including pottery vessels (Vase of the Seven Gods, Vase of the Eleven Gods), murals (San Bartolo), carved temple panels (Palenque Temple XIX) and stelae (Quirigua Stela C), and later written works such as codices and the *chilam balam* books, plus the Popol Vuh from the highlands. These feature a multitude of protagonists (including deities) and events, such as the birth of the *winal* (the Maya 20-day month) the beheading of the celestial monster, the false sun Seven Macaw and his defeat by the Hero Twins, the activities of the Paddler Gods, the birth of the Maize God, the setting of the three-stone hearth, a terrible deluge and flood, and so on (for exegeses of some of these, see, e.g., Carrasco 2010, 2015; Freidel et al. 1993; Knowlton 2010; Stuart 2005; Tedlock 1996). The varied content suggests that different peoples in different lowland places and times developed their own myths or modified those extant, but the overarching similarities and appearances in different media bespeak shared origins several thousand years ago.

Most of the doings in Maya mythistories took place before the creation date of 13.0.0.0.0 4 Ajaw 8 Kumk'u in their calendar, or August 11/13, 3114 B.C. in the Gregorian. Events occurred in primeval darkness, when all that existed was sky and water and gods: the sun had not yet made its appearance, nor had animals or humans been created. Many of these cosmogonic episodes transpired in the Milky Way, its bumps and stars and asterisms and bright spots interpreted as various mythic entities moving and dancing in proximity (see Freidel et al. 1993).

A reading of surviving creation narratives indicates that they were highly performative. As Tedlock (1996:31) says about the late Kiche' Popol Vuh, the authors of the written text are telling stories to a live audience: they seem to be

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describing scenes (the Hero Twins in a tree) and mention a "long performance." The account of creation, as they relate it, was accomplished by words and speech: Heart of Sky talking to Plumed Serpent; the forming of Earth by merely speaking the word; animals being "brought low" because they could not speak (Tedlock 1996:71–79). In a text in the Palenque Temple XIX inscriptions, the god known as GI sacrificed the celestial crocodile/monster by slitting its throat (Stuart 2005:60–77; also Bassie-Sweet 2021:51). The creature fell to Earth, its body forming land from the primordial waters. The "Birth of the Winal," a song in the *Chilam Balam of Chumayel* (Edmonson 1986:120–126; Knowlton 2010:153–177), relates the "birth" (origin) of the *winal*, the Maya "month" with 13 numerical prefixes in the 260-day divinatory almanac, by the first diviner/daykeeper. It recites the steps of creation on the 20 days of the first *winal* through the peregrinations of a supernatural entity and four older female relatives. They begin walking in the east, counting and measuring footprints: 13 for each of the five individuals totals 65, and 65 divided into 260 days accounts for the four "Burner" periods celebrated in the almanac. In another narrative, the two aged Paddler Gods—the Stingray Paddler and the Jaguar Paddler—placed the northern stone of the three-stone hearth in the northern Milky Way (Freidel et al. 1993:66; Looper 2003:158–164). This location, Nah Ho' Chan, was also the mountain place of the Maize God's birth; the Paddlers later guided a canoe bearing the dead Maize God southward through the Milky Way to the Underworld. In the Late Classic period, the Paddlers may be depicted on the upper parts of carved stelae in dotted "cloud" scrolls, the lumpy Milky Way itself.

The Milky Way

The Milky Way, the star-studded white band majestically wheeling across the night sky, must have been an awesome sight to earthly viewers before its glow was dimmed by today's ubiquitous electric light pollution. Ancient and modern peoples the world over have pondered this spectacle (Gullberg et al. 2020; Romain 2021), interpreting it metaphorically as a path, a road, a river, spilled liquid, and so on. For Mayanists, although the Milky Way and associated imagery—such as skybands—have long fascinated art historians, there has been little consideration of possible physical representations in architecture.

The term "Milky Way" comes from the Latin *via lactea*. In Classical Greek mythology, this heavenly band was formed from the splattered breast milk of the great goddess Hera, wife of Zeus, when she was tricked into suckling the infant hero-god Heracles (Roman Hercules). Today, astronomers know the Milky Way as a massive, rotating, barred spiral galaxy of gas and interstellar dust (Figure 2a) in which our solar system—our Sun and its orbiting planets, including Earth—is embedded. Modern science tells us that the Milky Way galaxy was formed about 13 billion years ago, 8 billion years after the "Big Bang" (Xiang and Rix 2022). It may incorporate as many as 400 billion stars and planets (a recent mapping effort identified 3.32 billion; Saydjari et al. 2023), and it is surrounded by a halo of invisible "dark matter," a major component of cosmic structure (see, e.g., Baudis 2017; Wechsler and Tinker 2018). The dark-matter halo includes dense stellar formations known as "globular clusters," which give the spiral disk its bumpy edges and are also visible in the bright stripe across the sky as viewed from Earth (Figure 2b). Because the galaxy is approximately disk shaped and we on Earth are in one of its four spiral arms in the same plane as the disk, we see it edge-on as a bright, lumpy, irregular band rather than as something that covers the sky completely.

The Milky Way appears to move during the night and throughout the year as a result of Earth's continuous motion: 24-hour rotation on its tilted axis while orbiting the Sun in 365.24 days. It presents most dazzlingly as a wide, north–south ribbon arching across the sky, but it also may lie on the horizon. In addition, the visible galaxy displays intermediate orientations during any 24-hour or 365-day period, which vary depending on the latitude of the observer as well as the time of observation. For example, at dusk on or around the equinoxes, the Milky Way stretches overhead: southeast to northwest in the northern hemisphere's spring, and southwest to northeast in the fall (Figure 3; see Milbrath 1999:288–291). At summer solstice, it rests on the eastern horizon.

Technically, all the stars we see in the sky and all the constellations (asterisms) our imaginations conjure from stellar arrangements are in the Milky Way, because our solar system is encapsulated within it. A bright "central bulge," a cluster of densely packed stars, is evident near the constellation Sagittarius in the galaxy's center, the point of rotation of its four arms. The dates of visible "risings" and "settings" of some of its especially bright stars, such as Alpha Sagittarii and Scorpius, have been determined vis-à-vis Earth's horizon at latitude 21° N (Merida, Yucatan, Mexico), at intervals of 500 years going back to 500 B.C. (Aveni 2001:Table 10). Over these 2,500 years, chronological slippage—called "precession" (delays or differences largely caused by slow changes in the orientation of a body's rotational axis)—can be traced. This means that rising or setting dates during the Preclassic period around 1000 B.C. would have been only a few days before those of 500 B.C. (for Classic-period [eighth-century] risings and settings at dawn, see Milbrath 1999:Table 7.2). Seasonality is roughly preserved.

The ancients knew nothing of our twenty-first century science, of course. The Maya viewed almost all natural phenomena, especially celestial (Sun, Moon, stars), as animate beings: they *moved*, after all, crawling or dancing, alone or with partners, through the great void overhead. Worldwide, the Milky Way has been interpreted in myriad ways, particularly with reference to the Great Rift—a dark, linear area that divides part of the visible galaxy lengthwise. This rift consists of dust clouds between the arms that obscure many stars and prompts imaginative perceptions. Many peoples envision dark and light areas of the visible galaxy as significant animals in their earthly—especially riverine—environments (e.g., a shark, serpent, emu, kangaroo, llama) and embellish them in their creation myths

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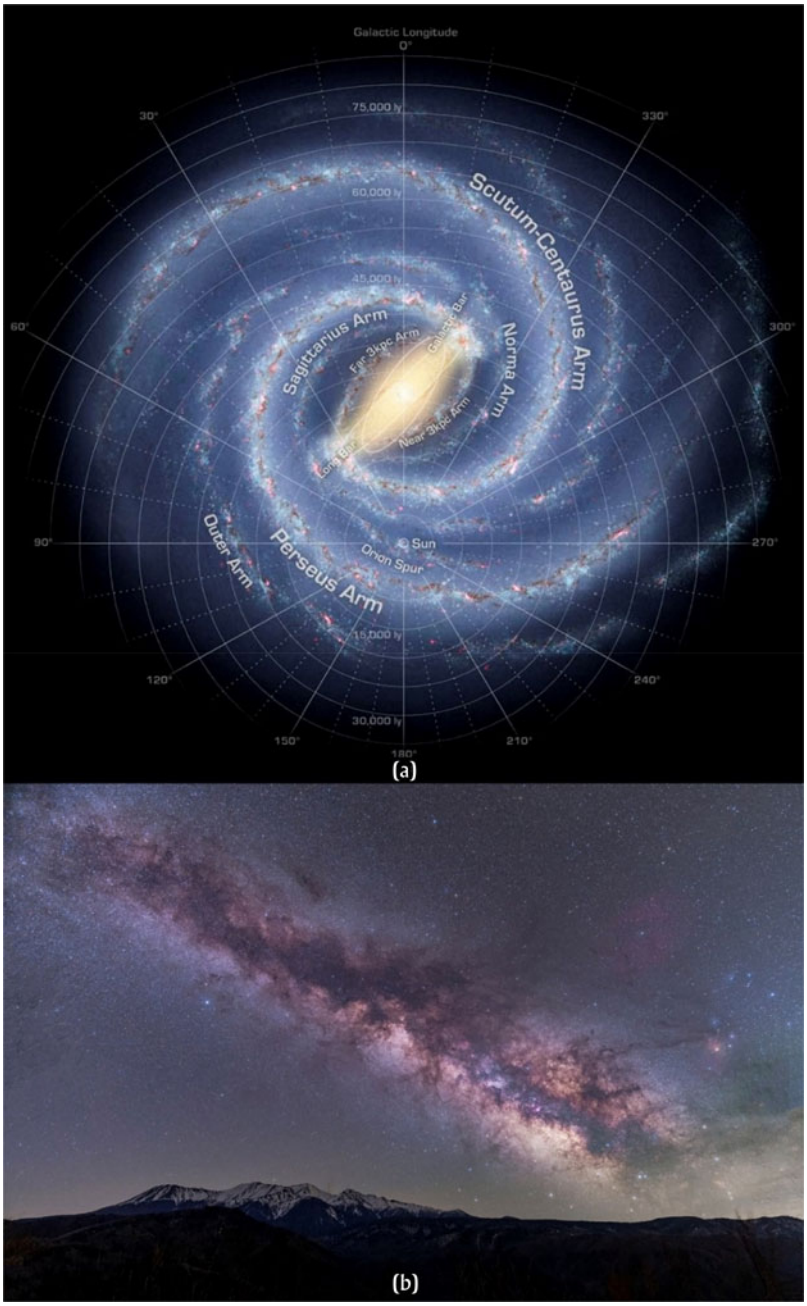


Figure 2. The Milky Way: (a) artist's reconstruction of the spiral galaxy (courtesy of NASA/JPL-Caltech/R. Hurt [SSC/Caltech]); (b) photograph of the lumpy, starry band across the night sky (Kota Hamori, unsplash.com-photos-i3iCSXTjzTA).

and cosmologies (Gullberg et al. 2020; Romain 2021). Among indigenous New World cultures, the Milky Way may have been identified as a path to the otherworld in a pan-hemispheric concept linked to deep and ancient traditions of shamanism (Barnhart 2003). Contemporary Mayan speakers, for example, typically see the Milky Way as a path or road (*sak be/bih,* "white road"), often associated with the dead (Freidel et al. 1993:76; Milbrath 1999:40–41; also Barnhart 2003).

The ancient Maya may have interpreted the Milky Way as "a misty, celestial river with a crocodile swimming in it" (Bassie-Sweet 2021:51, following Schele). Schele (in Freidel et al. 1993:85–100; also Milbrath 1999:249), who studied the changing positions and orientations of the Milky Way at different times of the year, saw in the east–west Milky Way a "Cosmic Monster" or crocodilian creature (others envision a celestial serpent), with the Great Rift as its open jaws (Figure 3). At other times, it may have been a cosmic or world tree (*wakah chan*; north–south) or a canoe heading to the watery underworld of death. Comparable concepts—world tree, canoe, river, path to the realm of the dead (Maya Xibalba)—can be found in other cosmologies (e.g., Gullberg et al. 2020; Martín-López and Giménez Benítez 2008; Romain 2021).

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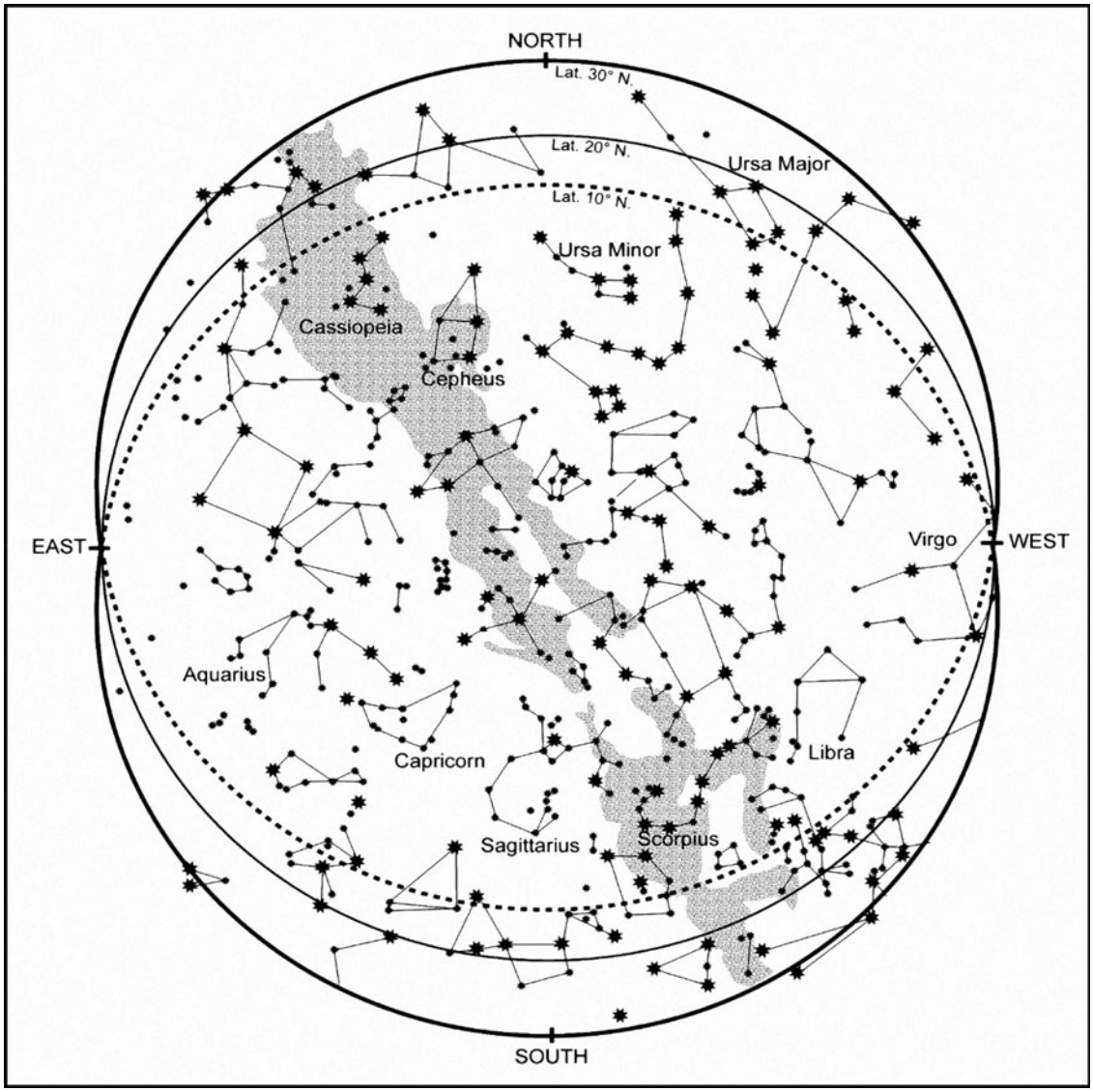


Figure 3. Examples of the night sky at latitudes 30°, 20°, and 10° N, at dusk near the fall equinox and at different times from April through October (the rainy season). The Milky Way (stipple) arches from northeast to southwest, with the Great Rift (center; see text)—the open mouth of the "cosmic monster" or "celestial serpent"—pointing downward toward the southern horizon. After Milbrath 1999:Figure 7.8A.

E Groups

The Mesoamerican architectural complex known as an E Group consists of two buildings, east and west, facing each other across a plaza. On the east side is a low, elongated, north–south platform or range structure; on the west side is an edifice—conical or rectangular in some early complexes and a radial pyramid in later ones—roughly centered on the platform opposite. E Groups or very similar configurations are found throughout early (Formative/Preclassic) Mesoamerica, including not only the Maya Lowlands (Freidel et al. 2017) but also the adjacent Chiapas / Río Usumacinta basin area, the Gulf and Pacific Coasts, and the Mexican highlands. In the Chiapas/Usumacinta area, they are part of what is called the "Middle Formative Chiapas" (MFC) site pattern (Clark and Hansen 2001).

Although the term "E Group" comes from a relatively late (Early Classic; A.D. 200–600) structure pairing at Uaxactun (Peten), the prototype of this arrangement and the MFC pattern was said to be found at Ojo de Agua, Chiapas, dating around 1200–1000 B.C. (Inomata et al. 2021:1494). Recent work by Takeshi Inomata and colleagues in the Gulf Coast region of Veracruz and Tabasco, Mexico (see Figure 1), has led to the discovery of even earlier complexes through lidar surveys. Beginning about 1400 B.C., standard architectural plans in the area include narrow, rectangular layouts; either large, raised, plateau-like platforms (e.g., at Aguada Fénix); or open plazas, oriented slightly east of north–south, with numerous variants (Inomata et al. 2021). E Groups may be constructed in the centers of these plazas: the well-known Gulf Coast Olmec sites of San Lorenzo (Veracruz; Early Preclassic, 1800–800 B.C. [Hirth et al. 2013]) and later La Venta (Tabasco; Middle Preclassic,

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ca. 800–400 B.C.) exhibit this general north–south linear pattern with E Groups. Traits of the underlying bedrock of the E Groups and other structures are not discussed.

The earliest radiocarbon-dated E Group known thus far in Peten is that at Ceibal in the southwest, dating to approximately 950 B.C. (Inomata et al. 2013; Inomata et al. 2015). Other Peten E Groups have comparable dates based on the presence of "Pre-Mamom" pottery—that is, pottery predating the widespread Middle Preclassic Mamom ceramic complex beginning approximately 900/800 B.C. At Tikal, both structures of the Mundo Perdido E Group began to be built atop leveled, elevated bedrock in Mamom Middle Preclassic times (Laporte and Fialko 1995; Montuori and Rosado Torres 2021). The eastern platform, constructed upon a "floor" (presumably of plaster), began as a three-tiered structure measuring 42 by 11 m, oriented approximately north–south. No signs of underlying sculpted bedrock are reported. Deposits in *chultunes* (pits excavated into limestone bedrock) included the remains of feasts and other activities, and more than 20,000 Pre-Mamom sherds (Cheetham et al. 2003:612). At Cival to the northeast, the E Group in the site epicenter had a burial with Pre-Mamom sherds in the surrounding fills (Estrada-Belli 2017:297–298). At Nixtun-Ch'ich' on the western end of Lake Peten Itza, construction of two E Groups—Groups AA1 and Y1—began in the Yum (Pre-Mamom-to-Mamom) Transition at about that same time (see below).

Unfortunately, in only a relatively few cases (e.g., Tikal and Uaxactun in Peten) have both structures of the E Group complexes been extensively excavated to investigate their histories, and most work has focused on the eastern platforms. In Peten, excavations revealed that these latter were often constructed on low limestone bedrock or marl knolls, or they incorporated such rises at their core. The bedrock was typically cleaned and sometimes carved:

- At Cenote, in the Lake Peten Itza basin, the earliest form of the E Group "was constructed of carved bedrock. Under the eastern platform, oriented very slightly northeast–southwest, bedrock was shaped as a stepped platform complete with lower side wings" (Chase and Chase 2017:47; also Chase 1983:92).
- At Cival, the earliest E Group was created of bedrock after first stripping away surface soil; the eastern platform in the Cenote style (see below) was "a modified limestone knoll into which the steps of a central stairway were carved" (Estrada-Belli 2017:296, 303, also 2011:74–75).
- At Ceibal, "residents made a plaza by scraping off humus and carved the earliest E Group buildings out of the natural marl" (Inomata 2017:220). The Cenote-style (see below) eastern structure "was entirely made of carved marl . . . and it apparently did not support any superstructures. As such, the eastern building . . . looked more like a raised edge of the plaza" (Inomata 2017:223).

In sum, the lowest levels of these eastern structures in lowland E Groups reveal vestiges of early, pre-constructional, ritual activity: ancient Maya placemaking, creating "Early Ritual Areas" (Rice 2017). This began with clearing soil off a small bedrock knoll to expose a clean white surface, which was sometimes sculpted.

The axial orientations of these early configurations everywhere are of interest, and their alignments vary. E Group orientations can be determined in two ways: by the azimuth of the axis of the centers of the western and eastern structures, or by the azimuth of the long axis of the eastern platform. These are roughly orthogonal, the primary axis of the eastern structure being north–south, although significant variations exist and the west–east axis is not always precisely perpendicular (see Aveni et al. 2003; Šprajc 2015). The north–south orientation of the eastern structure is primarily pivoted clockwise, toward northeast–southwest. Counterclockwise rotations from north are present but less common. Multiple spatiotemporal variants of the general north–south linear pattern have been documented, but this preferred orientation is evident from the earliest appearance of E Groups in the Early Formative Gulf Coast region (Inomata et al. 2021). There, most of the newly identified assemblages are oriented between -10° azimuth (slightly west of North) and 30° (east of North), especially around 6° to 20° (Inomata et al. 2021). The eastern structures of some later sites' E Groups give evidence of groups or families of alignments, such as a 14° azimuth (e.g., Aveni and Hartung 1986:17, 54–55, 2000:55). In the Maya area, this east-of-north orientation of structures in general, not solely those in E Groups, was a persistent architectural and spatiotemporal tradition, with 84 percent of Preclassic and Classic cities in one study displaying this axis (Aveni and Hartung 1986).

Middle Preclassic E Groups are considered the earliest formal and standardized architectural complex in the Maya Lowlands (Chase et al. 2017:8), but they present considerable variation. For example, in central Peten, the eastern platforms typically are tripartite, with three conjoined structures or superstructures, and they occur in two variants: "Cenote style" and "Uaxactun style" (Chase 1983; Chase and Chase 2017). In the Cenote style (Figure 4a), the central edifice sits slightly back (east) from the north–south axis of the platform, and low wings extend to smaller structures at the north and south ends, each with a rear (east) stairway. In the Uaxactun style (Figure 4b), the three buildings are in-line superstructures atop a single platform accessed by a central front (west) stairway. The eastern platforms of the earlier E Groups around the Gulf Coast lack superstructures, although at least one has a rear stair (Inomata et al. 2021:Figures 2 and 4).

Lowland E Groups survived for centuries, with refurbishing and rebuilding leading to marked changes in form (see, e.g., Mundo Perdido at Tikal; Laporte and Fialko 1995). Overall, differences between the two Peten styles do not appear to be geographical (Aimers and Rice 2006:82) but rather chronological, at least in part: the Early Classic Uaxactun style is later than the Cenote style. In southeastern Peten, E Group complexes exhibit significant structural, metric, and chronological differences compared with the central area (Chocón 2013).

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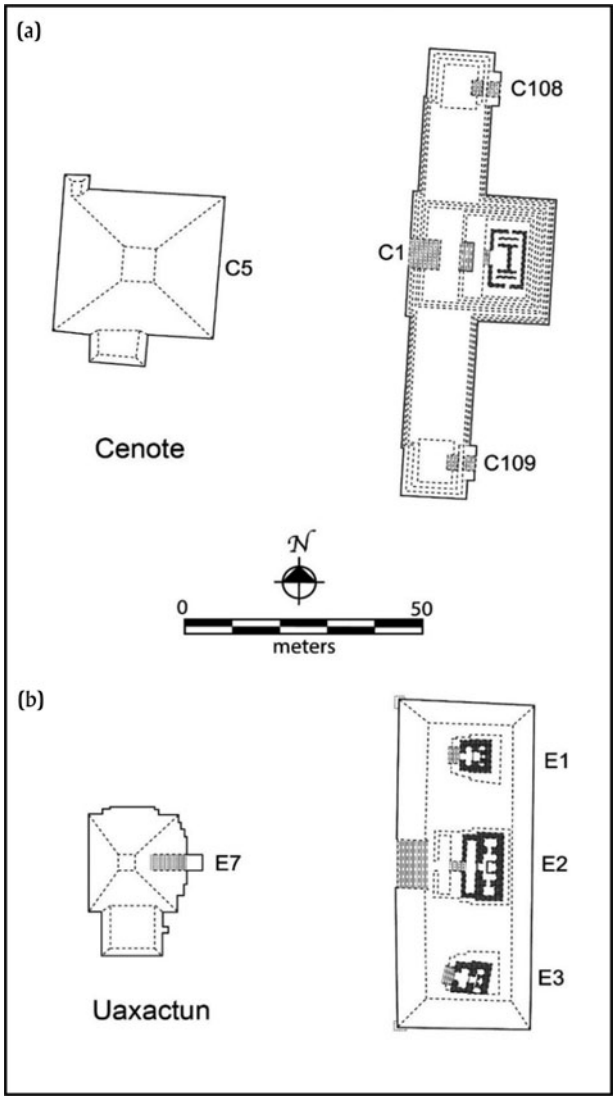


Figure 4. Examples of E Groups in Peten: (a) Cenote style; (b) Uaxactun style. After Chase and Chase 2017:Figures 2.1, 2.2, and 2.4.

E Groups' functions: Observational astronomy?

The long recognized architectural similarities of Maya E Groups led to expectations that they had similar uses. Among the many suggested functions (see, e.g., Milbrath 2017b), the most enduring centers on eastern horizon–based solar observational astronomy and timekeeping. As remarked by early archaeologists studying the newly discovered (but late dating) Uaxactun E Group (Blom 1924; Ricketson 1928; Ruppert 1977[1940]; see also Cohodas 1980), positions of the sun at sunrise, viewed from the western pyramid, appeared to coincide with points (corners, rooflines, etc.) on the three eastern superstructures at the solstices and equinoxes. But it is now evident that the earliest eastern-range structures—or the early stages of their construction—were simple, flat platforms; the three conjoined buildings or superstructures were later modifications. At Tikal, the superstructures began to be built in the Early Classic period (Montuori and Rosado Torres 2021). If the open early platforms had the proposed observational functions, wooden poles or stone slabs might have been placed to mark positions of celestial (solar, lunar, astral) risings, as with the basalt pillar (possibly one of three) on La Venta eastern Structure D-8 (see Drucker 1952:9).

The observation/timekeeping explanation of E Groups was bolstered when Anthony Aveni (2002:211; Aveni et al. 2003) noted that around 17° N latitude (that of the Peten lakes), the solar year can be "perfectly segmented into multiples of 20 days," each ending on a solstice, equinox, or zenith/nadir passage. Twenty days is the Maya *winal* calendrical unit—roughly a "month." The implication is that this latitudinal zone would have been fertile ground for development or elaboration of the Maya sacred almanac of 260 days: 13 numerals × 20 named *winal* days (see also Milbrath 2017a). A significant role of E Groups in astro-calendrical cycling (Aimers and Rice 2006:87–92; Aveni and Hartung 1989; Chase and Chase 1995) appears to have continued through the Early Classic period, when some of the earliest dated stelae were erected in front (west) of the eastern platforms to celebrate completion of 20-year periods known as *k'atuns* or *winikhaabs*. Some E Groups may have commemorated completion of 400-year *bak'tun* cycles (Chase and Chase 2017).

But several factors impinge on the solar-observational explanation, including variable visibility of the "natural horizon" resulting from the height of nearby structures, weather, topography, and vegetation. Low ground fog often shrouds the morning landscape until the sun burns it off, and cloud cover increases during the rainy season (June through October or later), although it typically disappears overnight. The limestone karst terrain is uneven, with hills and ridges interrupted by rivers, streams, and low, swampy areas (*bajos*). Except in certain areas, the visibility of the horizon is now—and would have been in Preclassic times—limited by the height and proximity of the lush tropical forest. These features, alone or in combination, might have obstructed views of the horizon and the rising or setting of stars, although not the sky overhead. Unsurprisingly, a viewshed analysis of Peten E Groups suggested they were carefully situated on elevated areas (Doyle 2012).

Moreover, variations from site to site in basic orientations of the assemblage, and particularly that of the eastern platform, have posed problems for hypotheses of solar stations. After an exhaustive analysis of azimuths and declinations of 71 central lowland Maya E Groups, Šprajc (2021) concluded that, although the central (east–west) axes of these arrangements were long maintained, there were no convincing astronomical explanations for the lateral structures, and "it is highly likely that astronomical criteria did not dictate the orientation of each and every E Group." In addition, although the general positioning of the western pyramid opposite the central eastern structure suggests a focus on equinoctial sunrises (see Chocón 2013:523, Figures 6–8; also Cohodas 1980), such dates are difficult to define by observation alone. Instead, the west-to-east alignments appear to register "sunrises and sunsets on agriculturally significant dates" and possibly also "quarter days"—rough approximations of equinoxes by halving counts of days between solstices (Šprajc 2021).

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Still other possible astronomical relationships suggest nonsolar phenomena: alignments to the Moon, Venus, or other stars or asterisms. Cival, for example, had five E Groups, perhaps dedicated to varied astro-calendrical cycles (Estrada-Belli 2017:320). Or, perhaps the display of hierophanies "via the subtle interplay of light and shadow in the architecture" was the aim (Aveni and Dowd 2017:88). Or "astronomical commemoration" was the intention (Fialko 1988), the three structures being metaphorical solar stations, in which case precision did not matter. Or, perhaps twentieth-century astronomical/solar explanations have been driven by "Western" traditions and biases, which can be traced back to the early Spaniards (May Castillo 2018). In these hermeneutical reflections, based on analogy to today's *ch'a chaak* (rain bringing) rituals in Yucatan, E Group ceremony took place in the daytime. The creation hypothesis proposes that the ceremonies took place at night, recreating the primordial darkness before the Sun emerged. Perhaps they were scheduled on the nights before sunrise on agriculturally significant dates.

As the robusticity of the observational astronomy explanation is increasingly questioned, other functions have been proposed, based on geographical associations with trade routes (Laporte et al. 2008; Stanton 2017) and watersheds (Chase and Chase 2017:34). Various kinds of ceremonial activity also have been suggested, including general agricultural ritual (Cohodas 1980), solar stations on "agriculturally significant dates" (Šprajc 2021), and maize-based ritual (Rice 2017:158; Stanton and Freidel 2003), all of which have implicit referents in seasonal cycling and rainfall. Other ceremonial functions relate to mortuary or ancestor veneration ritual as seen at Cival (Estrada-Belli 2017:297), Tikal (Laporte 2003; Laporte and Fialko 1995), and the Belize valley (Awe 2013; Awe et al. 2017:432–435; Brown 2017). The presence of multiple E Groups at various sites—five at Cival and three at both Nixtun-Ch'ich' and Yaxha—might indicate that certain kin groups built these complexes to proclaim their politico-ritual importance and power, perhaps in particular neighborhoods or sectors of the communities.

E Groups, the Milky Way, and creation

Regardless of the variability in eastern structure form, size, orientation, and date, the similarities among E Groups are generally emphasized over the differences, and they are seen as examples of a widely shared, unified belief system materializing Maya deep history (Chase and Chase 2017). If E Groups exemplify an early shared belief system, what *was* that system, or its core tenets, in Maya communities' histories? How was it materialized by E Group architectural arrangements? I suggest that this belief system and deep (i.e., mythical) history centered on cosmology and cosmogony: stories about creation, about the origins of the universe and of life and of time, focused on the Milky Way.

It is easy to imagine the Maya creation stories as public ritual performances and pageantry that promoted group cohesion, social integration, and community identities. These could be presented in multiple "acts" incorporating processions, dance, singing, and oratory, enhanced with physical, visual, and musical components. Early Maya E Groups, then, might have constituted ancient theaters for such performances (see Chase et al. 2017:18), with the eastern platform—symbolically the Milky Way—the stage for dramatic ceremonies re-enacting the events of creation.

The three eastern structures

The earliest lowland E Groups apparently consisted of only flat platforms, although they might have supported temporary or perishable features. At some point, however, the later Maya reconceived the eastern structures as tripartite, either as three conjoined platforms or with three superstructures. The reasons for this modification can only be guessed, but they suggest an important transformation in meaning and/or function of this edifice and perhaps of the E Group as a whole.

In terms of the Milky Way / creation proposal, these additions hint at a different conceptualization of this celestial phenomenon, or of creation itself, or of the performative content and context of creation ritual—or of some combination of these. The three architectural components might relate to changing emphases on the role of three beings, entities, or places, such as the three founding deities, known today as GI, GII, GIII (the Palenque Triad). In the Popol Vuh, the god Heart of Sky comprises three supernaturals: Thunderbolt Hurricane, Newborn Thunderbolt, and Raw Thunderbolt (Tedlock 1996). Or, they might represent prominent stars or asterisms in the Milky Way that are visible from Earth. If so, the large middle structure would represent the brightest feature, the central bulge of the Sagittarius constellation or globular cluster, with Alpha Sagittarii the eponymous star. The two end buildings would represent major features at the north and south extremes of the Milky Way, their visibility dependent on the galaxy's positioning. The constellation Scorpio/Scorpius and its bright central star—reddish Antares—lie at the south end, which according to Maya myth also represents the watery underworld, the land of the dead.

In Maya myth, the northern part of the Milky Way, from Sagittarius through the constellation Orion ("The Hunter"), constitutes the Place of Creation and the Three Stone Place. It was here, on the Maya date 13.0.0.0.0 (or 0.0.0.0.0), that the gods set up the triangular arrangement of the three stones of the Maya hearth: the stars Alnitak, Rigel, and Saiph in Orion. This is the three-stone or three-stone-throne place described on Stela C at Quirigua: the Jaguar stone/throne/platform "planted" by the Paddlers, the Snake platform by an unknown deity, and the Water throne by Itzamna (Looper 2003:158–160). Also, the three stars of Orion's belt (Alnitak, Alnilam, Mintaka) rose vertically in the east at the time of maize sprouting (Milbrath 2017b:89). Moreover, the cluster of stars known as the Pleiades lies in the northern area. In Yucatán, the Pleiades are known as *tzab*, the rattle-tail of the feathered serpent supernatural called Kukulcan/Quetzalcoatl and identified with Venus (Milbrath 1999:36, 38, 258). In 500 B.C., this asterism, closely associated by the Maya and other peoples with the start of planting (the Kiche' describe the Pleiades as a

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handful of corn), set in the evening in March and disappeared in early May (Milbrath 1999:258, Table 7.4), but it was visible at dawn on June 13.

Maya interpretations of this section of the Milky Way emphasize planting and agriculture, and Carrasco (2010:602) suggests—following Rafael Girard—that maize and agriculture played a major role in Maya mythology: "within the ontology of myth, [astronomical phenomena] are secondary to agrarian and domestic practices." He considers the three-stone domestic hearth to be both a "visual and literary symbol of the present creation" (Carrasco 2010:603). It is not difficult to conceive of maize, the Mayas' primary sustenance, as a key element of their creation myths: the first humans were said to have been formed of maize dough by the gods. Analysis of starch grains from stone tools recovered in northern Belize indicates processing of maize, beans, squash, manioc, and chili peppers as early as the Archaic period (Rosenswig et al. 2014:316–317). Maize was an important element of Early Formative / Olmec iconography; in Late Preclassic northeast Peten, the San Bartolo murals (Urquizú and Hearst 2011) show the Maize God being born from a mountain cave (in the Milky Way) and being dressed or "adorned" by young female attendants. It is not yet clear, however, when or how domesticated maize became sufficiently important as a dietary staple (or an elite food) among the Maya to play a major role in creation mythology.

Lake Peten Itza and Nixtun-Ch'ich'

At least 20 E Groups or possible E Groups were built in the basins of the central Peten lakes, nine of them around the largest—Lake Peten Itza (Figure 5). Two early cities bookending the lakes chain, Yaxha in the east and Nixtun-Ch'ich' at western Lake Peten Itza, have three of these complexes, with others in nearby smaller centers (see Rice and Pugh 2021). Most remain unexcavated but, as noted, cleaned and carved bedrock was at the core of the eastern structure of the E Group at the site of Cenote, on the Tayasal Peninsula in Lake Peten Itza (Chase 1983:92). The east–west axes of the central Peten E Groups correspond to sunrise on March 11 and October 2, and sunset (viewed over the western pyramid) on March 31 and September 12, identical to Tikal's Mundo Perdido (Šprajc 2021:Figure 11). Azimuths of the eastern structures reveal clockwise deviations from North, primarily between 3° and 13° (Table 1). If these structures reproduce the Milky Way, they seem to memorialize the position of the celestial band when it arches overhead, N/NE–S/SW, in the first half of the night between July and September, including the autumnal equinox (Rey 1962:Chart 14C). This is the rainy season, and the cleft/mouth of the celestial monster extended from overhead to the southern horizon (Figure 3), perhaps symbolically expelling rainwaters on Earth (Milbrath 1999:288, 291).

Nixtun-Ch'ich' E Groups

Three E Groups at the gridded city of Nixtun-Ch'ich' (Figure 6) lie on its central east–west axis (azimuth 95°). The westernmost, in Sector A, has not been excavated, but the other two, in Sectors AA and Y in the main civic-ceremonial core of the site, have been explored. Although no evidence of modification of a bedrock knoll has been found under their eastern platforms, the initiation of major construction of both was early and approximately coeval in "archaeological time"—that is, the transition from Early to Middle Preclassic periods.

The easternmost complex in Sector AA is known only by its eastern platform (Structure AA1/1); a western structure, if it existed, was overbuilt by the large Structure AA2 pyramid. Structure AA1/1—136 m long and 2.5 m high above bedrock, with an azimuth of 6°—lacks evidence of the tripart configuration or superstructures. If once present, these

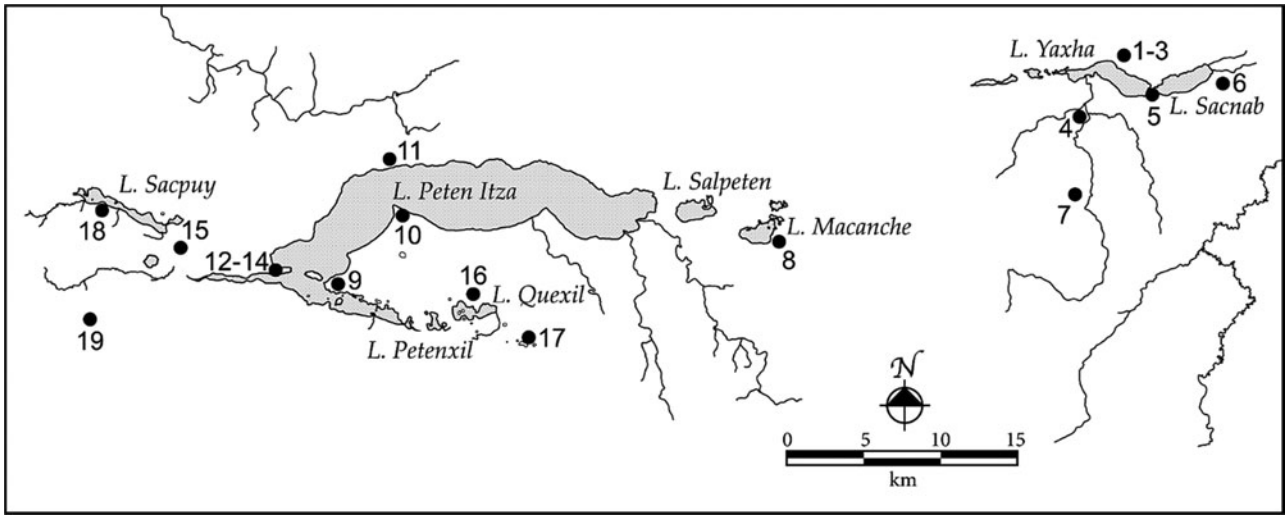


Figure 5. The central Peten lakes area, northern Guatemala, showing sites with E Groups (see Table 1 for identification of sites with numbers). Map by Don S. Rice.

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Table 1. E Groups and possible E Groups in the central Peten lakes' basins, with azimuths of the eastern structures

Lake basin	Site	# in Figure 5	Style date[a]	Comment	Azimuth[b]
Yaxhá-Sacnab	Yaxhá Plaza C	1	?		13.5°?
	Yaxhá Plaza E	2	Late?		11°
	Yaxhá Plaza F	3	Early?		11°?
	Ixtinto	4	Late?	Southwest of the Topoxté Islands	
	Yaxha Hill	5	Late?	"Uapake"; south of isthmus	
	Sacnab	6	Early?	Southeast of lake; no west structure	
	La Quemada Corozal	7	Late?	Well south of the lake	
Macanché	Cerro Ortiz	8	Middle Preclassic?	Major Middle Preclassic construction	
Petén Itzá	Tayasal Grp. 23	9	Late?	2 superstructures. Postclassic?	9°
	Tres Naciones	10	?		
	Chachakluum	11	Late Preclassic?	Possibly earlier?	
	N-C[c] Sector A	12	Middle Preclassic		5.7°
	N-C[c] Sector Y	13	Middle Preclassic		3°
	N-C[c] Sector AA	14	Early	No superstructures	6°
	T'up?	15	?	Not confirmed on ground	8°
Quexil	Cenote	16	Early?		11.5°
	Paxcamán	17	Early?		3°
Sacpuy	Sacpuy 1	18	Early?	Only E Group structures	22°?
	Ts'unun Witz	19	Late Preclassic	Well south of the lake	

[a]Style-dates with question mark rely on visual characteristics of standing architecture: Early? = Cenote style; Late? = Uaxactun style.
[b]From Aveni et al. 2003:Table 1; Chase and Chase 2017; Timothy Pugh, personal communication 2021.
[c]Nixtun-Ch'ich'.

might have been later destroyed, given that upper excavation levels revealed considerable Classic and Postclassic pottery. Of three test units, one into the northcentral part of the platform revealed a 30–35 cm thick deposit of mixed Pre-Mamom and early Middle Preclassic sherds (Yum Transitional ceramic complex, ~1000–800 B.C.) atop bedrock, covered by 70 cm of Middle Preclassic fill (Rice et al. 2018:755, Figure 2).

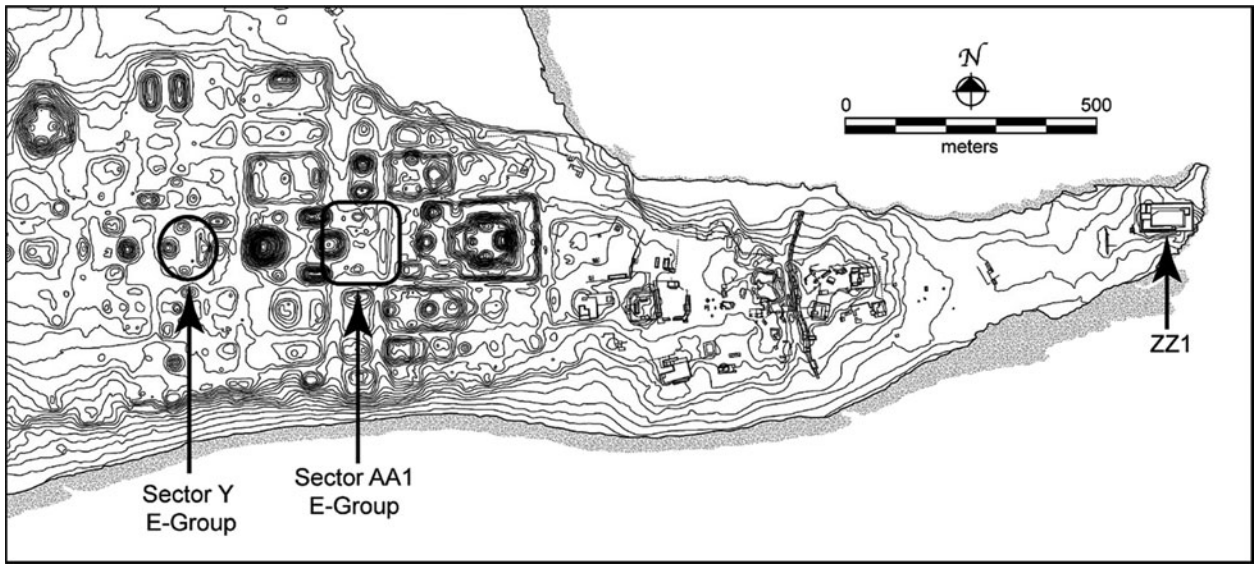


Figure 6. Plan of the gridded site of Nixtun-Ch'ich', on the western edge of Lake Peten Itza, showing the location of the AA1 and Sector Y E Groups and Mound ZZ1. The third E Group, Group A, is off the map to the left/west. Map by Don S. Rice.

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The Sector Y E Group was built upon a large, substructural platform (Structure Y1). Structure Y1/1, the eastern range structure, is 83.5 m long, about 2.5 m high above the present plaza surface and oriented 3° east of North. A test unit placed on the western (front) centerline of this building revealed part of the construction history of the substructural platform, beginning with a 50 cm thick deposit incorporating Pre-Mamom pottery on bedrock (Rice et al. 2019). Eight subsequent episodes of early Middle Preclassic construction were capped by a floor (Floor 6), above which were the patchy remains of Late Preclassic plaza surfacing that butted up to a central stairway scaling Y1/1's western (front) face. Two intrusive features were noted on the east–west centerline: an oval pit, perhaps where a stela had been placed and removed, and a partial human cranium. The final construction involved three superstructures on a single platform accessed by a front stairway. The central of these, Structure Y1/1-1, dated to the Terminal Classic or Postclassic period and had a rear (east) inset stairway of six steps. Excavations suggested that the original Y1/1 platform began as a narrow (~8 m east–west), stepped and terraced structure of indeterminate length, later greatly widened to the east or back. Massive stone fill precluded deep soundings because of the danger of collapse, so the characteristics of underlying bedrock are unknown.

The Sector Y E Group was paired with a deep depression (Fosa Y) to the east. Probably a natural sinkhole and a portal to the Maya underworld, Fosa Y was the anchor of the city's central axis urbis and its grid (Pugh and Rice 2017). The early raising of the E Group immediately to its west, with a stairway from the eastern platform descending to the *fosa*, accentuates the importance of this location as a sacred "mountain–spring" shrine, similar to the Olmec El Manatí site (Diehl 2004:26).

"Testing" the Milky Way / creation hypothesis

The broad geographical spread and protracted constructional histories of lowland Maya E Groups suggest that these arrangements were of profound cultural importance, but their functions, presumably widely shared, are incompletely understood. The architecture, impressive as it is, is functionally ambiguous. Moreover, as in archaeology in general, it is difficult to "prove" any interpretations of past behavior or beliefs; even radiocarbon dates have standard error ranges. The best one can do is try to amass supportive evidence from various sources and search for disconfirmatory data.

Here, the issue of interest concerns the much-debated purposes and uses of the E Group eastern platform, with its three late superstructures. The platforms might have functioned alone or with their western companion at different times. Multiple functions—mostly ritual, but with different foci—have been suggested: astronomical observation, mortuary/ancestor-veneration, trade agricultural/maize. Others propose general commemorative roles. Few of these propositions, bullleted here, have been framed as testable hypotheses:

- The astronomical explanation has been rigorously tested through celestial alignments and orientations. Some data are supportive and/or need modification; other data suggest that alternatives are necessary.
- Mortuary functions are, de facto, at least partially correct, as shown by the uncovering of burials or human remains in some eastern structures.
- The agricultural hypothesis of E Group function has been strengthened by testing the astronomical explanation: instead of uniformly pointing to solar stations, the west-to-east alignments appear to register "sunrises and sunsets on agriculturally significant dates" (Šprajc 2021). Moreover, the cluster of stars known as the Pleiades, often a marker for the start of planting, lies in the northern area of the Milky Way.
- Several lines of evidence provide circumstantial support for the Milky Way / creation hypothesis: known Maya creation myths, discussed above, relate characters and events that occurred in the Milky Way.
- Support for the creation part of the proposal can be drawn from ethnographic analogy: lowland Maya E Groups might have played roles in ancient communities analogous to the 10 *cofradía* (religious brotherhood) houses in Santiago Atitlan, in western highland Guatemala. These

> ...represent the abodes of sacred ancestors and gods. These are not just symbolic representations of sacred mountains. They are, in a sense, the first mountain where creation first took place . . . a focal point for regenerative power . . . . Each is a place of origin in the sense that ritual activity conducted there opens a portal not only into sacred space but also into sacred time. Participants in these ceremonies consider themselves to be present at the moment of first beginnings when their gods and ancestors set the pattern for the world's existence. Such regeneration allows the Maya to periodically re-birth their world . . .in harmony with sacred order. Such ceremonies are considered essential to the very existence of the world (Christenson 2008:119).

How might the Milky Way/Creation hypothesis of E Group function be "tested" archaeologically? Here are some possibilities:

- Data might be sought through more intensive excavations of both superstructures and substructures of the eastern platforms. Precise measurements of the azimuths of the earliest platforms over bedrock would be useful. Did they change with refurbishing? If so, can they be identified with different times/seasons of observing the Milky Way? Do they preserve associations with the rainy season?
- Might the three superstructures have been decorated to enhance their identification with the sky bodies in accordance with whatever public activities were taking place? Recall that the northern Milky Way is the place of creation per se, whereas the southern part leads to the Underworld of Death. Do different kinds or styles of artifacts occur at, in, or around the three structures, corresponding to myth—agriculture (or three hearth stones) in the north, death/underworld in the south? Movable props—for example,

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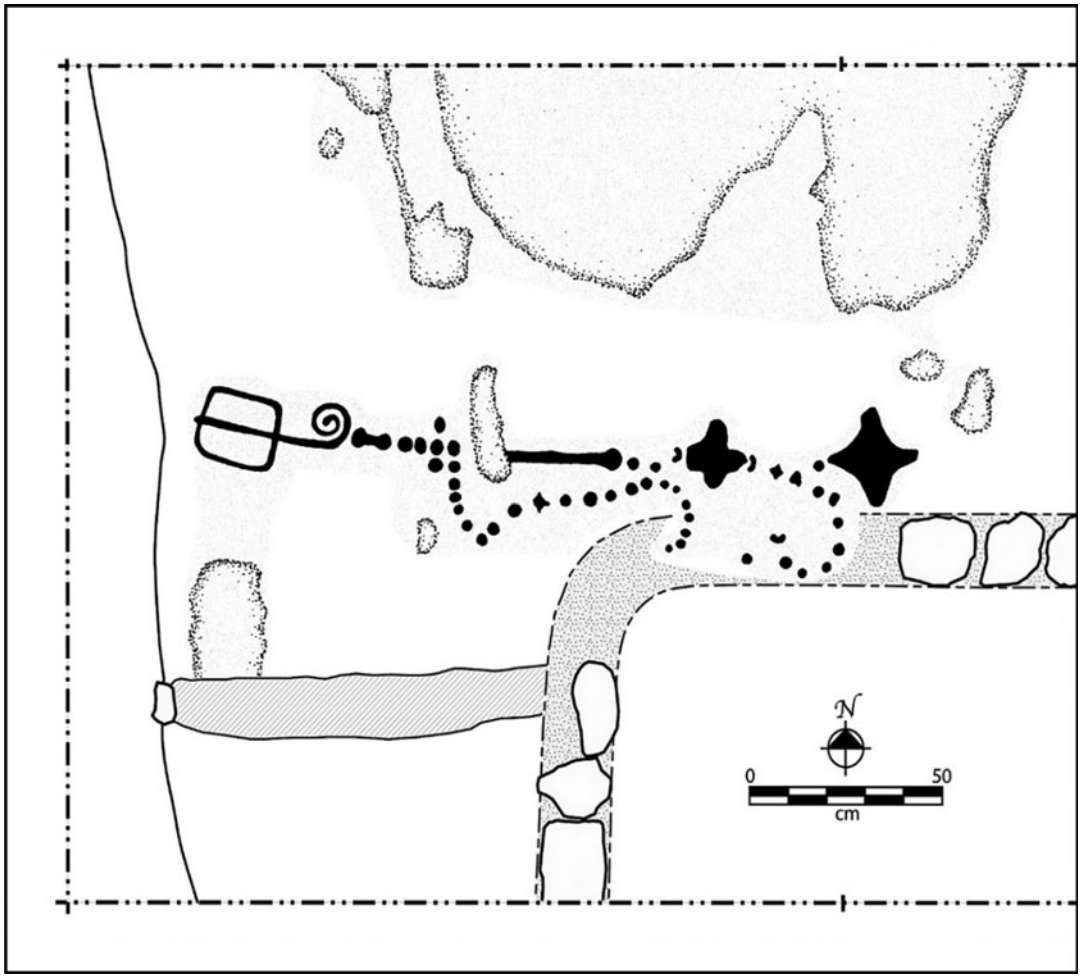


Figure 7. Pecked design in the plaster floor capping Late Middle Preclassic Structure B-2 at Nixtun-Ch'ich' Mound ZZ1. The northwest foundation of Structure B-1 is seen in the lower right corner of the figure. After Rice 2009:Figure 11.

real corn plants or representations of them—might have been placed appropriately.

- Were caches placed in the platform or superstructures, as opposed to the plaza? At Uaxactun, for example, two types of in-floor caches were noted in all three superstructures: (1) lip-to-lip redware dishes holding the skull of a sacrificed individual, and (2) lidded cylinders, one of which held an "'archaic' green mudstone human figurine" (Ricketson 1933:78). Caches might support mythic associations if different materials were cached in the north, central, and southern parts—such as agricultural implements or seeds in the north, or water symbols (e.g., shell, jade) in the south.
- Might there be unrecognized architectural parallels to the Milky Way's dark rift, such as depictions of serpents or the cosmic monster beheaded by the gods?
- Inscriptions, such as the enigmatic pecked design on a Preclassic floor of Nixtun-Ch'ich' Structure ZZ1 (not part of a recognizable E Group), might support celestial affinities. That linear design, approximately 1.9 m long (Figure 7), consisted of a skyband-like arrangement of lines of dots, two four-pointed star-like elements (the main sign of *lamat/ek'*, 'star, Venus'), and three tiny crescents.

The problem with many of these possibilities for "testing" the hypothesis is that embellishments of the platform or superstructures to accentuate celestial and/or mythical affinities could have been painted, sculpted, or created with perishable materials such as textiles, basketry, animal skins, and plant matter. If this were the case, preservation issues severely constrain testing and explanation.

Concluding thoughts

The Preclassic lowland Maya adopted and transformed the iconic architectural assemblages later known as E Groups from their Gulf Coast neighbors. This borrowing, before or around 1000 B.C., accompanied other major changes in the lifeways of lowland peoples, including growing reliance on maize agriculture, permanent settlement, population growth, and more formalized ritual/religious and hierarchical sociopolitical organization. These monuments, consisting of only two structures—eastern and western—exhibit considerable variability in both their physical appearance and axial orientations.

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The long-lived Maya E Groups are thought to represent a shared belief system materializing mythic histories. I propose that the low eastern platform, oriented roughly north–south, was an earthly recreation of what we know today as the Milky Way. This broad, glowing, white band arching across the night sky must have captured the attention and imagination of early peoples seeking to understand and explain the mysteries of their world. A key role for the Milky Way in the conceptualization of the E Group eliminates the problems with the solar-observational hypothesis caused by difficulties in viewing the horizon because of fog, clouds, trees, topography, or other structures: the Milky Way was, instead, often high in the sky and therefore readily seen. The Milky Way was the otherworldly setting for Maya origin myths, and the early eastern platforms can be envisioned as stages for performances of their creation stories. E Groups are therefore examples of what Carrasco (2010:620) called "the sacred architecture of Creation."

The very early dates of these E Groups, or at least their eastern platforms, raise the likelihood that components of this arrangement have roots in Early Preclassic public ritual and architecture of the Gulf Coastal region. There, the long edges of the early plazas were sometimes lined with 20 platforms—10 per side—and thought to date to that region's Early Formative apogee (Inomata et al. 2021:Figure 4). These might reproduce the clusters of stars creating the bumpy edges of the Milky Way visible from Earth (Figure 2b). Or, they might register architecturally the development of the 260-day "calendar," with its 20 day names.

The early dates also suggest wide sharing of belief systems and rituals among the semisedentary, semihorticultural peoples of the region. Analogies drawn from middle range or tribal groups in other times and places indicate that such sharing was facilitated by their mobility and the seasonal or situational forming of larger settlement aggregations. During such times, groups held meetings, dances, mortuary rituals, and other socially integrative activities in special places, perhaps at the residential compounds of esteemed individuals such as elders, leaders, or founders (see Kopytoff 1987; Powis and Cheetham 2007) or in open spaces lacking permanent architecture. They also built monuments, frequently burial mounds to venerate their ancestors. According to Joyce (2004:15), "because [these constructions] shaped unique and novel spaces, they provided new sites for emerging social distinctions to be inscribed, including through exclusive burial practices."

The E Group construction process began with simple, modified bedrock in the Early Preclassic period or perhaps even earlier. Beginning with clearing soil off bedrock, often over a small knoll, to expose a clean and empty white surface, the builders reproduced the mythical landscape of creation. The bedrock rise—sometimes carved—formed a white, linear, Milky Way–like feature in an open area, suitable for public gatherings and clear views of the sky. The Maya subsequently overbuilt these Early Ritual Area components with stone masonry, or they created them de novo with rubble and debris, then finished them into the eastern platform of what archaeologists have come to call E Groups. The very early carved bedrock knolls can be seen as initial Maya landscape modifications, embryonic ritual structures inspired by the white band visible in the sky above. These were later overbuilt with earth and stone and covered with stucco, creating white, linear platforms extending approximately north–south, on the east side of open gathering spaces—in other words, earthly emulations of the celestial Milky Way. At some point—perhaps simultaneously, perhaps later—a structure was placed opposite in the west. But over time, the eastern platforms were the most enduring part of the assemblage, because the western pyramids were often overbuilt. Irrespective of their multidimensional, spatiotemporal complexity, the two structures of an E Group can be seen as a terrestrial, east-to-west, horizontal restructuring of a vertical, Earth-to-sky view of the Milky Way stretching north–south across the void.

The different axial orientations of the E Groups, especially those of the eastern platform, have been difficult to explain and—as some researchers have suggested—they may correlate with a multitude of positions of Sun, Moon, Venus, or other phenomena. I suggest that the general northeast–southwest axis of the eastern structure is related to the position of the Milky Way vis-à-vis the rainy season (northern hemisphere summer). However, any ancient intentionality of aligning structures to celestial features is difficult if not impossible to prove. With respect to the Milky Way, this is even more problematic because the starry band's visible position varies depending on where and when the observations are made: dusk, middle of the night, dawn; at varying times/seasons of the year; in varied places. These factors will be extremely difficult to tease apart. Fortunately, there seem to be groupings of azimuths that might narrow down the choices.

The three structural components of the eastern platforms may represent key visible features or asterisms of the Milky Way, in the middle and at its extremes, reimagined as three heroic mythohistorical beings—creator gods—at the core of Maya cosmological order. But why were these components expressed in such different styles? Is it merely a matter of chronology (early versus late)? Or can they be traced to something deeper, such as ethnolinguistic background, or different belief systems (creation/origin myths?) connected to the power of ancestors, emerging dynasties, and their tutelary deities? Superstructural differences may relate to changing emphases on the roles of three beings, entities, or places (e.g., Chase and Chase 2017:63) at the foundation of cosmological order, or with changes in polity size and composition, or with different rituals and cycles being celebrated by different groups.

Existing hypotheses about the function of E Groups are neither completely wrong nor completely correct. No single one is sufficient. Solar (and other) observation points might have been commemorated, ancestors were buried and venerated, and agriculture/maize ritual may have been carried out. The Milky Way / creation hypothesis does not negate these proposed functions; rather, it complements and supplements them. Maya E Groups were creation monuments, sacred landscapes and sacred timescapes serving as enduring memorials to the most sacred beliefs and traditions of the Maya world. With or without the tripart structures,

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the eastern platform furnished a stage for ritual performances—probably creation related, judging from Classic and Postclassic iconography and myths. The eastern night sky would have formed a wondrous backdrop to such theatrics, with stars and constellations rising, falling, and dancing in the velvety dark sky before the climactic "dawning": the emergence of the Sun.

References

Aimers, James John, and Prudence M. Rice
2006 Astronomy, Ritual, and the Interpretation of Maya "E-Group" Architectural Assemblages. *Ancient Mesoamerica* 17:79–96.

Aveni, Anthony F.
2001 *Skywatchers*. University of Texas, Austin.
2002 *Empires of Time: Calendars, Clocks, and Cultures*. Rev. ed. University Press of Colorado, Boulder.

Aveni, Anthony F., and Anne S. Dowd
2017 E Groups: Astronomy, Alignments, and Maya Cosmology. 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. 75–94. University Press of Florida, Gainesville.

Aveni, Anthony F., and Horst Hartung
1986 Maya City Planning and the Calendar. *Transactions of the American Philosophical Society* (Philadelphia) 76(7):1–79.
1989 Uaxactun, Guatemala, Group E, and Similar Assemblages: An Archaeoastronomical Reconsideration. In *World Archaeoastronomy*, edited by Anthony F. Aveni, pp. 441–461. Cambridge University Press, Cambridge.
2000 Water, Mountain, and Sky: The Evolution of Site Orientations in Southeast Mesoamerica. In *In chalchihuitl in quetzalli / Precious Greenstone Precious Quetzal Feathers. Mesoamerican Studies in Honor of Doris Heyden*, edited by Eloise Quiñones Keber, pp. 59–65. Labyrinthos, Culver City.

Aveni, Anthony F., Anne S. Dowd, and Benjamin Vining
2003 Maya Calendar Reform? Evidence from Orientations of Specialized Architectural Assemblages. *Latin American Antiquity* 14:159–178.

Awe, Jaime J.
2013 Journey on the Cahal Pech Time Machine: An Archaeological Reconstruction of the Dynastic Sequence at a Belize Valley Polity. *Research Reports in Belizean Archaeology* 10:33–50.

Awe, Jaime J., Julie A. Hoggarth, and James J. Aimers
2017 Of Apples and Oranges: The Case of E Groups and Eastern Triadic Architectural Assemblages in the Belize River Valley. 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. 412–449. University Press of Florida, Gainesville.

Barnhart, Edward L.
2003 The Milky Way as the Path to the Otherworld: A Comparison of Pre-Columbian New World Cultures. Electronic document, https://www.mayaexploration.org/pdf/milkyway.pdf.

Bassie-Sweet, Karen
2021 *Maya Gods of War*. University Press of Colorado, Louisville.

Baudis, Laura
2017 The Search for Dark Matter. *European Review* 26:70–81.

Blom, Franz
1924 Report on the Preliminary Work at Uaxactún, Guatemala. *Yearbook* 23:217–219. Carnegie Institution of Washington, Washington, DC.

Brown, M. Kathryn
2017 E Groups and Ancestors: The Sunrise of Complexity at Xunantunich, Belize. 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. 386–411. University Press of Florida, Gainesville.

Carrasco, Michael D.
2010 From Field to Hearth: An Earthly Interpretation of Maya and Other Mesoamerican Creation Myths. In *Pre-Columbian Foodways: Interdisciplinary Approaches to Food, Culture, and Markets in Ancient Mesoamerica*, edited by John E. Staller and Michael D. Carrasco, pp. 3–25. Springer, New York.
2015 Epilogue: Portals, Turtles, and Mythic Places. In *Maya Imagery, Architecture, and Activity: Space and Spatial Analysis in Art History*, edited by Maline D. Werness-Rude and Kaylee R. Spencer, pp. 374–411. University of New Mexico Press, Albuquerque.

Chase, Arlen F.
1983 *A Contextual Consideration of the Tayasal-Paxcaman Zone, El Peten, Guatemala*. Ph.D. dissertation, Department of Anthropology, University of Pennsylvania, Philadelphia.

Chase, Arlen F., and Diane Z. Chase
1995 External Impetus, Internal Synthesis, and Standardization: E Group Assemblages and the Crystallization of Classic Maya Society in the Southern Lowlands. *Acta Mesoamericana* 8:87–101. Special issue edited by Nikolai Grube entitled "The Emergence of Lowland Maya Civilization: The Transition from the Preclassic to Early Classic".
2017 E Groups and the Rise of Complexity in the Southeastern Maya Lowlands. 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. 32–71. University Press of Florida, Gainesville.

Chase, Arlen F., Anne S. Dowd, and David A. Freidel
2017 The Distribution and Significance of E Groups: A Historical Background and Introduction. 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. 3–30. University Press of Florida, Gainesville.

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, 2002*, edited by Juan Pedro Laporte, Bárbara Arroyo, Héctor Escobedo, and Héctor Mejía, pp. 609–628. Museo Nacional and Instituto Nacional de Antropología e Historia, Guatemala City.

Chocón, Jorge E.
2013 Complejos de conmemoración astronómica, complejos de ritual público o grupos tipo E. In *XXVI Simposio de Investigaciones Arqueológicas en Guatemala, 2012*, edited by Bárbara Arroyo and Luis Méndez Salinas, pp. 519–528. Museo Nacional de Arqueología y Etnología, Guatemala.

Christenson, Allen
2008 Places of Emergence: Sacred Mountains and Cofradía Ceremonies. In *Precolumbian Landscapes of Creation and Origin*, edited by John Edward Staller, pp. 95–121. Springer, New York.

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. International Monographs in Prehistory, Archaeological Series, Vol. 15. University of Michigan, Ann Arbor.

Clark, John E., and Richard Hansen
2001 The Architecture of Early Kingship: Comparative Perspectives on the Origins of the Maya Royal Court. In *Royal Courts of the Ancient Maya, Volume 2: Data and Case Studies*, edited by Takeshi Inomata and Stephen D. Houston, 1–45. Westview, Boulder.

Cohodas, Marvin
1980 Radial Pyramids and Radial-Associated Assemblages of the Central Maya Area. *Journal of the Society of Architectural Historians* 39:208–223.

Diehl, Richard A.
2004 *The Olmecs: America's First Civilization*. Thames and Hudson, London.

Doyle, James A.
2012 Re-Group on "E-Groups": Monumentality and Early Centers in the Middle Preclassic Maya Lowlands. *Latin American Antiquity* 23:355–379.

Drucker, Philip
1952 *La Venta, Tabasco: A Study of Olmec Ceramics and Art*. Bureau of American Ethnology Bulletin 153. Smithsonian Institution, Washington, DC.

Edmonson, Munro S. (translator and annotator)
1986 *Heaven Born Merida and Its Destiny: The Book of Chilam Balam of Chumayel*. University of Texas Press, Austin.

Estrada-Belli, Francisco

https://doi.org/10.1017/S0956536123000020 Published online by Cambridge University Press

2011 *The First Maya Civilization: Ritual and Power before the Classic Period*. Routledge, New York.
2017 The History, Function, and Meaning of Preclassic E Groups in the Cival Region. 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. 293–327. University Press of Florida, Gainesville.

Fialko, Vilma
1988 Mundo Perdido, Tikal: Un ejemplo de conjuntos de conmemoración astronómica. *Mayab* 4:13–21.

Fowles, Severin M.
2002 From Social Types to Social Process: Placing "Tribe" in a Historical Framework. In *The Archaeology of Tribal Societies*, edited by William A. Parkinson, pp. 13–34. International Monographs in Prehistory, Archaeological Series 15. University of Michigan, Ann Arbor.

Freidel, David, Linda Schele, and Joy Parker
1993 *Maya Cosmos: Three Thousand Years on the Shaman's Path*. Morrow, New York.

Freidel, David A., Arlen F. Chase, Anne S. Dowd, and Jerry Murdock (editors)
2017 *Maya E Groups: Calendars, Astronomy, and Urbanism in the Early Lowlands*. University Press of Florida, Gainesville.

Gullberg, Steven R., Duane W. Hamacher, Alejandro Martín-Lopez, Javier Mejuto, Andrew M. Munro, and Wayne Orchiston
2020 A Cultural Comparison of the "Dark Constellations" in the Milky Way. *Journal of Astronomical History and Heritage* 23:390–404.

Hirth, Kenneth, Ann Cyphers, Robert Cobean, Jason De León, and Michael D. Glascock
2013 Early Olmec Obsidian Trade and Economic Organization at San Lorenzo. *Journal of Archaeological Science* 40:2784–2798.

Inomata, Takeshi
2017 The Isthmian Origins of the E Group and Its Adoption in the Maya Lowlands. 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. 215–252. University Press of Florida, Gainesville.

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, J. C. Fernandez-Diaz, Daniela Triadan, M. García Mollinedo, Flory Pinzón, Melina Garcia Hernandez, Atasta Flores, Ashley Sharpe, Timothy Beach, Gregory W.L. Hodgins, Juan Javier Duron Diaz, Antonio Guerra Luna, Luis Guerrero Chavez, Maria de Lourdes Hernandez Jimenez, and Manuel Moreno Diaz.
2021 Origins and Spread of Formal Ceremonial Complexes in the Olmec and Maya Regions Revealed by Airborne Lidar. *Nature Human Behaviour* 5:1487–1501.

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. *Proceedings of the National Academy of Sciences USA* 112:4268–4273.

Joyce, Rosemary
2004 Unintended Consequences? Monumentality as a Novel Experience in Formative Mesoamerica. *Journal of Archaeological Method and Theory* 11:5–29.

Knowlton, Timothy W.
2010 *Maya Creation Myths: Words and Worlds of the Chilam Balam*. University Press of Colorado, Boulder.

Kopytoff, Igor
1987 The Internal African Frontier: The Making of African Political Culture. In *The African Frontier: The Reproduction of Traditional African Societies*, edited by Igor Kopytoff, pp. 3–84. Indiana University Press, Bloomington.

Laporte, Juan Pedro
2003 Thirty Years Later: Some Results of Recent Investigations in Tikal. In *Tikal: Dynasties, Foreigners, & Affairs of State*, edited by Jeremy A. Sabloff, pp. 281–318. School of American Research Press, Santa Fe.

Laporte, Juan Pedro, and Vilma Fialko
1995 Un reencuentro con Mundo Perdido, Tikal, Guatemala. *Ancient Mesoamerica* 6:41–94.

Laporte, Juan Pedro, Jesús Adánez, and Héctor H. Mejía
2008 Entre cayucos y caites: Una ruta de interacción entre el Mar Caribe y el Río Pasión. In *XXI Simposio de Investigaciones Arqueológicas en Guatemala, 2007*, edited by Juan Pedro Laporte, Barbara Arroyo, and Hector H. Mejia, pp. 744–769. Museo Nacional de Arqueología y Etnología, Guatemala City.

Looper, Matthew G.
2003 *Lightning Warrior: Maya Art and Kingship at Quirigua*. University of Texas Press, Austin.

Martín-López, Alejandro, and Sixto Giménez Benítez
2008 The Milky Way and Its Structuring Functions in the Worldview of the Mocoví of Gran Chaco. *Archaeologia Baltica* 10:21–24.

May Castillo, Manuel
2018 Time and the E-Group. A Hermeneutical Reflection on Maya Ceremonial Centers. *Indiana* 35(1):9–38.

Milbrath, Susan
1999 *Star Gods of the Maya: Astronomy in Art, Folklore, and Calendars*. University of Texas, Austin.
2017a The Legacy of Preclassic Calendars and Solar Observation in Mesoamerica's Magic Latitude. 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. 95–134. University Press of Florida, Gainesville.
2017b The Role of Solar Observations in Developing the Preclassic Maya Calendar. *Latin American Antiquity* 28:88–104.

Montuori, Riccardo, and Ana Laura Rosado Torres
2021 Transformaciones en la Arquitectura de los Grupos E: Los Casos de Tikal y Uaxactun. *Gremium* 8(15):113–130.

Mueller, Andreas D., Gerald A. Islebe, Michael B. Hillesheim, Dustin A. Grzesik, Flavio S. Anselmetti, Daniel Ariztegui, Mark Brenner, Jason H. Curtis, David A. Hodell, and Kathryn A. Venz
2009 Climate Drying and Associated Forest Decline in the Lowlands of Northern Guatemala during the Late Holocene. *Quaternary Research* 71:133–141.

Powis, Terry G., and David Cheetham
2007 From House to Holy: Formative Development of Civic-Ceremonial Architecture in the Maya Lowlands. *Research Reports in Belizean Archaeology* 4:177–186.

Pugh, Timothy W., and Prudence M. Rice
2017 Early Urban Planning, Spatial Strategies, and the Maya Gridded City of Nixtun-Ch'ich', Petén, Guatemala. *Current Anthropology* 58:576–603.

Rey, H. A.
1962 *The Stars: A New Way to See Them*. Houghton Mifflin, Boston.

Rice, Prudence M.
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.
2017 The E Group as Timescape: Early E Groups, Figurines, and the Sacred Almanac. 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. 135–176. University Press of Florida, Gainesville.

Rice, Prudence M., and Timothy W. Pugh
2021 Middle Preclassic Nixtun-Ch'ich': A Lowland Maya Primate/Ritual City. *Journal of Anthropological Archaeology* 63. https://doi.org/10.1016/j.jaa.2021.101308.

Rice, Prudence M., Ann S. Cordell, Gerry Kidder, Willie G. Harris, Timothy W. Pugh, and Evelyn Chan Nieto
2018 Early Construction at Nixtun-Ch'ich', Petén, Guatemala: An Architectural-Footing and -Bonding Sample. *Journal of Archaeological Science: Reports* 17:754–761.

Rice, Prudence M., Timothy W. Pugh, and Evelyn 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.

Ricketson, Oliver G., Jr.
1928 Astronomical Observatories in the Maya Area. *Geographical Review* 18:215–225.

https://doi.org/10.1017/S0956536123000020 Published online by Cambridge University Press

1933 Excavations at Uaxactun. *The Scientific Monthly* 37:72–86.

Romain, William F.
2021 Following the Milky Way Path of Souls: An Archaeometric Assessment of Cahokia's Main Site Axis and Rattlesnake Causeway. *Journal of Skyscape Archaeology* 7:187–212.

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.

Ruppert, Karl
1977 [1940] A Special Assemblage of Maya Structures. In *The Maya and Their Neighbors*, edited by Clarence L. Hay, Ralph L. Linton, Samuel K. Lothrop, Harry L. Shapiro, and George C. Vaillant, pp. 222–231. Dover, New York.

Saydjari, Andrew K., Edward F. Schlafly, Dustin Lang, Aaron M. Meisner, Gregory M. Green, Catherine Zucker, Ioana Zelko, Joshua S. Speagle, Tansu Daylan, Albert Lee, Francisco Valdes, David Schlegel, and Douglas P. Finkbeiner
2023 The Dark Energy Camera Plane Survey 2 (DECaPS2): More Sky, Less Bias, and Better Uncertainties. *The Astrophysical Journal Supplement Series* 264(28):1–35.

Schupbach, Simon, Torben Kirchgeorg, Daniele Colombaroli, Giorgia Beffa, Marta Radaelli, Natalie M. Kehrwald, and Carlo Barbante
2015 Combining Charcoal Sediment and Molecular Markers to Infer a Holocene Fire History in the Maya Lowlands of Petén, Guatemala. *Quaternary Science Reviews* 115:123–131.

Šprajc, Ivan
2021 Astronomical Aspects of Group E–Type Complexes and Implications for Understanding Ancient Maya Architecture. *PLOS One* 16(4). https://doi.org/10.1371/journal.pone.0250785.

2015 Pyramids Marking Time: Anthony F. Aveni's Contribution to the Study of Astronomical Alignments in Mesoamerican Architecture. In *Cosmology, Calendars, and Horizon-Based Astronomy in Ancient Mesoamerica*, edited by Anne S. Dowd and Susan Milbrath, pp. 19–36. University Press of Colorado, Louisville.

Stanton, Travis W.
2017 The Founding of Yaxuná: Place and Trade in Preclassic Yucatán. 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. 450–479. University Press of Florida, Gainesville.

Stanton, Travis W., and David A. Freidel
2003 Ideological Lock-In and the Dynamics of Formative Religion in Mesoamerica. *Mayab* 16:5–14.

Stuart, David S.
2005 *The Inscriptions from Temple XIX at Palenque: A Commentary*. The Precolumbian Art Research Institute, San Francisco.

Tedlock, Dennis (translator)
1996 *Popol Vuh: The Definitive Edition of the Mayan Book of the Dawn of Life and the Glories of Kings*. Rev. ed. Simon and Schuster, New York.

Urquizú, Mónica, and Heather Hurst
2011 The Murals of San Bartolo: A Window into the Art and Cosmovision of Precolumbian Man. *PARI Journal* 12(2):8–13.

Wechsler, Risa H., and Jeremy L. Tinker
2018 The Connection between Galaxies and Their Dark Matter Halos. *Annual Review of Astronomy and Astrophysics* 56:435–487.

Xiang, Maosheng, and Hans-Walter Rix
2022 A Time-Resolved Picture of our Milky Way's Early Formation History. *Nature* 603:599–603.

https://doi.org/10.1017/S0956536123000020 Published online by Cambridge University Press