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Evidence from Escalera al Cielo: Abandonment of a Terminal Classic Puuc Maya Hill Complex in Yucatán, Mexico

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Abstract

Excavations at the hilltop site of Escalera al Cielo, located in the Puuc Maya region of Yucatán, Mexico, have uncovered evidence of a planned abandonment at the end of the Terminal Classic period (A.D. 800–950). Six buildings investigated among three residential groups contain rich floor assemblages similar to those known from only a few rapidly abandoned sites in the Maya area. Through an analysis of de facto refuse—most of which was recovered in locations of storage and provisional discard—and midden refuse, this paper illustrates how the assemblages represent an example of household-level abandonment with anticipated return. We also consider Escalera al Cielo in light of our present understanding of the political and environmental history of the Puuc region during the late 9th century A.D.

Keywords: Maya, Terminal Classic period, site abandonment, site formation processes, household archaeology
Introduction

Four seasons of excavation at Escalera al Cielo (EAC), an elite suburban hill complex in the Puuc Maya region of Yucatán, Mexico have revealed contexts similar to those known from only a handful of sites in the Maya area (e.g., Ceren, Aguateca, Seibal, Copan) (FIG. 1). These include rich artifact assemblages left in and around every building yet investigated, which we believe demonstrate that the residents of EAC abandoned their homes in a planned, but hasty, manner with the intention to return. Approximately 85% of the ceramic material, all investigated architecture, and radiocarbon dates are consistent with a punctuated Late–Terminal Classic-period (A.D. 600–950) occupation, an era marked by a florescence in the northern Maya lowlands that ended with a widespread demographic collapse concurrent with the abandonment of EAC (Demarest et al. 2004a).

EAC is an extended or multiresidence household as defined by its circumscribed hilltop location and the particular form of its architecture and features. At least five residential patio groups (Ashmore 1981)—six if the south group also served a residential function—each contain evidence of basic production and consumption activities (FIG. 2). The size and quality of construction, including numerous vaulted stone buildings, reflect the EAC inhabitants’ ability to mobilize a large work force, probably residing in the neighboring hills. This vaulted architecture combined with the presence of valuable, exotic objects such as jadeite beads mark it as an elite group (Kurjack 1974, 2003). The nature of “elite” status in the context of the Puuc hills region, however, requires some explanation. We posit that the inhabitants of EAC represent what is sometimes referred to as a lesser or intermediate elite, or “middle class” (e.g., Elson and Covey 2006), probably subordinate to the ruling elite (lords or royals) residing in the palace complex at Kiuic (FIG. 1). Additional status distinctions can likely be drawn among the inhabitants of the
vaulted and unvaulted residences, ranging from household servants to specialized laborers to various levels of elites. Thus we define elite status primarily by wealth, which was most likely based in ownership and/or management of land and agricultural production. Furthermore, we propose that EAC formed part of the urban zone of Kiuic and may have served a function similar to a suburban plantation (Carrillo Sánchez et al. 2003, 2004). This model proposes that wealthy landowners who managed large tracts of land surrounding Kiuic moved to hilltop locations where they built elaborate residential/civic complexes. EAC is one such “residential hill complex,” a label referring to all of the domestic features associated with the hill, including platforms and features on the sides and at the base, as well as associated domestic groups on neighboring hills. The EAC settlement lies a short distance to the southwest of the latest palace residence at Kiuic (1.4 km) through a largely architecture-free zone, and extends the limits of urban settlement into what we call a “suburban zone” since it is too close to the center to be considered “rural.” Large expanses of unoccupied land extend in all other directions. Kiuic would have been visible from EAC with much of the vegetation cleared for cultivation, but far enough away for a fairly autonomous day-to-day existence. At least two other hill complexes are known around Kiuic, and this settlement pattern holds true for other urban nodes in the Bolonchén landscape (e.g., el Cerro del Astrónomo southwest of Labna [Carrillo S. et al. 2004]). Therefore, topography played an important role in integrating the EAC social unit.

Settlement surveys in the Puuc region have tested the hypothesis that the regional settlement hierarchy was oriented to control prime agricultural resources (Dunning 1992; Garza Tarazona and Kurjack 1980), but these rely mostly on visible architecture and features with potential sociopolitical implications (e.g., hieroglyphic stelae and intersite roads). Still, it remains likely that agricultural production was the main source of wealth in the region and the
multihousehold economic group at EAC may have controlled tracts of fertile land in the low-lying areas surrounding the hilltop (Carillo Sánchez et al. 2003, 2004).

Here, we provide a detailed overview of excavations in indoor and outdoor spaces at EAC, describing the spatial distribution of de facto refuse and midden materials. We draw from the growing body of literature on abandonment behavior (e.g., Cameron and Tomka 1993; Inomata and Webb 2003b; Schiffer 1972, 1987; Stevenson 1982) and define de facto refuse as artifacts that have been deposited “without the performance of discard activities” (Schiffer 1972: 160, 1987). The majority of these artifacts were found in storage locations; and we distinguish them from intentionally discarded artifacts that represent either primary (discarded at the location of use) or secondary refuse (e.g., midden materials). Deal defines a distinctive kind of storage behavior—provisional discard—as “the intentional storage of damaged or fragmented items for future disposal or reuse” (Deal 1985: 253); we identified substantial concentrations of material at EAC as provisional discard.

In addition, we discuss floor assemblages from EAC in their specific geographical, ecological, and archaeological settings, and compare these assemblages with other archaeological and ethnoarchaeological examples. While admittedly speculative, we offer hypotheses regarding the causes for the abandonment of EAC that can be tested with further research in the Maya area. Contributing factors potentially include the demographic collapse of Maya polities to the south; resulting economic disruptions (e.g., of trade networks); dynamic sociopolitical forces in the northern Yucatán peninsula particularly involving Uxmal, a possible Puuc regional capital, and the expanding Chichen Itza polity; and environmental changes (e.g., drought). The analysis of floor assemblages from EAC contributes important comparative data
for studies of household archaeology in Mesoamerica and research on abandonment behavior worldwide.

Geography, Ecology, and Archaeology of the Puuc Maya

Geographical and ecological setting

The Puuc region is situated in the Mexican states of Yucatán and Campeche and comprises three distinct physiographic zones. A fault line delineates the eastern boundary, above which rises the Sierrita de Ticul escarpment. To the west lies the Valle de Santa Elena, a triangular area of low relief and deep soils. This valley, known as the “bread basket” of the Yucatán, contains the most productive agricultural lands today, which may have held true in antiquity considering that the three largest sites of the Puuc region (Uxmal, Nohpat, and Kabah) (FIG. 1) are found here and could have commanded food production for the region (Barrera Rubio 1987). EAC is situated in the Bolonché District of the Puuc, which stretches to the east and south, and is characterized by cone karst hills ranging from 40 to 60 m in height, with intervening flatlands (Wilson 1980) (FIG. 3). These low-lying areas contain a variety of cultivable soils, whereas thin, rocky soils blanket the uplands. Agriculture is dependent upon variable rainfall owing to a lack of perennial water sources. Therefore, the thousands of chultunes—or water cisterns excavated into the limestone bedrock—associated with prehispanic residences were essential for water provisioning during the November to April dry season (Barrera Rubio 1987; McAnany 1990; Thompson 1897). Every group at EAC contains at least one chultun (FIG. 2).

Biodiversity is high throughout the Maya area, and vegetation in the Puuc is characterized as a deciduous seasonal forest (Wilson 1980), almost all of which is secondary regrowth as a result of clearing for modern agriculture and cattle ranching. Phytolith analysis
conducted by one of us (SS) supports the expectation that land was cleared/disturbed in antiquity for both infield and outfield cultivation.

Archaeological setting

The Bolonchén Regional Archaeological Project (BRAP), directed by Tomás Gallareta Negrón, George Bey, III, and William Ringle, was initiated in 2000 and encompasses a $9 \times 1$ km region containing the prehispanic urban centers of Labna, Huntichmul, and Kiuc. From the outset, the BRAP has taken a holistic approach to understanding the Puuc political economy by exploring regional settlement patterns, the three urban centers, and rural or suburban settlements such as EAC.

Sociopolitical organization in the Puuc, and northern lowlands in general, was different from that of the great Classic-period Maya polities of the central and southern lowlands. Few sites in the northern lowlands contain evidence of a strong centralized ruler. Instead, the northern Maya lowlands appear to have been more decentralized during most of the Classic Maya florescence than regions to the south. Puuc is also a cultural designation that refers to the distinctive architectural style of the region (Andrews 1986, 1995; Pollock 1980; Thompson 1892), as well as differences in ceramic technology, iconography, and site orientation (Aveni and Hartung 1991; Kowalski 2003; Ringle et al. in press; Sharp 1981). Research, beyond the seminal studies of Puuc architecture (cited above), has focused on characterizing dense Late–Terminal Classic settlement patterns (Dunning 1992; Gallareta Negrón et al. 1999, 2003; Garza Tarazona and Kurjack 1980; Smyth et al. 1995), exploring urban centers, and, more recently, documenting an extensive Preclassic occupation across the northern lowlands that demonstrates a continuity of
occupation in the region (e.g., Anderson 2011; Bey 2006; Gallareta Negrón and May Ciau 2007; Stanton and Ardren 2005).

Within the BRAP study area, interrelated survey and excavation efforts are aimed at characterizing regional settlement patterns along an urban–rural continuum (Killion et al. 1989: 276). Excavation has concentrated on the site of Kiuic (Fig. 1), primarily in the Yaxche palace group, due to its deep history of occupation—spanning the Early Preclassic to Terminal Classic periods (800 B.C.–A.D. 950) (Andrews et al. in press) (Table 1). EAC lies within a network of cone karst hills that ring the flat lowlands of Kiuic and it is the largest outlying architectural complex yet identified. It was discovered in 2001 during intersite survey conducted by T. Gallareta Negrón, mapped in 2003 by Ramón Carrillo Sánchez and again in 2003 and 2008 by W. Ringle. EAC is located 1.4 km southwest of Kiuic and comprises two major architectural concentrations, one on each cusp of a 60 m-tall hill, with additional low platforms and domestic features scattered along a 250 m north–south trend (Fig. 2). A group consisting of five vaulted buildings surrounding a central patio dominates the southern cusp of the hill. Based on architectural form and excavations, this group is thought to be the center of civic-ceremonial activity at the site, perhaps even serving as a palace-style residence (Carrillo Sánchez et al. 2004). The North Group is entirely residential. A total of eight chultunes, 28 metates (grinding stones), and five sascaberas (quarries for raw lime plaster material) are dispersed between the groups. The South Group at EAC was accessed by a large stairway to the east that represents a continuation of the steep trajectory from the base of the hill, and there were probably additional access routes that passed by rough platform features dispersed around the sides of the hill.

The majority of recovered ceramic material (ca. 85%) dates to the Late–Terminal Classic period and corresponds to a single construction phase. Overall, evidence for use of the hilltop
spans the late Middle Preclassic (600–300 B.C.) through early Postclassic (A.D. 950–1300) periods (TABLE 1), although these chronological extremes are represented by only a handful of sherds. Radiocarbon dates from below and above the sealed plaster floor of the stone-vaulted residence in the northwestern patio group (within the North Group) at EAC place its construction to ca. A.D. 810 (Beta-287385; CAL A.D. 690–900 and 920–950 at 2σ) and abandonment sometime before A.D. 1020 (Beta-286658; CAL A.D. 980–1060 and 1080–1150 at 2σ). Kiuic was continuously occupied through the Terminal Classic period and contains evidence of ephemeral Postclassic ritual activity; however, there is no sign of reoccupation or postabandonment disturbance at EAC.

**Floor Assemblages from EAC**

In 2008, the BRAP began a program of exploratory excavations across EAC. Broad horizontal exposures of two small buildings (S2870E3260 and S2955E3280) composed of low masonry walls (one or two courses in height) that once supported perishable, pole and thatch superstructures revealed concentrations of smashed ceramic vessels and other classes of artifacts on floor surfaces and outdoor terraces. Many of the vessels proved to be completely or partially reconstructable, and their distribution around the edges of rooms, especially in the corners, corresponds with storage locations documented archaeologically at Mesoamerican sites such as Ceren, Aguateca, and Xochicalco (e.g., Inomata and Triadan 2010; Sheets 2002b; Webb and Hirth 2003) as well as ethnographically (Arnold 1990; Deal 1985; Hayden and Cannon 1983). Other classes of artifacts include exotic shell and jadeite ornaments, ceramic figurines, and an effigy whistle. The presence of these classes is suggestive, as small objects of value would have
been easily transportable in the event of a protracted abandonment with no expectation of return (Stevenson 1982).

Excited by the discovery of de facto refuse, a rare occurrence in the Maya area owing to processes of gradual abandonment and postabandonment scavenging, we conducted additional excavations over three subsequent field seasons (2009–2011) to evaluate the hypothesis of a rapid abandonment. These excavations confirmed the abandonment of the entire hilltop, rather than isolated structures as at Seibal Structure C-31a (Tourtellot 1982, 1988) and Copan Structure 9N-81 (Webster 1989). There is no indication that the inhabitants of EAC fled their homes under extreme conditions such as a military siege or volcanic eruption, but the amount, distribution, and nature of the materials left behind suggests that they left abruptly, packing some things and leaving many behind, perhaps with the intention to return. A detailed inventory of the six completely excavated buildings, all of which contained rich floor assemblages (except S2865E3225, which only contained a partial jar), is followed with a discussion of what this example of household-level abandonment reveals about abandonment behaviors in general and the social context for abandonment in particular.

All vessels are Late–Terminal Classic-period types from the Cehpech ceramic sphere based on the type-variety analysis (Smith 1971; Gunn 2008, 2009, 2010) (FIG. 4). Additional refitting and modal analysis—recording attributes such as form, capacity, decoration, and use wear—is almost complete for floor assemblage materials collected through 2011. The considerable weight of the collapsing stone vaults and low masonry walls caused the objects on the floor to shatter into many pieces, and in some cases scatter across a large area or become embedded in the upper layer of the plaster floors (FIGS. 5, 6). As a result, refitting complete or partial vessels is a time-consuming endeavor that is still in progress. Here, we report the
minimum number of partial (at least half of the vessel present) and complete (at least 80% of sherds present) vessels identified among the materials lying directly on the floor, not including sherds from upper levels mixed in with the collapsed vaults or sherds that may have been ejected from the room as the walls buckled. Another challenge we faced when identifying discrete concentrations of sherds was the fact that everything in the stone-vaulted residence (S2870E3225) was covered with a thin, cemented layer of *sascab* (limestone powder) from the decomposition of construction debris (FIG. 5). As a result, many vessels were not identified as being reconstructable until after they had been washed and sorted. One common vessel type—Yokat striated jars—proved nearly impossible to refit because of the soft, friable edges of sherds and their tendency to break into many small pieces. Thus, we gauged completeness for Yokat jars by the presence of a complete rim/neck, base, and the total weight of body sherds.

An inventory of partial and complete vessels and other artifacts recovered from each of the six buildings is presented in Table 2. Pottery comprises a standardized set of basic utilitarian and serving forms including basins, jars (some with lids), bowls, and dishes, in addition to a few specialized forms such as censers. Other domestic artifacts include chipped tools made from imported chert and obsidian; groundstone implements produced from local limestone; jadeite, marine shell, stone, and bone beads, and other personal adornments (FIG. 7); and ceramic figurines and whistles.

*Northwestern patio group*

**BUILDING S2870E3225**

The majority of excavations were in the northwestern patio group of the North Group (FIGS. 2, 8) to obtain a sample of three of the four buildings that comprise what was probably a single
residential compound, or a single household. The four buildings define the northern and western boundaries of the hilltop and face an open, quadrangular patio area; the hill slopes dramatically downward to the north and west. The group contains two large chultunes for water storage (and a third chultun in the process of excavation that may indicate an expansion of the group, or at least of water storage capacity), 10 metates, two stone-vaulted residences, and two perishable buildings that served as kitchen and storage facilities. Only one of the residences has been investigated (S2870E3225) owing to the expense associated with completely excavating and consolidating such massive architecture.

Building S2870E3225 is a three-room, stone-vaulted residence that dominates the west side of the patio (FIGS. 2, 8). Each room has a central doorway facing in toward the patio and the two rooms on the ends have an interior area of approximately 3.5 m in length by 2.5 m deep, while the central room is larger at 5.5 m in length. It is constructed in the regional Puuc style, consisting of fine-cut masonry stones covering a nucleus of mortar and stone fill, all of which was once plastered and probably painted. Radiocarbon dates from below the floor and on the floor surface in the south room place construction at the beginning of the Terminal Classic period and abandonment sometime before A.D. 1020 (Beta-287385 and Beta-286658). All three stone vaults collapsed in antiquity preserving interior plaster floors and crushing the ceramic objects left on them. Only a thin layer (ca. 1 cm) of sediment had accumulated on the floor, blown in through the doors prior to the collapse of the vaults; therefore, we hypothesize that the building collapsed a short time after it was abandoned.

After removing the collapsed vault stones in the south room, we encountered an empty plaster floor that had yellowed in color, especially around the entrance, perhaps from habitual foot traffic. In the northern corners of the room we observed circular, blackened areas (ca. 15–30
cm in diameter) that might be the result of burning incense or fuel for warmth during the chilly evenings of the dry season, or less likely cooking. Beneath the floor of this room was a pair of elaborate secondary burials arranged in hollow cists with abundant grave goods. The burials were placed before the floor was laid and were therefore contemporary with initial construction. These are consistent with examples of residential burials throughout the Maya area and other parts of Mesoamerica. The carefully curated bones are likely kin, or perhaps even ancestors, of the initial settlers of EAC, placed beneath a room that served as the sleeping quarters for elite members of the household (McAnany 1995).

In contrast to the clean interior floor of the south room, the larger central room contained at least six reconstructable ceramic vessels. The vessels were concentrated in the corners of the room and along the edges, with a clear passage through the doorway into the center of the room (FIG. 5). Among the vessels are two large storage jars with lids, a large basin, two serving bowls, and a censer. A stone pie (Spanish) was affixed to the back wall and used as a hanger for suspending objects above the floor; other examples of these are known from Labna (Pollock 1980: 27) and the term “pie” is a homonym for the anatomically correct “foot” form with five toes. Beneath the preserved plaster floor of this room, in the southwestern corner, we recovered a third secondary burial also arranged in a hollow cist overlying bedrock with two ceramic vessels. Thus, this larger central room was used for everyday storage, and also probably served as a work and/or sleeping space.

The north room also contained multiple ceramic vessels including one complete and one partial jar, two partial serving bowls, and a limestone mano (grinding stone, accompaniment to a metate), which were concentrated along the southern and western interior walls.
The low stone terrace directly in front of the residence was regularly swept and clear of debris. At least three episodes of plastering are evident at the base of the outer walls, and it is possible that the entire patio was plastered; alternatively, just the small terrace in front of the three investigated buildings on the west side of the patio could have been plastered. This terrace was most likely shaded by thatched eaves providing a pleasant outdoor work area. Two metates and what appears to be a combination mortar/metate (ground on two surfaces) were located on the terrace immediately outside the entrances to the north and south rooms, beneath the eaves of the roof. These grinding stones are smaller, with shallower troughs, and of a higher quality limestone than the large metates adjacent to the kitchen and storage buildings, suggesting that they were used for grinding a variety of foods or industrial materials (e.g., pigments). Ongoing residue analyses will illuminate the precise functions of domestic artifacts. To our surprise, we also recovered a large jadeite bead (> 2 cm in diameter) (FIG. 7C)—the most valuable object recovered from all excavations at EAC and Kiuic—from the terrace just outside the northeastern corner of the north room. Our attempts to connect the bead with a ritual offering or dedicatory deposit at the corner of the building were unsuccessful. Therefore, it appears that the bead was simply dropped here or ejected from the interior of the north room when the building collapsed.

BUILDING S2880E3230

Single-room buildings constructed of perishable materials once stood to the south and north of the residence. Based on their architectural form, associated metates (at least three each), and other culinary equipment, these buildings are assumed to be places of food storage, processing, and preparation, although it is clear that different kinds of activities took place at each. They present similar patterns of refuse disposal, with dense middens that extend around their back
edges (outside the patio work area). This is consistent with patterns of refuse disposal at Kiuic and at other sites documented archaeologically and ethnographically (discussed below), indicating that residents habitually swept the patio, depositing broken ceramics that were no longer useful (small and eroded sherds), spent stone tools, and small quantities of organic waste (identified through phytolith analysis) just beyond the edges of the patio work area.

The southern building (S2880E3230) is most likely a kitchen and contains large quantities of material scattered inside, on the outer terrace, and in dedicatory caches (FIG. 8). The interior space measures 2.6 m wide by 1.8 m deep. Among the ceramic material inside the building are four mostly reconstructable vessels: two large storage jars, a large basin, and a fine serving bowl. These four vessels do not account for the majority of the dense scatter of sherds heaped around the inner edges of the room, however, which resembles floor deposits at Xochicalco interpreted as provisional discard (or “orphan sherds”) (Webb and Hirth 2003: 33). The piles of sherds include large, conjoinable fragments and could represent curation of broken but recyclable materials (e.g., provisional discard to be used as scoops, lids, plates, plugs to mend other broken vessels, etc.). A few worked sherds are in the assemblage and indicate that broken, but still usable ceramics were indeed curated for secondary uses. It is also possible that these materials were stored in an elevated context, but owing to exposure to the elements, bioturbation (tree roots and burrowing), and the small range of vertical displacements for objects on the eroded floor surface (5–10 cm), we cannot say for certain.

A partially reconstructable large basin rested outside the building, on the eastern terrace between two large metates (broken, probably from natural erosion of the limestone), where it might have been used to collect food ingredients before or after grinding. Two fine bowls ritually consecrated the building: one beneath the floor and one underneath the eastern wall that was
cached with two jar lids (one of which was a recycled body sherd). Three chert axes (unhafted), two ceramic handles (from a jar or basin), and a broken fragment of a small metate (19 × 16 cm) were recovered in a neat pile just outside the entrance to the building, at the base of the eastern door jamb, where they were likely stored or provisionally discarded. At Ceren, ceramic lug handles such as these were affixed to walls in Structure 3, where they are interpreted as door mounts/hinges or curtain tie-backs (Gerstle 2002: fig. 9.1); alternatively, these handles could have been recycled for some other, non-architectural purpose. Two identical piles of chert axes (outside of S2870E3260 and S2950E3270, described below) support the interpretation that this was a purposeful storage location. A third metate (also broken but complete) rests on the terrace at the northwestern corner of the building. An accompanying mano was recovered nearby, resting on the terrace.

We also recovered a beautifully preserved bark beater with dotted diagonal cross-grooving at the eastern edge of the terrace suggesting that the residents of EAC were making paper and/or bark cloth here; the latter perhaps representing a tribute item. Finally, we documented a concentration of crude, unevenly fired clay balls off the back, southeastern edge of the building. Ongoing analyses demonstrate that these objects were expediently manufactured and heated to temperatures consistent with cooking fires (based on Fourier transform infrared spectroscopy); in addition, they are covered in microbotanical residues including maize starch. We believe that the clay balls represent a local cooking technology either for stone boiling or roasting in a pit oven, and were dumped here after their primary use life had expired.

BUILDING S2865E3225
The slightly smaller building to the north of the residence has an interior space measuring 1.9 m wide by 1.5 m deep (FIG. 8). Clear differences between this building and the kitchen/storage building to the south of the residence (S2880E3230) are consistent with observations of residential groups in archaeological as well as ethnographic studies (e.g., Hayden and Cannon 1983; Hutson et al. 2004; Killion 1990; Sheets 2002b), in which each room in a house lot served specialized storage, processing, and cooking functions. In contrast to the southern kitchen, this building only contained a partially reconstructable jar, smashed just inside the entrance. Two large, broken metates—similar in form to the two on the eastern terrace associated with the southern kitchen—rested on the terrace to the southeast of the entrance. We also recovered one complete and one broken mano from the terrace immediately outside of the building. A dense midden deposit of small, eroded ceramic sherds, spent lithics, and some organic waste (including squash rind phytoliths) wraps around the back edge of the building.

**North-central patio group**

**BUILDING S2870E3260**

On the eastern edge of the northwestern patio, but oriented toward the neighboring patio group (FIG. 2) of the North Group, are a two-room building (S2870E3260) and two large limestone metates propped on their sides just outside the doorways (FIGS. 9, 10). We posit that the Maya positioned metates like this in order to prevent debris from collecting in their troughs, since most metates are recorded with their work surfaces facing up. The fact that the residents of EAC took care to do this is one of the pieces of evidence that we believe signals their intention to return. It is unlikely that these metates were elevated on wooden supports like many of those documented at Ceren owing to their large size (ca. 1 m in length) and tremendous weight. Instead they appear
to have been placed directly on the ground; they are a “turtle-shell” form (e.g., Carrillo Sánchez 2004; Coe 1959), thus dubbed for the curved, unworked shape of the underside that would have been stabilized by smaller stones also placed directly on the ground. In addition to S2870E3260, this patio group comprises two stone-vaulted buildings (probably residences), a single-room perishable building surrounded by three large metates, and a single chultun.

The west room of S2870E3260 contained two reconstructable vessels, a basin and a jar, among a dense pile of sherds (like that described for S2880E3230) concentrated along the inner east wall, as well as beads and a limestone mano. We documented a second pile of chert axes (two) in front of the entrance to the east room, apparently stored here on or near the floor. In contrast, the east room contained a significant quantity of stone tools and debitage on the interior floor and just outside the room, but no ceramics. The lithic material included some chert blanks and elevated concentrations of debitage suggesting that residents of this household performed small-scale lithic manufacture or retouching here. In addition, the east room contained four manos (two complete and two broken halves), two limestone ornaments (a bead and a pendant), and a jadeite bead (FIG. 7A). The interior space of each room measures approximately 3.7 m wide by 3.1 m deep.

A lip-to-lip cache composed of two large basins, one inverted over the other, with a shell pendant inside was placed on the terrace, off the back, northeastern corner of the building (FIG. 11). We also recovered a ceramic jar lid lying to the south of the cache. Another dense midden deposit extended along the back wall (to the north) and especially along the base of the outer west wall filling the space between this building and the vaulted building to the southwest, just beyond the patio work area.
We believe that the large quantity of personal adornments (FIG. 7) suggests that at least one room served as a residence for non-elite individuals. These could have been servants attending the wealthier residents of the vaulted houses. In addition to sleeping here, the residents also engaged in storage and grinding activities as well as in the maintenance and curation of a diverse stone toolkit for culinary and perhaps other industrial uses.

*Platform S2960E3275*

**BUILDING S2955E3280**

We have also investigated the three rooms atop a large platform (19 m EW × 12 m NS) to the southeast, roughly in the middle of the EAC architectural sprawl, between the North and South Groups (FIGS. 2, 12). The platform (S2960E3275) is associated with a chultun, a large sascabera, and two large metates suggesting that it constitutes another single family residence/household. We refer to this kind of architectural group as a simple habitational platform, which probably housed lower status members of the EAC cooperative. S2955E3280 is a single-room building at the northeast corner of the platform built of masonry walls (ca. 1.3 m in height) and having a west-facing entryway with a perishable roof. The cut stones in the entrance to the room constituted formal door jambs, unlike any of the other investigated buildings incorporating perishable construction material. This building is rather exceptional for the quality of the masonry and associated fine objects. Its interior space measures 3.4 m wide by 2.55 m deep and a low stone terrace, about 10 cm high and 70 cm wide, spans the west side in front of the doorway. Five reconstructable vessels were recovered in discrete concentrations across the interior floor surface, again located in the corners and close to the inner edges of the room, except for sherds from a very large (partial) storage jar that extended from the south wall to the
center of the room due to the force of the collapsing walls. The vessels include a fine bowl, a
dish, one complete and one partial storage jar, and a partial basin. We also recovered two marine
shell pendants (FIG. 7B) and a ceramic figurine from the floor surface. A second stone “pie” was
recovered, probably once affixed to the inner west wall adjacent to the door, which could have
been used as a hanger for the basin upon which it rested. In addition, a large jar, a partial bowl,
and a chert point were cached beneath the floor. It is unclear whether this building served
exclusively for storage or, more likely, for multiple uses including possible sleeping quarters.

BUILDING S2950E3270
At the end of the 2011 field season, we excavated S2950E3270, which is a two-room perishable
building at the northwest corner of the platform (S2960E3275) (FIGS. 2, 12). Its doorways are
oriented southward, facing the central area of the platform that probably served as an outdoor
work space. Two large metates rest on the western edge of the platform, close to this building.
The interior space of each room measures 3.2 m wide by 2.5 m deep and, like all other
investigated buildings, a low stone terrace flanks the doorways.

Both rooms contained rich floor assemblages, primarily composed of ceramic material.
The east room contained some large, conjoinable sherds in discrete concentrations; overall, these
seem to represent provisionally discarded materials. The west room is more difficult to assess
since its interior surface was completely covered with sherds (cf. S2880E3230 and the west room
of S2870E3260). These sherds include at least four large storage jars and one bowl, among many
other sherds that may represent more provisional discard. Immediately outside the entrance to the
west room, along the outer west wall, was another pile of chert axes (two) consistent with
previously documented patterns of storage. Beneath the floor of the west room, we encountered a
hollow cist constructed of rough limestone blocks containing a secondary burial with a dish inverted over the disarticulated bones adjacent to a bowl. To the northeast of the burial was a partial vessel (rim and neck) that served as a stand for a complete jar. The burial goods also included three beads and small fragments of obsidian blades. Compared with other excavated buildings at EAC, we hypothesize that the west room was used for storage and the east room, which contained fewer vessels concentrated in the corners and a burial, served as a sleeping area.

Discussion

Abandonment behavior
The distribution of artifacts on floor surfaces and on terraces surrounding buildings at EAC conforms to expected patterns for a relatively rapid, yet planned abandonment of the site (as opposed to ritual termination) (Pagliaro et al. 2003: 79–80; Stanton et al. 2008: 237–238) based on ethnographic and archaeological models. These models consider how factors such as the speed of abandonment, whether or not the inhabitants anticipated returning to their homes, the distance to the next site, the mode of transportation, and the season of departure serve to structure the archaeological record (Stevenson 1982: 238). Data from EAC provide insight into many of these variables, and allow us to explore behaviors that affected patterns of curation and deposition of materials within and around the buildings. There is no indication that EAC was abandoned under conditions such as those that forced the evacuation of Aguateca or Ceren. Instead, we draw comparisons with sites such as Akrotiri, a Bronze Age settlement on the island of Santorini, or Godin Tepe in modern Iran. Akrotiri was abandoned in the wake of a volcanic eruption during the second millennium B.C., but unlike Pompeii or Ceren, no human remains were found and there were few valuable objects remaining in the houses, indicating that the
residents had time to execute an orderly evacuation (Doumas 1983). Godin Tepe represents another good analogue for EAC; the site was briefly abandoned at the end of the third millennium B.C. as demonstrated by well preserved houses containing numerous artifacts (Gopnik 2011; Weiss and Young 1975). Among the artifacts are reconstructable ceramic vessels, tablets, and some metal implements, but virtually no precious metals or stones. This pattern led the excavators to interpret the abandonment as a rapid event in which the most valuable items were carried off, but the majority of house contents were left in situ. Subsequent inhabitants built their new homes directly atop the standing walls of the abandoned homes, still covered in lime plaster, which signals a short hiatus in occupation. Keeping these archaeological examples in mind, we now discuss the reasons why we interpret the abandonment of EAC as a rapid event with the expectation of return.

The presence of artifacts that can be characterized as small, easily transportable, and valuable is a compelling piece of evidence for rapid abandonment (e.g., Inomata and Stiver 1998: 432). We recovered jadeite beads, among other personal adornments made from imported materials (FIG. 7), small figurines, and numerous useful, portable stone tools. Many of these objects and a significant quantity of ceramic vessels (TABLE 2) appear to have been left in storage or habitual-use contexts at the time of abandonment indicating that the inhabitants left quickly, without packing or stashing these items for safekeeping. Schiffer and others postulate that the presence of artifacts left in processes of manufacture, use, or maintenance indicates an unplanned, hasty departure (Schiffer 1972: 160; Stevenson 1982). The combined evidence from EAC supports the notion that it was a planned event: we believe that such small, valuable objects would have been carried away if the residents of EAC had had time to do a more thorough job of packing; if it was only a short distance to their next destination, enabling multiple trips; or that
they left these items behind because they expected to return. The large jadeite bead recovered from the ground surface outside the northeastern corner of S2870E3225 (FIG. 7c) is particularly interesting and may suggest a rushed job of packing; it also supports evidence that there was no reoccupation or postabandonment scavenging at EAC.

The presence of whole and partially reconstructable ceramic vessels, at least 30 left in systemic contexts from six excavated buildings, also suggests that the inhabitants of EAC abandoned their homes quickly (FIG. 4; TABLE 2). Compared with the inventories of ceramic vessels from other rapidly abandoned sites in Mesoamerica (summarized in Webb and Hirth 2003: fig. 3.9), it is clear that this does not represent a complete functioning assemblage and a significant quantity of vessels, perhaps containing food and other provisions for the journey, may have been carried away from EAC. This suggests that the hilltop was not abandoned under duress, as some useful materials appear to have been hauled off as the residents descended from their homes on foot. Drawing from ethnographic studies of modern Maya potters in Guatemala, we know that a single vendor can carry more than 20 (empty) vessels weighing upwards of 85 pounds to market using wooden backracks or nets suspended from tumplines (Reina and Hill 1978: 211, plates 382, 395). Yet among the vessels left behind are portable fine serving dishes and bowls; we would expect to find fewer of these forms in the event of a carefully planned or gradual abandonment with no anticipation of return (Deal 1985: 270; cf. Caracol palace assemblages, Chase and Chase 2004). Meanwhile, pottery and other objects that represent provisional discard, such as the dense piles of sherds including large, conjoinable fragments and some reconstructable vessels recovered from S2880E3230, and from the west rooms of S2870E3260 and S2950E3270, would be left behind regardless of the speed of abandonment (Stevenson 1982).
Another piece of evidence reinforces the idea of a planned return. Of the many metates scattered across EAC, most are broken, probably from natural weathering of the limestone. A striking exception can be found in front of S2870E3260, where two large, well-preserved metates were turned on their sides (FIG. 10). Perhaps the residents of this house, believing that they would be returning to their homes, placed their metates like this in an effort to keep them from collecting debris during their absence. Storing and caching of functional items imply the expectation that they will be reused upon return (Deal 1985: 269; Stevenson 1982: 253).

The practice of opening ancestral tombs to remove bones has been documented at multiple sites in the Maya area (e.g., Dos Pilas, Copan, Caracol, Tikal, Piedras Negras, Baking Pot) (Aimers 2003: 156; Chase and Chase 1996; Harrison 1999; Houston et al. 1998; Palka 2003: 130; Sharer et al. 1992). At least four buried individuals were left behind when the inhabitants of EAC departed, suggesting that they intended to return and reinherit the homes consecrated by the bones of their kin or ancestors. If the abandonment was gradual and meant to be permanent, it is possible that they would have removed the bones to dedicate their new homes.

Site formation processes

While not an exhaustive treatment of site formation processes, in part owing to the need to excavate larger portions of outdoor patio areas where many daily activities would have been performed, we offer some summary comments on how preabandonment (i.e., daily household activities), abandonment, and postabandonment conditions structured the archaeological record at EAC. Most of the artifacts recovered from EAC were found in locations of storage or provisional discard, or were midden refuse. These interpretations are based on consistency with
archaeological and ethnographic models. In particular, the central area of most rooms at EAC was kept clean and likely utilized for food-related, craft, and other activities during the day and/or as sleeping space at night. The south room of the vaulted residence S2870E3225 was completely devoid of durable artifacts, but contained a pair of elaborate secondary burials beneath the floor. We hypothesize that this room may have been used for sleeping quarters, and perhaps there is a correlation between rooms with dedication burials and sleeping space (cf. the central room of S2870E3225 and the west room of S2950E3270).

Whole ceramic vessels were primarily concentrated in the corners of rooms and along the interior walls where they may have rested on the floor, on low shelves, or been suspended from or tucked into the rafters. In the vaulted residence, wooden beams once spanned the width of the room beneath the vault spring (Pollock 1980) and it is possible that objects were also stored on these beams. At Ceren, Sheets (1998) notes that two-thirds of the artifacts were stored in elevated contexts. Unfortunately, at EAC it is difficult to distinguish elevated from floor-level storage since there is little vertical displacement (5–10 cm) and the interior plaster floors of perishable buildings were completely eroded.

The total numbers of ceramic vessels per household are smaller than those described for other rapidly abandoned sites in Mesoamerica. At Ceren, Aguateca, and Xochicalco, for instance, archaeologists provide estimates ranging from 50 to 100 vessels per household, or composite household in the case of Xochicalco (Beaudry-Corbett and Bishop 2002; Inomata and Triadan 2010; Webb and Hirth 2003: fig. 3.9), whereas households at EAC contain far fewer vessels; there are at least 30 complete and partially reconstructable vessels among the three investigated households. We believe this signals that the residents of EAC had time to carry
selected items away with them, although they departed with enough haste to leave many valuable, easily transportable items behind (TABLE 2).

EAC contains a small assemblage of imported chert and obsidian artifacts, and abundant grinding implements manufactured from local limestone. Compared to the similarly small assemblages from Kiuic and other nearby sites, it is possible that the few tools from EAC represent most or all of this portion of each household toolkit. Alternatively, the residents of EAC and nearby sites may have carried many of their portable stone tools with them upon departure. A comprehensive analysis of lithic material from EAC is still in progress, but certain similarities exist among the investigated households. Neat piles of chert axes were documented for all three households in what appear to be storage locations: three axes were clustered with other implements outside the entrance to S2880E3230; two axes rested just outside the entrance to the eastern room of S2870E3260, in front of the eastern door jamb; and two axes were placed outside the western room of S2950E3270 at the base of the western wall. Each household also contained small fragments of obsidian blades, chert flakes, and evidence for retouching and/or small-scale manufacture of chert implements (suggested by the presence of chert blanks).

EAC also presents regular patterns of groundstone deposition, with at least one pair of large metates for each household and accompanying manos resting on the ground near metates and inside rooms where they may have been curated in elevated contexts (cf. Sheets 2002a: 146–147). Metates are often arranged in twos or threes, grouped at the edge of a patio or just under the eaves of a thatched roof where women probably gathered in the shade to work and chat. The northwestern household in the North Group and the civic-ceremonial South Group at EAC both contain elevated numbers of well-used metates (10 each), including a variety of different metate forms that may correspond with diverse functions. The northwestern household also contained a
combination mortar/metate and a pestle. These areas could be associated with the production of community feasts (as at Ceren’s Household 1) (Brown 2001; Brown and Gerstle 2002), or perhaps the members of these households were involved in industrial activities. At Labna, higher status households (defined primarily by greater investment in architecture) contain more metates than simple habitational platforms: compare an average of five metates per household for the former with two per household for the latter (Carrillo Sánchez 2004). Carrillo Sánchez (2004) suggests that this could also indicate that more women, possibly attendant servants, worked in the high status households.

Patterns of provisional discard and refuse disposal at EAC are consistent among households, as well as between EAC and other models. We have discussed the presence of at least one large pile of provisionally discarded items per household, mainly consisting of large, potentially recyclable sherds, and some reconstructable vessels that may have been broken in antiquity. These piles are concentrated around the interior edges of two rooms and one covers most of the floor surface in the eastern room of S2950E3270. Again, it is difficult to determine whether this material was once curated in an elevated context and scattered across the floor as the perishable buildings decomposed, or if it accumulated directly on the floors. We interpret the concentrations of small eroded sherds mixed with other classes of material that wrap around the outside edges of many buildings as middens, rather than provisional discard. These midden deposits appear to be the result of habitual sweeping and dumping of broken, unusable items around the immediate margins of the patio work area and behind buildings, just out of sight. Further analysis of these deposits may reveal that some are, in fact, concentrations of provisionally discarded, recyclable materials but our initial impression is that they are middens. Isolated 2 × 2 m units excavated around the edges of the northwestern and north-central groups,
but away from buildings, also yielded dense midden deposits of mixed, highly fragmented and eroded, inorganic materials. Phytolith analysis revealed a low concentration of plant waste in a single midden, located behind S2875E3225, which suggests that organic waste was handled in a different manner, and perhaps used as compost for infield cultivation or burned. Hayden and Cannon (1983: 126–127) describe intentional dumping of organic refuse downhill in a modern Tzeltal Maya community, which is another possibility at EAC. Systematic fine screening for faunal remains failed to produce any material. This suggests that animal food remains were deposited beyond the immediate vicinity of the residential areas, or they could have been consumed or scattered by scavenging dogs, or it may simply be a case of poor preservation.

Aside from a handful of Postclassic sherds, there is no evidence of activity at EAC following abandonment at the end of the Terminal Classic period. During the colonial period and up until 2000, the privately owned land was sparsely inhabited by local Maya, and by a single family since at least the late 18th century. Few disturbances are evident even within the Kiuic site center. Since 2000, EAC has been protected as part of the Kaxil Kiuic Biocultural Reserve.

**Hypotheses regarding the reason for abandonment**

It is not our aim to equate this example of household-level abandonment with the Maya “collapse,” but the timing is certainly appropriate and unfinished monumental construction at nearby centers such as Labna and Kiuic (Bey et al. 2010; Gallareta Negrón 2003; Pollock 1980 [features an entire section on unfinished buildings in the Puuc region]) supports the notion that the abandonment of EAC was part of a region-wide abandonment and restructuring of Maya society during the Terminal Classic period. It is therefore possible to integrate data from the
EAC households with hypotheses for regional changes in social, political, and ecological systems (Inomata and Webb 2003a: 9).

A few studies have demonstrated that the Yucatán peninsula experienced a drier climate in general and periodic droughts during the Terminal Classic period (Hodell et al. 2007; Medina-Elizalde et al. 2010; Stahle et al. 2011). The residents of EAC would have been highly susceptible to drought conditions since they relied on seasonal rainfall to replenish the water stored in chultunes for household consumption and to maintain agricultural production in the fields. Drought alone does not explain the rapid abandonment, but it is a potential push factor and may also help explain why the hilltop was never reinhabited.

We favor sociopolitical factors as the more likely prime movers of change during the Terminal Classic period. There is abundant evidence for warfare and collapsing polities among the Maya to the south, which undoubtedly had consequences for their neighbors in the northern lowlands (Demarest et al. 2004b). A disruption of potential trade networks with the collapsing polities to the south and a reorientation of Maya interaction with the rest of Mesoamerica likely had wide-ranging effects. In addition, this period witnessed the rise of Chichen Itza to the east and possible conflict between it and Uxmal, which may have been the Puuc regional capital during this time.

Based on evidence from monumental architecture, iconography, and inscriptions, Uxmal seems to have consolidated its power and resources around A.D. 900, while at the same time a powerful polity arose centered at Chichen Itza (Kowalski 1994). After A.D. 950 monumental construction ceased at Uxmal. Debate exists about whether Uxmal ever consolidated the Puuc and whether Itza hegemonic expansion played a role in Puuc regional political dynamics (Carmean and Sabloff 1996; Carmean et al. 2004; Cobos Palma 2004). More research is needed.
to explore these shifts in power, and determine what, if any, effect they had on settlements such as those in the Bolonché District of the Puuc. Understanding political and economic processes at the regional level, as well as between regions in the Maya area, will provide insight into the causes for abandonment at EAC.

At the regional level there is little doubt that the abandonment of EAC was part of the overall retreat from the Puuc region at the end of the Terminal Classic period. Yet the exact pattern and sequence of abandonment still eludes us and consequently the point at which Kiuic and EAC were abandoned in relation to other centers is still unknown. A radiocarbon date from EAC raises the possibility that it was abandoned as late as the early 11th century A.D., however the lack of extensive Puuc mosaic architecture in the site center—a stylistic hallmark of Terminal Classic period construction in the region (Andrews 1986, 1995; Pollock 1980)—suggests an earlier date, perhaps in the mid-to-late 9th century or before the major breakdown at Uxmal. As mentioned above, there are indications from the latest palace construction at Kiuic that progress halted abruptly, with unfinished plazas and buildings and evidence of actual construction underway at the time of abandonment (Bey et al. 2010). Even here, though, we are not sure if the site center and the abandonment of EAC took place simultaneously or over an extended period of time and, if so, which came first.

If drought did play a significant role in the abandonment of EAC, is it possible that the entire region was suffering a similar degree of crisis and responded in a similar fashion. Yet, since the Maya of this region successfully occupied the Puuc from the early Middle Preclassic until the end of the Terminal Classic, or roughly 1900 years, it is likely that they were adapted to not only managing rain water but also to managing a lack of rain water. Perhaps the population density and a large-scale agricultural economic system in Terminal Classic times made them
more susceptible to drought than in earlier periods, but a lack of rain is a lack of rain. It is therefore likely that the Puuc Maya were forced to abandon areas periodically throughout their history. The planned abandonment at EAC, with such indications as the metates placed on their sides, suggests that the residents believed this was a temporary crisis and that they would eventually return and continue living there.

We would like to shift attention away from the causes of EAC abandonment and focus on why they never returned. The northern plains of the Yucatán peninsula (lying to the north-northeast of the Puuc region) also experienced major demographic shifts at the site level, with most Terminal Classic centers being abandoned. People remained in the region, however, they simply moved to outlying locations. The abandonment of the Puuc extended beyond individual households and sites to affect the entire region. Unlike the northern plains, the Puuc region was never reoccupied and remains largely uninhabited today. The reasons for this must be larger than any environmental issue, and were most likely unconnected with any single political event or the impact of Chichen Itza on the region. It probably centers on the breakdown of the political and economic infrastructure that took place during and after the abandonment of the region. To reoccupy the Puuc and get the centers functioning again would have taken an organized effort led by a stable political and economic system. People could have reoccupied sites like EAC, but without the assistance of the state on a variety of levels and the ability to market their agricultural surplus it did not make social or economic sense. It is likely that the ultimate failure of the Maya to reoccupy this rich environment lies in the breakdown of the state or states that took place at the end of the Terminal Classic period. When the time came to return to EAC and the rest of the Puuc, we speculate that there was no infrastructure to assist in the reoccupation
and the people who once inhabited the Puuc probably remained in the northern plains trying to adapt to the Postclassic world that was centered there.

**Conclusions**

EAC is among the few Maya sites that offer the opportunity to understand abandonment at the household level, and unravel the political, economic, and environmental causes that contributed to regional abandonments across the Maya area at the close of the Terminal Classic period. There is no evidence of warfare or sudden natural disaster, and the EAC domestic inventories do not appear to be complete compared to those documented at other sites in Mesoamerica; yet the amount of valuable, portable material that was left behind suggests a planned, but hasty abandonment with an anticipated return. Combined data from the BRAP support the notion of a loosely centralized political economy, leading us to suggest something like a plantation system in which wholly or partially independent economic groups controlled tracts of agricultural land. During the Late–Terminal Classic period, the residents of EAC, who were perhaps wealthy farmers or landowners, thrived on their hilltop, just outside the urban core of Kiuic, until some combination of forces prompted them to abandon their homes late in the Terminal Classic.

**Acknowledgments**

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Stephanie R. Simms (Ph.D. candidate, Boston University) is conducting dissertation research centered on the EAC households and associated materials to document patterns of daily life activities and prehispanic Maya foodways. Specific techniques include the identification of phytoliths and starch grains recovered from sediments and artifact residues.

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Table 2 Frequencies of major artifact classes among floor assemblages from the six excavated buildings (including objects on outdoor terraces and excluding chipped stone tools).

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**Figure captions**

Figure 1 Map of the Maya area.

Figure 2 Plan view of the EAC hilltop with the residential North Group, simple habitational platform in the center (Platform-S2960E3275), and residential/civic-ceremonial South Group. Map by W. Ringle.

Figure 3 General view of the Bolonchén landscape.

Figure 4 Examples of reconstructed ceramic vessels. A) Chumayel red-on-slate jar; B) Muna bowl; and C) Tekit incised jar lid. Scale is 5 cm.

Figure 5 Floor assemblage in the central room of S2870E3225. A) North half of room; B) South half of room.

Figure 6 Discrete concentrations of broken ceramic vessels in S2955E3280.

Figure 7 Examples of personal adornments among the floor assemblages. A) Jadeite and limestone beads and a pendant from S2870E3260; B) Marine shell pendants from S2955E3280; C) Large jadeite bead from outside north room of S2870E3225; and D) Shell pendants from S2870E3260. Scale is 3 cm.
Figure 8 Plan view drawing of the investigated structures and floor assemblages in the northwestern patio group. From north to south: S2865E3225, S2870E3225 (vaulted residence), and S2880E3230. Grid squares measure 2 × 2 m each and represent the excavated area.

Figure 9 Plan view drawing of S2870E3260 and floor assemblage in the middle patio group of the North Group. Grid squares measure 2 × 2 m each and represent the excavated area.

Figure 10 Metates intentionally tipped on their sides in front of S2870E3260.

Figure 11 Lip-to-lip basins, shell pendant, and jar lid cached outside the northeastern corner of S2870E3260.

Figure 12 Plan view drawing of the investigated buildings and floor assemblages on the simple habitational platform in the center of the hilltop (Platform-S2960E3275). Grid squares measure 2 × 2 m and represent the excavated area.
Mano
Mortar/Metate 1
Metate 5
Metates 6, 7
Metate 4
Chert axes
Mano
Midden
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Midden
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