The 2018 Season of the Chan Chich Archaeological Project

EDITED BY

Brett A. Houk

Papers of the
Chan Chich Archaeological Project, Number 13
Department of Sociology, Anthropology, and
Social Work
Texas Tech University • Lubbock, Texas
2019

Chan Chich Archaeological Project
CCAP
Chan Chich, Belize - Central America

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WITH CONTRIBUTIONS BY

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Gregory Zaro

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Cover art: Red Relief Image Map of 500-x-500-m drone survey block in Gallon Jug. Map prepared by Mark Willis.

Acknowledgments

In 2018, the Chan Chich Archaeological Project (CCAP) completed its twelfth season of archaeological research, and, the Belize Estates Archaeological Survey Team (BEAST) conducted its fifth season of regional investigations. For the first time, our work did not include an archaeological field school; grant funding entirely supported the fieldwork and subsequent analyses.

I would like to thank Dr. John Morris of the Institute of Archaeology (IA) for supporting of our work and issuing us a permit to excavate at Chan Chich and at Gallon Jug. The other staff members at the IA provided assistance throughout the season, including George Thompson, Delsia Marsden, Josue Ramos, Antonio Beardall, and Melissa Badillo.

The 2018 season marked the third with funding from the Alphawood Foundation Chicago. Kristin Hettich, the program officer at Alphawood, has been tremendously helpful over the past three years, and the project is in her debt. I would also like to thank the board of directors of Alphawood for funding the project.

The project is also grateful to the Bowen family for allowing us to work at Chan Chich and at Gallon Jug. Alan Jeal, the general manager of Gallon Jug Ranch, has supported our work since 2012, when we renewed investigations at Chan Chich. He was a tremendous help in 2018, assisting us with lodging and meals at Gallon Jug. In addition to Alan, I would like to thank the staff of Gallon Jug Ranch for helping us with access, fuel, and many other matters. Rigoberto Alvarado deserves particular thanks for serving as our project foreman, coordinating pre-arrival clearing, and arranging for workers on the weekend. Marleny Lemus and Dunia Colindras worked tirelessly to host us at the Stable Lofts in Gallon Jug. Amit Dixit, the new manager at Chan Chich Lodge, and his staff kindly tolerated our presence in the Upper Plaza and on the veranda of the bar, which became our lunch spot at Chan Chich.

I would also like to thank Jeff Roberson and Alex Finkral of The Forestland Group (TFG) for allowing us to pass through Yalbac Ranch. Although we did not work on TFG lands in 2018, both gentlemen remained strong advocates for our research.

As always, we could not have accomplished anything without the assistance of our field and lab assistants. In 2018, we had 33 different assistants working in the field or lab at various times. They were Shianti Acosta, Fidel Alvarado, Mauricio Alvarado, Rigoberto Alvarado, Saul Alvarez, Samuel Bah, Oswaldo Bolaños, Julio Castillo, Alexis Cortez, Jose Cortez, Henry Estuardo, Emil Flota, Kimberly Garcia, Yazir Garcia, Justin Gomez, Edwin Gutierrez, Nohoman Guitierrez, Norman Guitierrez, Josue Hernandes, Israel Jones, Avelino Magaña, Renaldo Magaña, Joel Melara, Hipolito Moh, Leonardo Moh, Antonio Monroy, Hory Monroy, Lusbin Monroy, Eduardo Olivares, Feliciano Quetzal, Gary Romero, Roel Romero, and Wayne Tush.

The project staff in 2018 included Tomás Gallareta Cervera, Trudy Kilgore, Bridgette Degnan, Molly Masterson, Rachel Naasz, Tyler Seale, Cora Mikolajczyk, and Hannah Hughes. Anna Novotny did not join us in the field, but she analyzed our skeletal material back in Lubbock. Jackson Vaughn, armed with

an MA degree in Classics, joined us for the first part of the project and—instead of spending his summer brushing mosaics and Greek sculptures—got to learn what real archaeology is like. I would like to thank Fred Valdez and Lauren Sullivan for analyzing our ceramics. Finally, the authors of the chapters in this report deserve thanks for all their hard work.

Guns up!

Brett A. Houk, April 29, 2019

2018 CCAP staff at "the escarpment" overlooking the BEAST permit area on Hawaiian Shirt Wednesday in a totally candid, unplanned photograph. From left to right: Tomás Gallareta Cervera, Rachel Naasz, Cora Mikolajczyk, Molly Masterson, Hannah Hughes, Brett A. Houk, Bridgette Degnan, and Tyler Seale. Not pictured: Trudy Kilgore and Jackson Vaughn.

An Introduction to the 2018 Season of the Chan Chich Archaeological Project and the Belize Estates Archaeological Survey Team

Brett A. Houk

Texas Tech University's (TTU) Chan Chich Archaeological Project (CCAP) and its regional component, the Belize Estates Archaeological Survey Team (BEAST), operate in the tropical forest of northwestern Belize in a large permit area covering approximately 144,000 acres. The CCAP completed its twelfth season of research in 2018, which, for the first time, did not include an archaeological field school. BEAST has been in operation since 2013. This report presents the preliminary results of the 2018 season. This chapter covers the usual project minutia (dates, staff, permits, funding, and so on) and provides brief summaries of the 2018 project activities, which included excavations at Chan Chich and Gallon Jug and community outreach.

PERMIT AREA

As established by the Institute of Archaeology (IA) in June 2014, the CCAP and BEAST permit comprises Gallon Jug Ranch, Laguna Seca Ranch, and the northwestern corner of Yalbac Ranch, an area of roughly 144,000 acres of land in northwestern Belize (Figure 1.1). Houk and Zaro (2014) discuss the sale of a large portion of Gallon Jug Ranch to The Forestland Group, which affected in the final configuration of the permit area. The area includes 18 numbered Belize Estate (BE) sites. CCAP and BEAST conducted archaeological work at two of the 18 sites in 2018—Chan Chich (BE-1) and Gallon Jug (BE-4).

PROJECT TIME LINE, STAFF, AND CONSULTANTS

The fieldwork phase of the summer session of the project began on May 22, 2018, with the arrival of the project staff (Table 1.1). For the first time, the project based in Gallon Jug Ranch, using the ranch's Stable Lofts for lodging, meals, and lab space. The staff unpacked the lab and field equipment, secured the excavation permit, and made preliminary visits to the planned excavation areas before commencing excavations on May 25. The project staff completed field excavations and backfilling by June 25 at both sites and attended the Belize Archaeology Symposium from June 26 to June 30. Gertrude Kilgore departed the project on June 30 to join the University of Texas at San Antonio's project in the Belize River Valley. The rest of the project staff returned to Gallon Jug to conduct lab analysis, inventory equipment, and pack the lab from June 30 to July 6. The field component of the 2018 field season ended on July 7 with the departure of the project staff from Gallon Jug Ranch.

Houk, Brett A.
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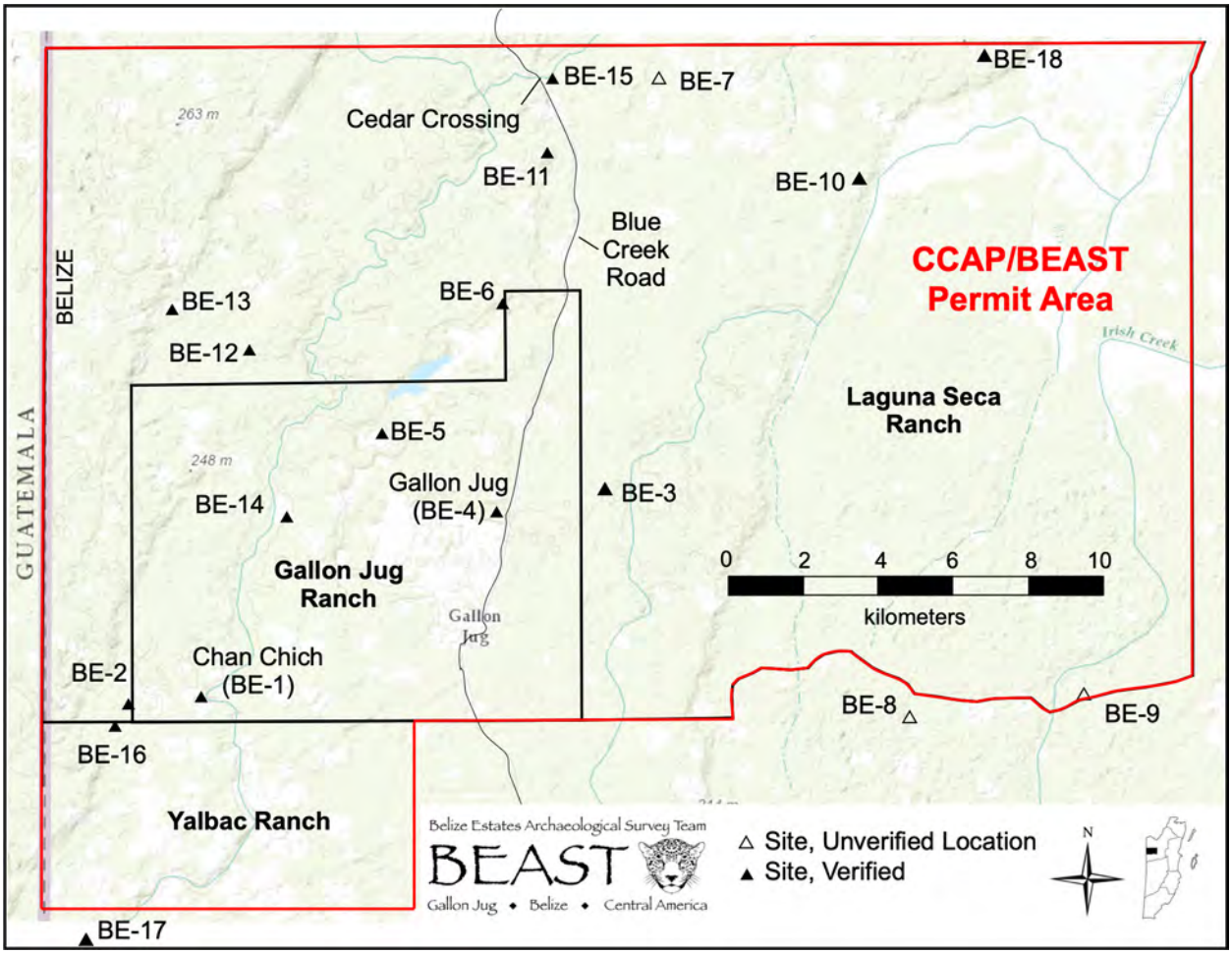

Figure 1.1. Map of the CCAP/BEAST permit area showing the locations of Chan Chich (BE-1) and Gallon Jug (BE-4).

Table 1. List of Project Staff and Consultants, Summer 2018

Name	Role	Affiliation	Arrival	Departure
Dr. Brett A. Houk	Project Director	TTU	5-22-18	7-7-18
Dr. Tomás Gallareta Cervera	Operation Director	Kenyon College	5-22-18	7-7-18
Hannah Hughes	Lab Director	TTU	5-22-18	7-7-18
Bridgette Degnan	Operation Director/ Suboperation Director	University of Virginia	5-22-18	7-7-18
Gertrude Kilgore	Operation Director	University of Kentucky	5-22-18	6-30-18
Molly Masterson	Suboperation Director	Hood College	5-22-18	7-7-18
Cora Mikolajczyk	Suboperation Director	TTU	5-22-18	7-7-18
Rachel Naasz	Suboperation Director	TTU	5-22-18	7-7-18
Tyler Seale	Field Archaeologist	TTU	5-22-18	7-7-18
Dr. Lauren A. Sullivan	Assistant Project Ceramicist	UMASS-Boston	7-3-18	7-3-18
Dr. Fred Valdez, Jr.	Project Ceramicist	UT-Austin	7-3-18	7-3-18

PROJECT FUNDING AND PERMITTING

The 2018 season marked the third year of an initial 3-year grant from the Alphawood Foundation of Chicago. The Alphawood grant to TTU supported all of the costs associated with fieldwork and analysis.

The IA, part of the Belizean National Institute of Culture and History, issued Permit No. IA/H/2/1/18(12) to Houk for the excavations at Chan Chich and Gallon Jug. At the time the permit was issued, Dr. John Morris served as Director of the IA. The landowners of Gallon Jug Ranch and Laguna Seca Ranch also gave permission for the research.

AN OVERVIEW OF THE 2018 SEASON

In 2018, our efforts targeted three objectives. At the site of Chan Chich, Tomás Gallareta Cervera directed the third season of Alphawood-funded research in the Upper Plaza (Operation [Op] CC-15) and Bridgette Degnan continued her work at the North Plaza to explore lithic production locales (Op CC-18). Gertrude Kilgore supervised test excavations at the minor ceremonial center of Gallon Jug under the BEAST research flag (Op GJ-01).

Investigations at Chan Chich (CCAP)

During the 6-week long summer field season, the project focused its efforts on Op CC-15, a continuation of 2016 and 2017 research at the Upper Plaza, and Op CC-18, a continuation of 2017 research at an epicentral lithic workshop at Structure A-6 and the eastern side of the North Plaza (Figure 1.2). The first, Op CC-15, built on the 2016 and 2017 excavations in the Upper Plaza and was the third of three planned seasons of research at the group. In 2017, the CCAP targeted a suspected lithic workshop located at Structure A-6 (Op CC-18)—part of a larger interest in lithic production at the site going back to 1998 (see Houk and Zaro 2015; Meadows and Hartnett 2000) and including proposed future work at debitage deposits in Group B—to examine issues of stone tool production just outside the Main Plaza at the site (Degnan 2018; Degnan et al. 2017). In 2018, we returned to Op CC-18 to expand our understanding of the lithic production area.

Continued Investigations in the Upper Plaza (Op CC-15)

The Upper Plaza (Figure 1.3) has been an area of interest for the CCAP since the project's inception. Home to the largest and tallest buildings at the site and situated in the center of the monumental precinct, the Upper Plaza houses the oldest known occupation at the site. During the initial seasons of research, the CCAP excavated Tomb 2 (Houk et al. 2010), portions of Structure A-1 (Robichaux 1998, 2000; Robichaux et al. 2000), and the summit of Structure A-13 (Robichaux 2000). With the resumption of operations in 2012, the CCAP conducted remote sensing in the Upper Plaza (Walker 2012), documented Structure A-15 and its looters' trenches with Structure from Motion (SfM) mapping (Willis et al. 2014), produced an instrument-based contour map of the Upper Plaza (Willis et al. 2017), and conducted additional excavations in the plaza and on some of its surrounding structures (Gallareta Cervera et al. 2017; Herndon et al. 2014; Houk 2016; Kelley 2014; Kelley et al. 2012, 2013). Since 2016, a primary goal of our work in the Upper Plaza has been creating a detailed construction chronology for the plaza and its surrounding structures through an aggressive program of radiocarbon dating. Concurrently, we are studying the development of the group as the seat of political power for the community following the burial of a divine king in Tomb 2, ca. AD 250.

As discussed by Gallareta Cervera and colleagues in Chapter 2 of this volume, in 2018 we completed the final of three planned

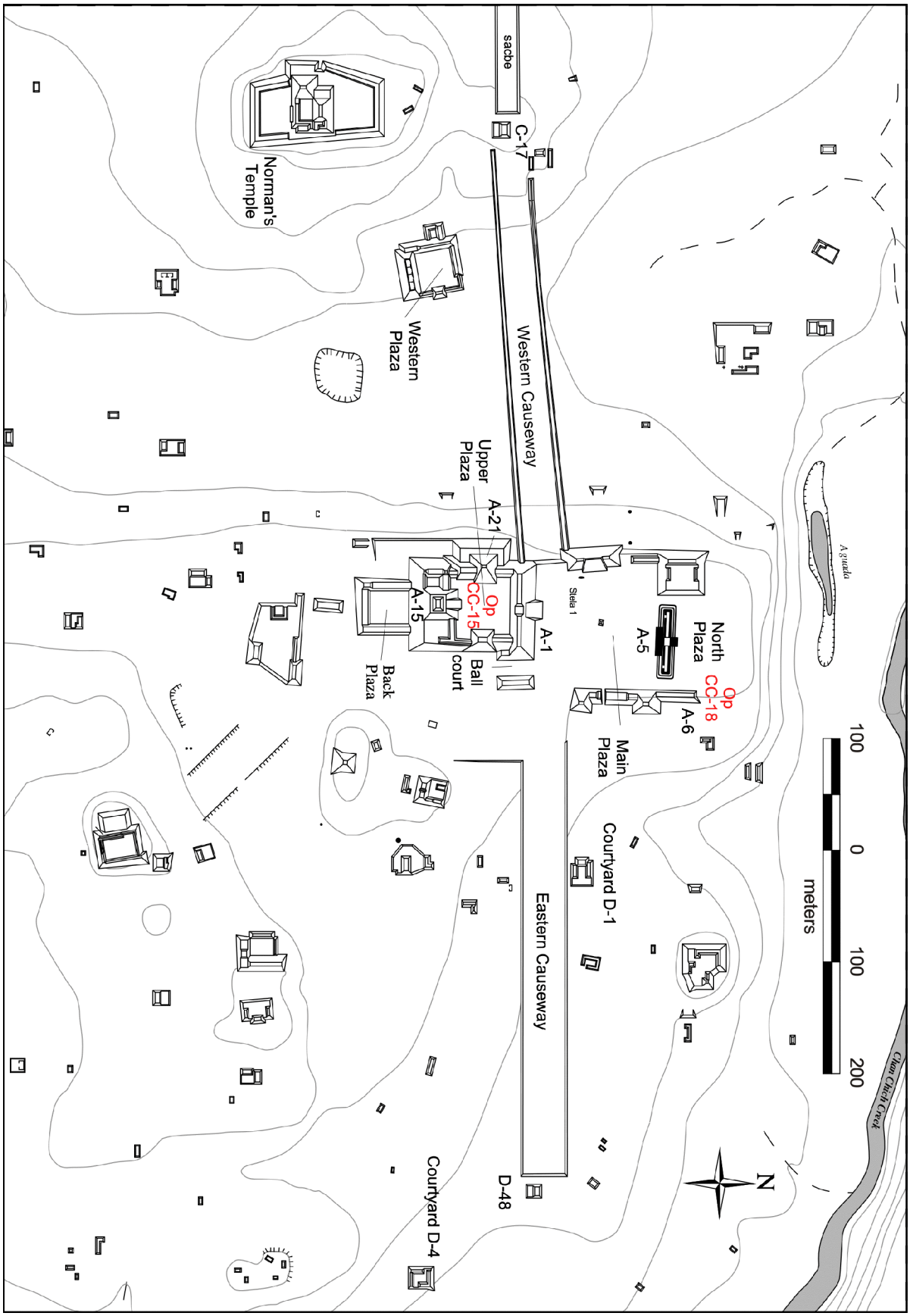

Figure 1.2. Map of Chan Chich with the Upper Plaza (Op CC-15) and the North Plaza (Op CC-18) research areas highlighted.

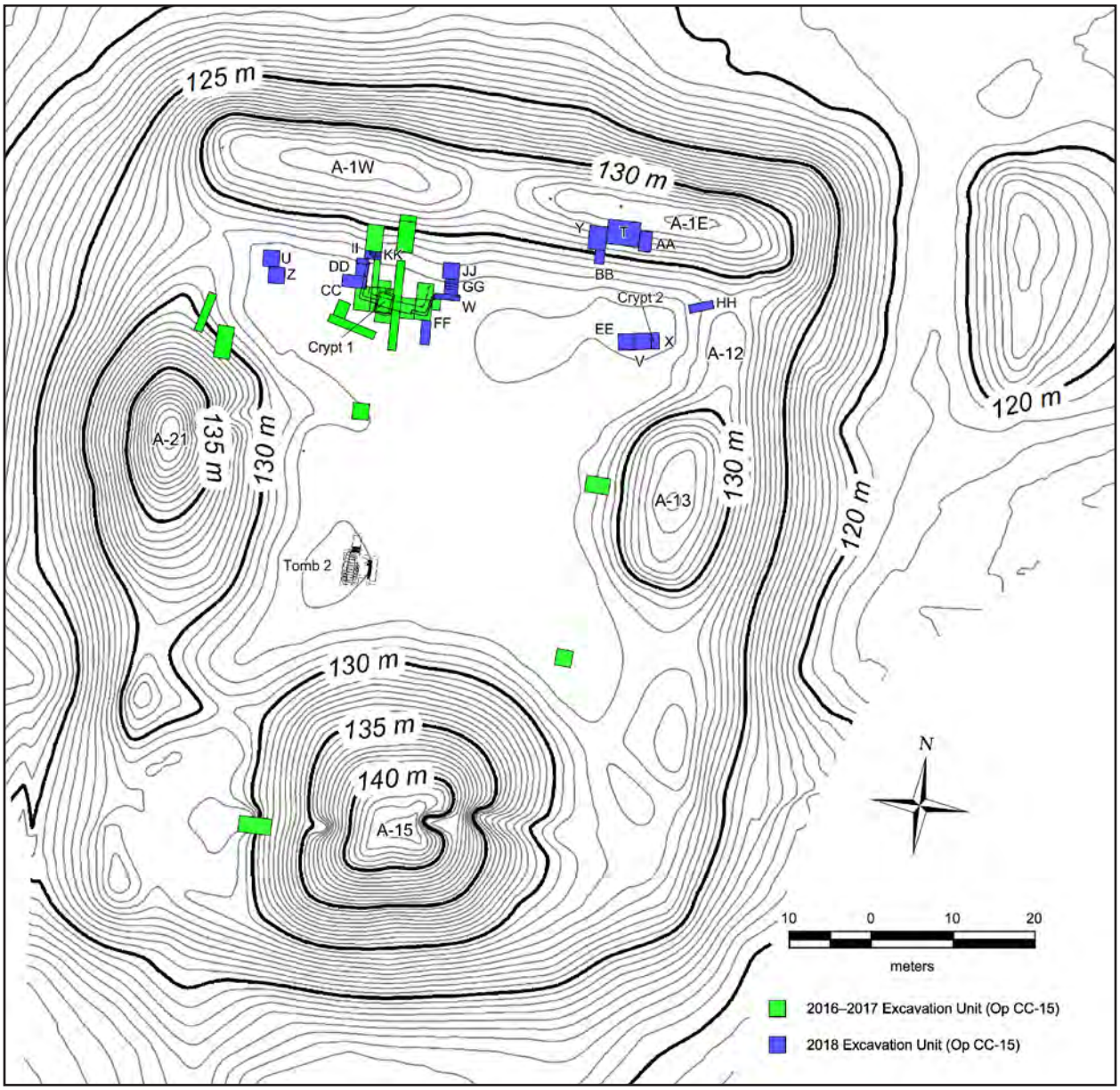

Figure 1.3. Contour map of the Upper Plaza showing 2016–2018 excavations (Op CC-15).

seasons of work targeting those questions. Our investigations included additional chronological test pitting in the northeastern and northwestern corners of the plaza; additional investigations to clarify the age and form of Blanca, a Preclassic platform, which was truncated in antiquity; and excavations of two rooms on the summit of Structure A-1.

A significant achievement of the three seasons of work in the Upper Plaza has been the large number of radiocarbon samples collected and analyzed. Between 2016 and 2018, we generated 65 AMS dates on charcoal and bone from a wide range of contexts in the plaza and from its surrounding structures. All 65 dates except for Sample CC-15-S092 (PSUAMS# 2748), which is likely from pre-settlement carbon incorporated into fill with its 3335–3033 cal. BC age range, are plotted on Figures 1.4–1.7. While constructing a high-precision Bayesian chronology of the Upper Plaza sequence remains a goal, at this

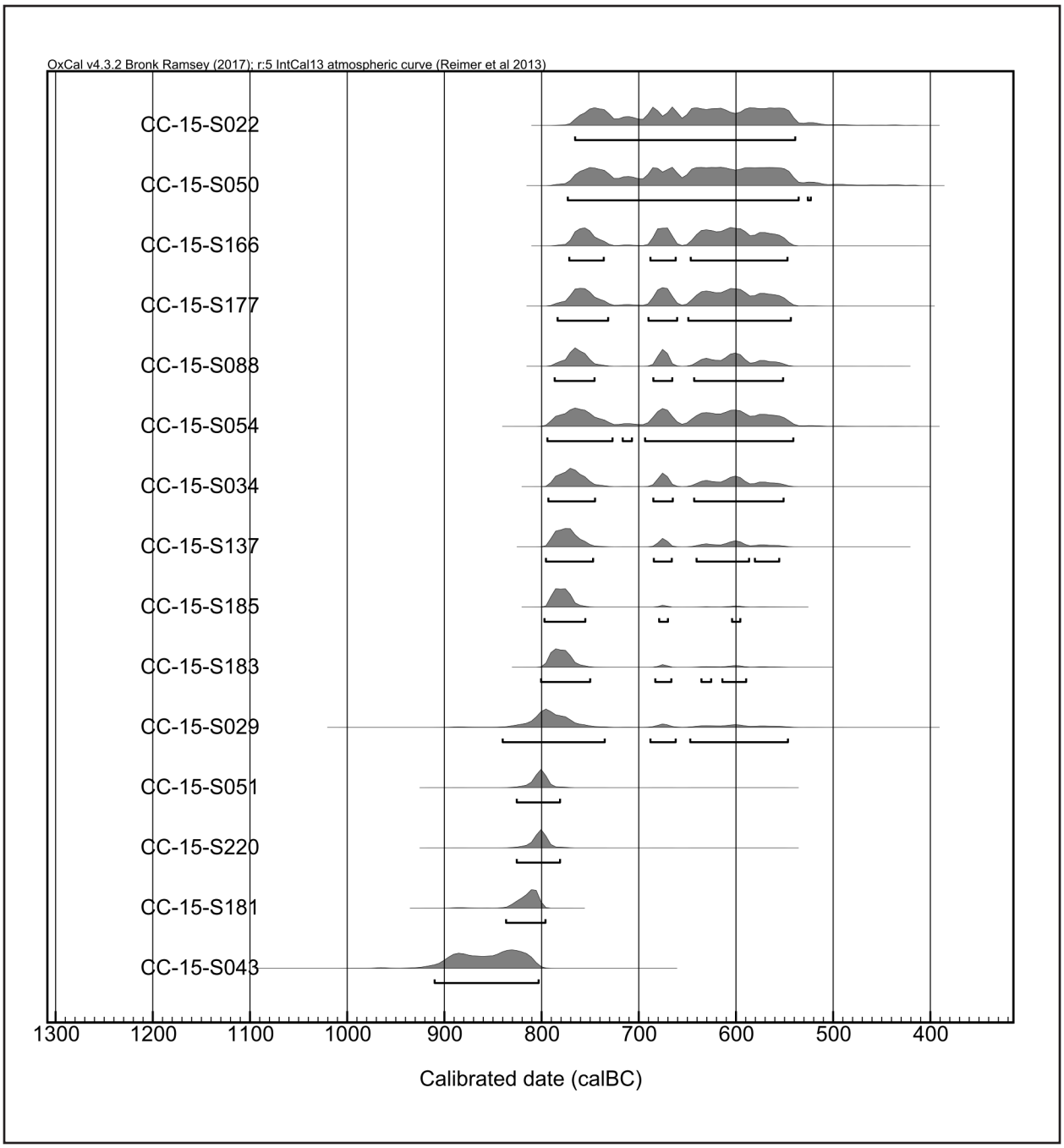

Figure 1.4. Plots of Middle Preclassic radiocarbon dates from the Upper Plaza, part 1, from the 2016 to 2018 seasons.

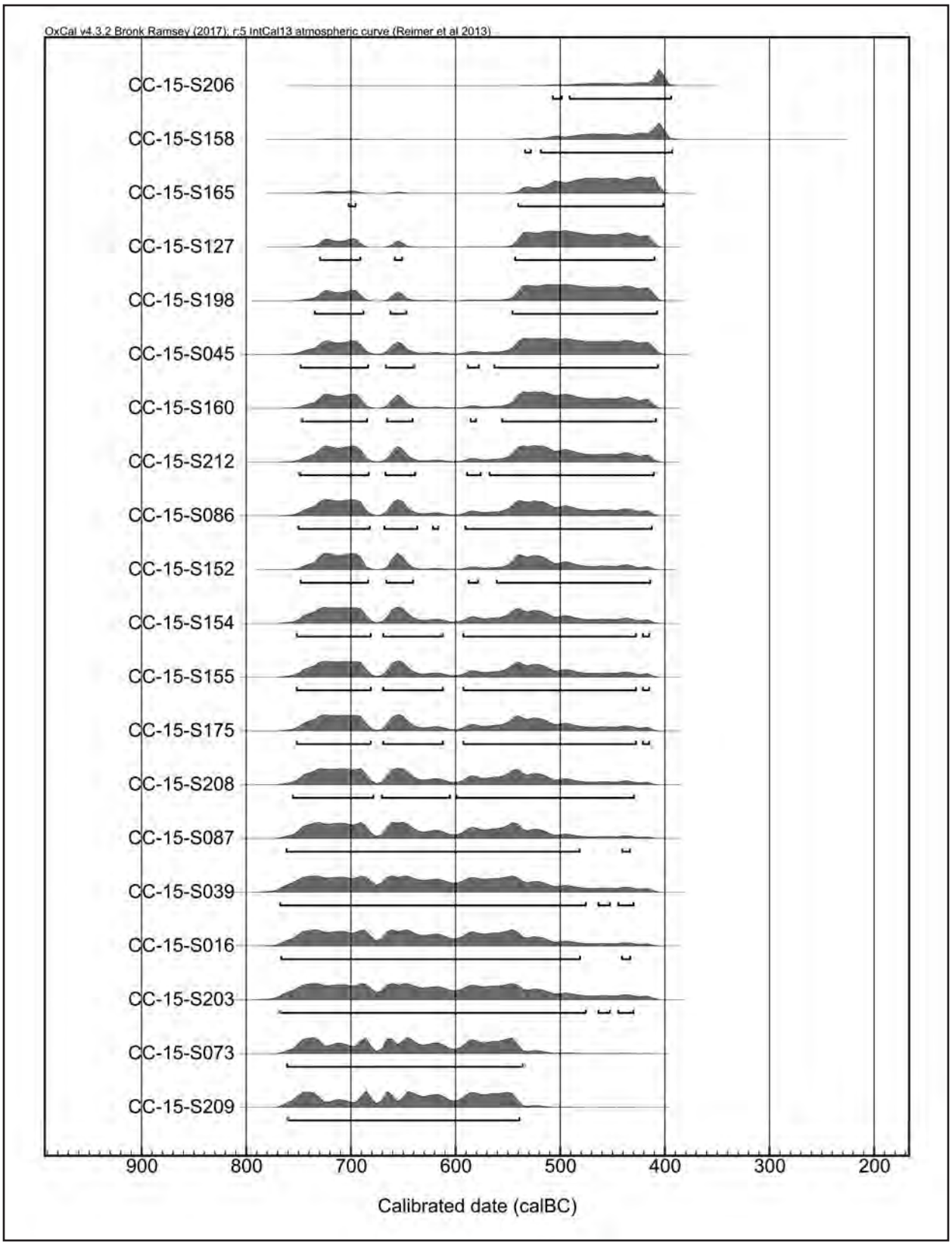

Figure 1.5. Plots of Middle Preclassic radiocarbon dates from the Upper Plaza, part 2, from the 2016 to 2018 seasons.

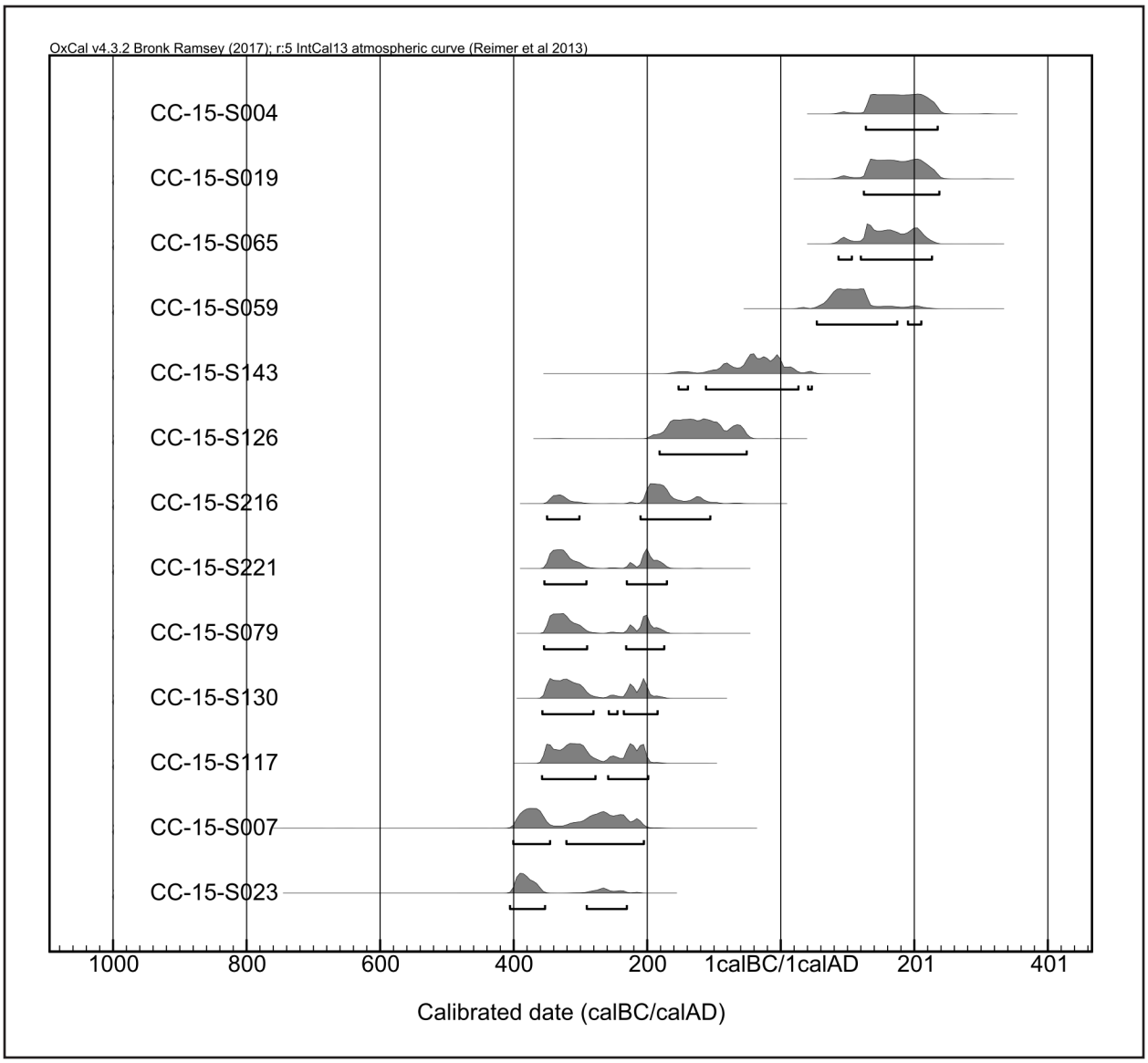

Figure 1.6. Plots of Late and Terminal Preclassic radiocarbon dates from the Upper Plaza from the 2016 to 2018 seasons.

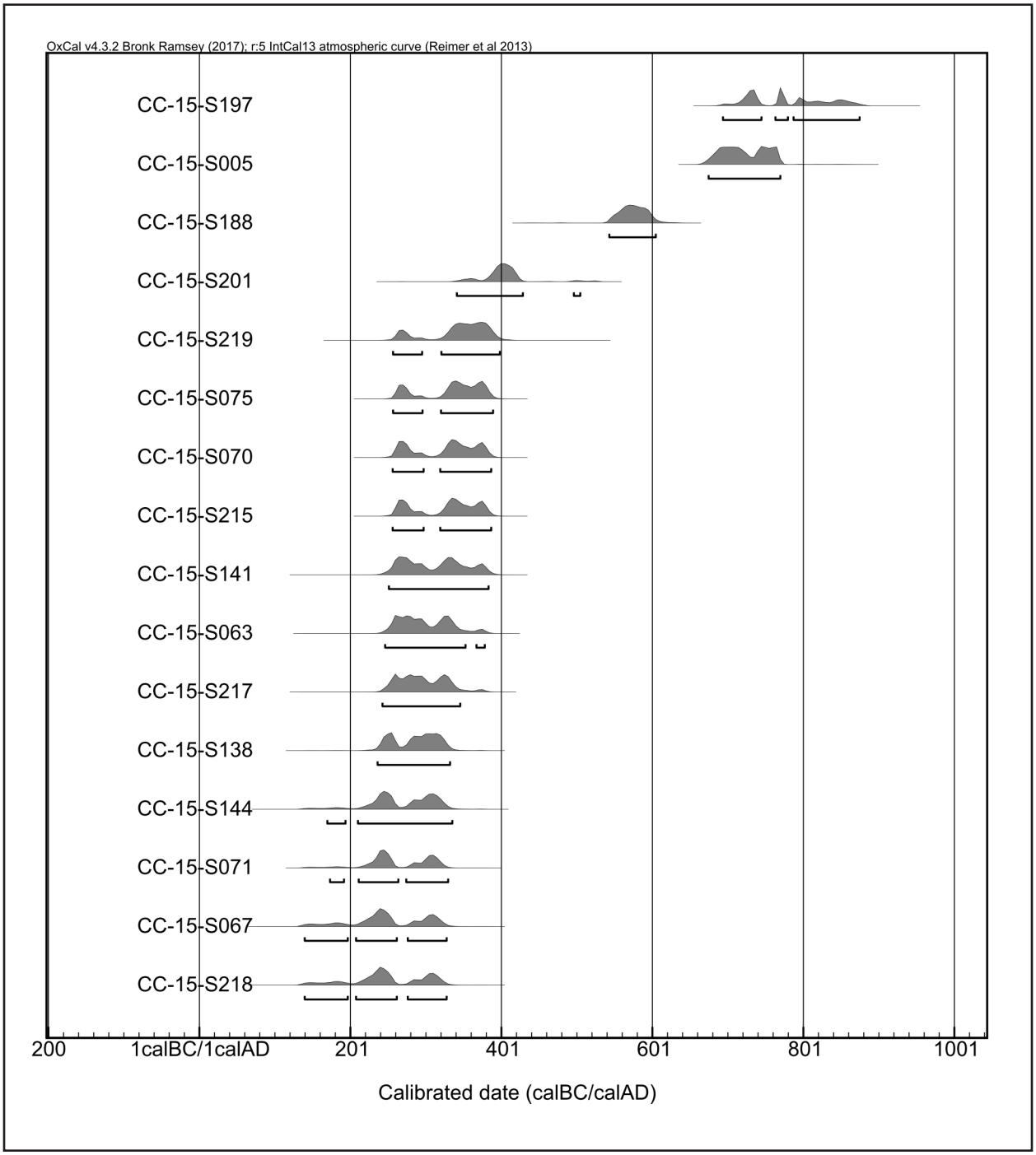

Figure 1.7. Plots of Early and Late Classic radiocarbon dates from the Upper Plaza from the 2016 to 2018 seasons.

preliminary stage the data clearly demonstrate initial occupation of the hilltop upon which the plaza was constructed during the early Middle Preclassic period, with substantial activity in the Late and Terminal Preclassic periods. One of the more exciting discoveries from the past three seasons has been the verification of Early Classic activity in the plaza, confirmed by both AMS dates (see Figure 1.7) and ceramics. For years, our excavations failed to identify Early Classic features, but Gallareta Cervera and colleagues (2017, this volume) encountered Early Classic construction activity and burials (Figures 1.8 and 1.9) in the northern part of the Upper Plaza, including Crypt 1, which appears to contain an Early Classic royal interment (see also Novotny et al. 2017, this volume). For now, Early Classic monumental antecedents to the Late Classic buildings surrounding the plaza remain elusive, and only trenching excavations are likely to remedy that.

As described by Gallareta Cervera and colleagues in Chapter 2, the excavations on the summit of Structure A-1's eastern building, known as Structure A-1E, exposed portions of two rooms on the southern face of the mound. While other teams had previously exposed rooms on Structure A-1W (Herndon et al. 2014; Robichaux 2000), our 2018 investigations discovered benches for the first time on the Structure A-1. Curiously, one of the benches—in the western room—appears to have been looted in antiquity. Additionally, excavations in the western room revealed graffiti on the

Figure 1.8. The first look at the interior of Burial CC-B20's crypt came from an iPhone lowered through the capstones. Facing southwest, this photograph shows vertebrae, ribs, and the skull, with black roots in the foreground.

Figure 1.9. The skeletal elements from Burial CC-B20 are unusually well-preserved for a burial from Chan Chich, as this photograph in the field laboratory demonstrates.

northern wall, which Gallareta Cervera and colleagues describe in Chapter 2 (Figures 1.10 and 1.11).

The renewed excavations in the north-central portion of the Upper Plaza exposed more of the truncated early Late Preclassic platform known as Blanca. Importantly, Gallareta Cervera's team was able to bracket Blanca's construction to later than cal 768–431 BC (Sample CC-15-S203, PSUAMS# 203)—the age of the floor below Blanca—and its truncation to before cal 154 BC–AD 47 (Sample CC-15-S143, PSUAMS# 2977) when the Maya interred Burial CC-B17 in the fill above the buried platform (Gallareta Cervera et al., this volume). Thus, it appears the Maya constructed, used, and demolished the building in the span of time between the late Middle Preclassic and Late Preclassic periods.

Investigations at the Structure A-6 Lithic Workshop (Operation CC-18)

In 2017, Bridgette Degnan, Kevin Miller, and Brett A. Houk (2017) investigated Structure A-6 and a nearby debitage deposit to test the hypothesis that the Maya used Structure A-6 as a lithic tool workshop (see Figure 1.2). Degnan (2018) used the data from the excavations and her analysis of the recovered debitage as the basis for her undergraduate honors thesis at the University of Virginia.

Our 2017 investigations determined that Structure A-6 was a low platform with

Figure 1.10. Tomás Gallareta Cervera and Bridgette Degnan inspect graffiti on the north wall of one of the rooms on Structure A-1E at night using controlled lighting conditions.

Figure 1.11. Tomás Gallareta Cervera and Bridgette Degnan attempt to document graffiti on the north wall of one of the rooms on Structure A-1E using a flatbed scanner.

rather crude construction and no masonry superstructure (Degnan et al. 2017). Abundant chert and chalcedony debitage on the summit of the platform confirmed that the area had been the site of stone tool production in the Late/Terminal Classic period. Three 1-x-1-m test units tested the debitage deposit north of Structure A-6 and determined that it ranges from 30 to 50 cm thick. Degnan's (2018) analysis of the debitage concluded that artisans at Structure A-6 produced oval bifaces from locally available chert and chalcedony, starting with blanks that they or others had roughly shaped at an unknown procurement site. This initial shaping removed large decortication flakes, and small flakes with less than 25 percent cortex dominated the debitage assemblage from Structure A-6 and the nearby debitage deposit (Degnan 2018; Degnan et al. 2017).

In 2018, we expanded our investigations at the North Plaza to determine if there was evidence of lithic production activity off of the Structure A-6 platform and to establish the northern limit of the debitage deposit. Degnan (Figure 1.12) supervised a small crew and excavated two additional 2-x-2-m units to investigate the first question, and Houk systematically probed the debitage deposit using a posthole digger to determine how far north the debitage deposit extends (Degnan and Houk, this volume). Degnan subsequently analyzed the debitage from the new excavations, and Houk examined the stone tools.

Based on their new excavations, Degnan and Houk (this volume) conclude that lithic tool production activities occurred in the eastern

Figure 1.12. Bridgette Degnan, Op CC-18 director, drawing a profile in the Upper Plaza on an iPad Pro during the 2018 season.

part of the North Plaza as well as on Structure A-6 during the Late Classic period. The data tentatively support the hypothesis that the Structure A-6 platform and the newly tested area were part of a Late Classic marketplace, which likely occupied the North Plaza. Additionally, they conclude that the flint knappers using the northeastern part of the plaza and Structure A-6 as workshops kept their work spaces relatively clean and dumped their debitage along the eastern edge of the plaza, creating the large debitage deposit covering minimally 585 m^2 (Degnan and Houk, this volume). Using debitage density data collected from test pits in 2017, Degnan and Houk estimate that the debitage deposit resulted from the production of at least 133,000 bifaces.

As part of the overall examination of lithic production at Chan Chich, Degnan (2018) reanalyzed three column samples from Group H, Debitage Deposit 1, which Meadows and Hartnett (2000) collected in 1999. Her comparison of the Group H debitage to that from the North Plaza deposit reveals that that knappers at both locales reduced primarily decorticated blanks, which had been partially reduced elsewhere, made on locally sourced chalcedony and chert cobbles. The Group H knappers produced a wider range of tool types and engaged more frequently in tool maintenance activities than did their North Plaza counterparts, who appeared to have specialized in oval biface production. The low failure rate of preforms at the North Plaza tentatively suggests that the artisans working at the epicentral workshop were more skilled than those at the rural workshops in Group H (Degnan and Houk, this volume).

Excavations at Gallon Jug (BE-4)

One of the overarching goals of BEAST is to clarify the relationship between the paramount site of Chan Chich and the surrounding settlements. In 2018, we initiated investigations at the site of Gallon Jug, which is located in tropical broadleaf forest, just north of the cleared pastures of Gallon Jug Ranch (see Figure 1.1). The detailed report on the 2018 season is not yet available, and only a very brief summary is presented here. Thomas Guderjan's teams first mapped the ruins and conducted limited testing in 1990 (Guderjan et al. 1991; Yaeger 1991). The site's tallest structure is a 15-m high temple-pyramid on the east side of an irregularly shaped, east-west plaza (Figure 1.13). Guderjan's crew mapped the plaza and a number of courtyard groups surrounding it and excavated six 1-x-1-m test pits to collect chronological information. While all the test pits encountered Late Classic ceramics in construction fill, the units on the western side of the plaza also recovered Late Preclassic materials (Guderjan et al. 1991). David Sandrock (2017) later reported a small stela near the northern range structure at the site during a reconnaissance visit in 2013.

During our clearing and inspection of the plaza in 2018, the crew, supervised by Gertrude Kilgore, discovered a second, extremely eroded stela and a possible altar. On an inspection visit to the site, Houk subsequently discovered a third stela near the eastern end of the plaza, atypically hanging about 1 m off the ground, wrapped in the roots of a fallen tree. A group of limestone rocks may be a fourth stela, but this conclusion is highly tentative (see Figure 1.13).

The initial excavations conducted in 2018 included units on monuments to look for caches and plaza test pitting to establish the chronology of the site and look for buried Late Preclassic structures. Generally, the excavations encountered bedrock less than 1 m below modern ground surface.

While none of our monument excavations encountered caches or Late Preclassic

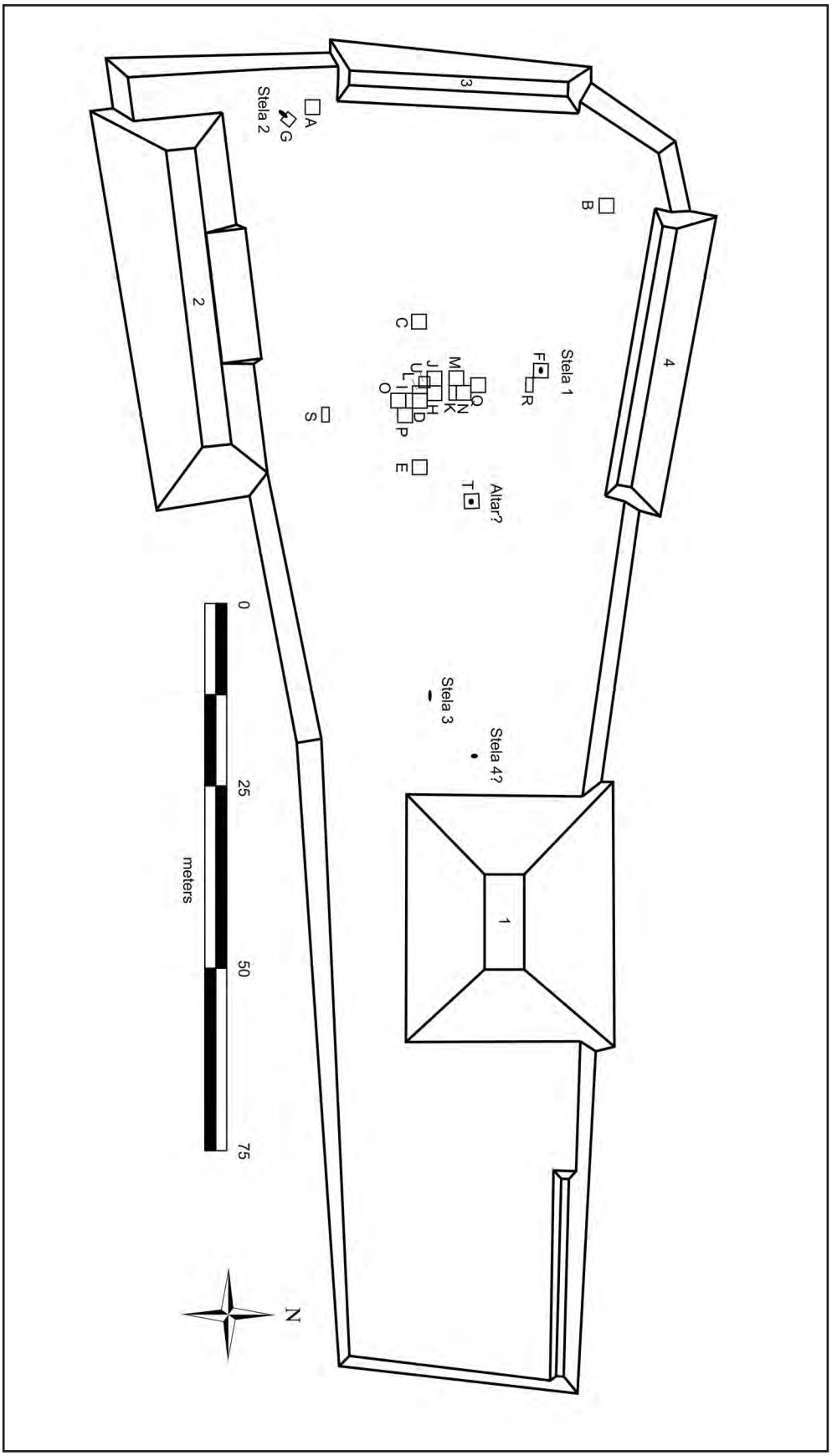

Figure 1.13. Map of Gallon Jug site core showing locations of 2018 excavations and stone monuments (after Guderjan et al. 1991:Figure 40).

structures, a test unit in the center of the plaza uncovered a buried platform, dubbed Esperanza by excavators (Figure 1.14), prompting additional excavations to document the feature. The portion of Esperanza exposed by our excavations runs 13 m north-south, faces east, and actually comprises two large platforms abutting one another and a third lower platform extending to the east. The two large platforms meet near the center of our excavation block; at the junction, the orientation of Esperanza's eastern face changes by approximately 12 degrees and a plastered, ramp-like feature juts to the east/northeast (Figures 1.15 and 1.16). A lower platform, comprising only one course of facing stones, is south of the ramp-like feature, at a different orientation and extending farther to the east. Our excavations did not determine its eastern extent.

The ramp and platforms are made of cut limestone blocks placed directly on bedrock, suggesting that bedrock served as the original occupational surface in this part of the plaza. In places, the northern platform comprises three courses of stone, preserved to approximately 65 cm high. Our preliminary assessment is that Esperanza dates to the Early Classic period, but this conclusion is based on a small sample of ceramics recovered from within the northern platform. The fill cover Esperanza and bedrock east of it dates to the Late Classic period, based on ceramics.

Figure 1.14. Molly Masterson (left) and Rachel Naasz plan mapping Esperanza on an iPad Pro in the field. Note the ramp-like feature, which was partially damaged by the original test pit excavations.

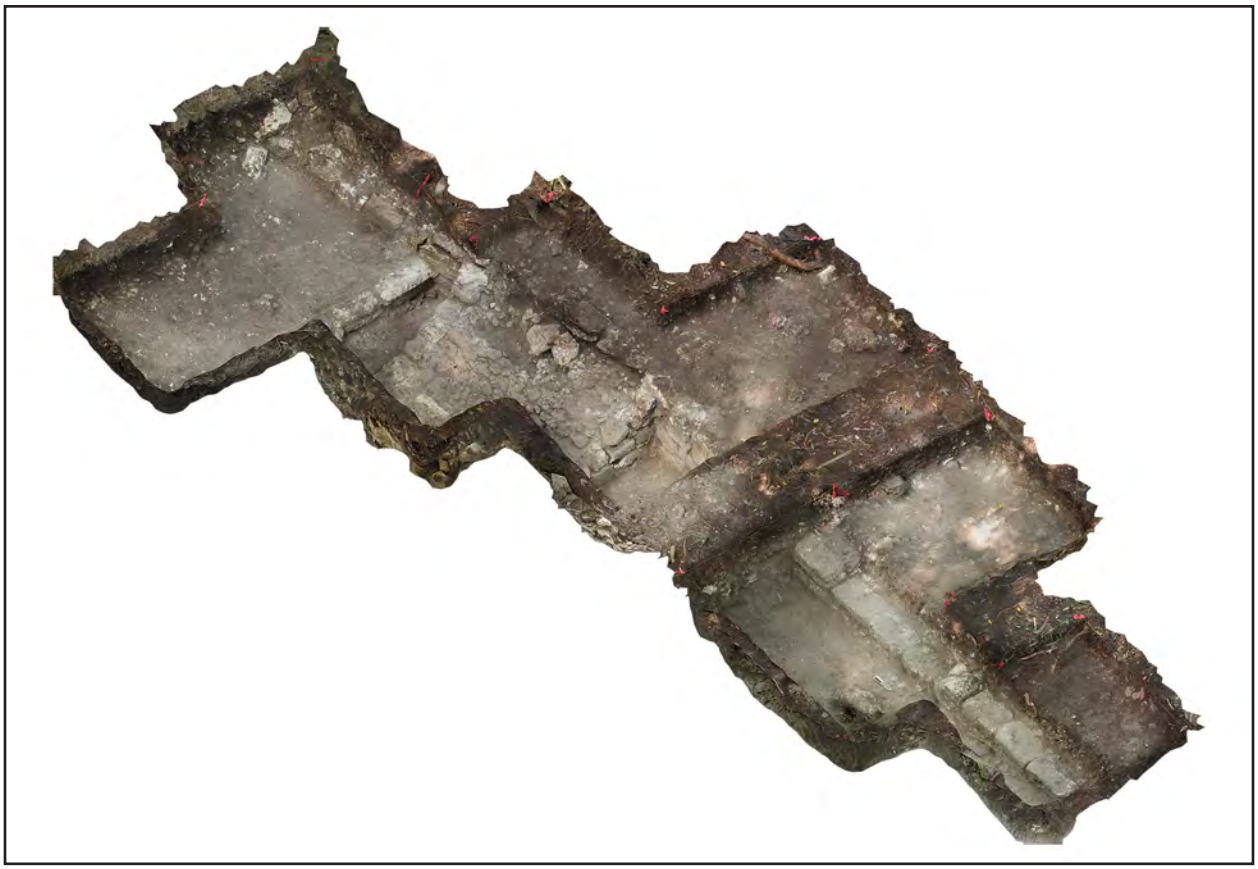

Figure 1.15. Orthomosaic of the Esperanza structure. Perspective view to the southwest. From north to south, the excavation area is 13 m long.

While the buried monumental platform offers future research possibilities, the courtyards surrounding Gallon Jug provide the opportunity to pursue household-related topics. Socio-political processes are predicated on daily activities enacted in and around residential dwellings as well as community-building events conducted in association with civic-ceremonial architecture. At the moment we do not understand the relationship between the development of centralized political authority at Chan Chich during the Preclassic and Classic periods and the daily lives of Maya people living in regional settlements. Identifying the construction history and activity areas of the settlement group will extend our knowledge about how political centralization affected outlying populations. Burials are often encountered in residential structures, which can help clarify regional mortuary practices and shed light on the health and mobility of the wider population. In 2018, workers cleared a small courtyard group on the trail from the Blue Creek road to the plaza at Gallon Jug. Given its size, accessibility, and condition, this courtyard is an excellent candidate for examining household-related topics, and we plan to pursue excavations there in 2019.

COMMUNITY OUTREACH AND ENGAGEMENT

As part of our public outreach, CCAP staff sponsored an archaeology program at Casey Community School in Gallon Jug on May 29, 2018 (Figures 1.17 and 1.18). The children at the school all live in Sylvester Village or in staff housing at Chan Chich Lodge, and many of their parents work for the project as excavators on the weekends. In addition to a

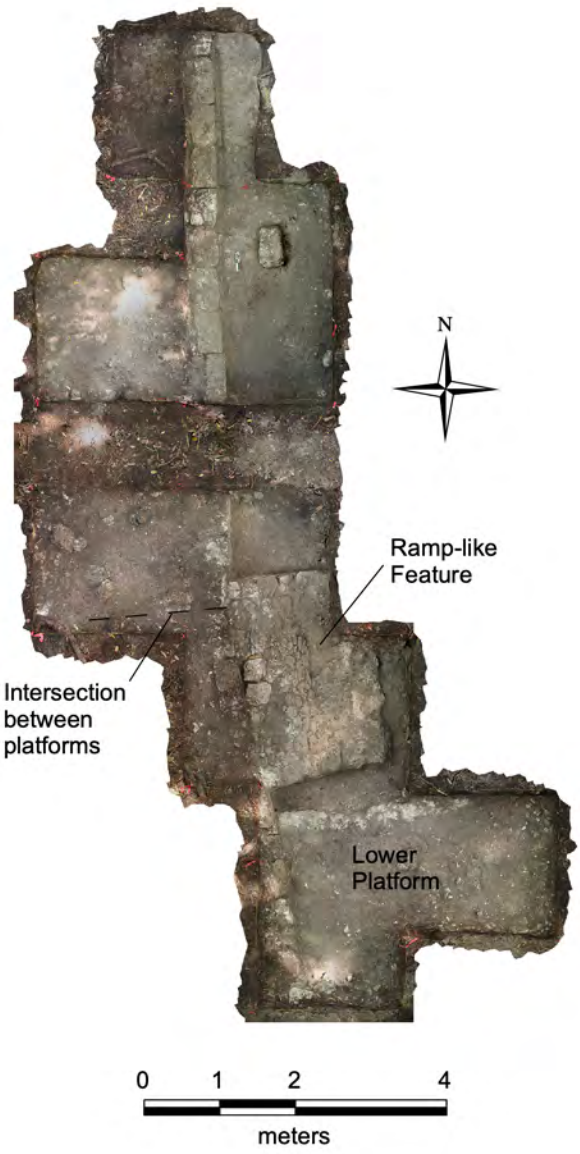

Figure 1.16. Orthomosaic plan view of Esperanza structure. Note the change in orientation just north of the ramp.

Figure 1.17. CCAP staff Gertrude Kilgore (center) and Tomás Gallareta Cervera (left) show artifacts excavated by the project to students and teachers.

Figure 1.18. Casey Community School students examine artifacts and listen to the staff's presentation.

hands-on artifact display, the staff distributed activity books to the children. Gertrude Kilgore and Claire Novotny (this volume) designed the books, and the project printed them using funds from Alphawood Foundation.

ORGANIZATION OF THIS VOLUME

Gallareta Cervera and colleagues present a summary of the 2018 Upper Plaza investigations in Chapter 2. Degnan and Houk describe the results of additional work in Op CC-18, including new excavations and additional artifact analysis examining lithic production in the North Plaza in Chapter 3. In Chapter 4, Anna Novotny and colleagues describe the bioarchaeological analysis of skeletal material recovered from the Upper Plaza in 2018. Houk, Mark Willis, and Gregory Zaro revisit the 2016 drone survey of Gallon Jug's pastures (Willis 2016) to identify ancient Maya structures visible in the enhanced imagery in Chapter 5. We include a copy of Kilgore's and Novotny's activity book as Chapter 6. Finally, Chapter 7 includes updated project lists.

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The 2018 Investigations in the Upper Plaza at Chan Chich, Belize

Tomás Gallareta Cervera, Bridgette Degnan, Cora Mikolajczyk, Tyler Seale, Molly Masterson, and Rachel Naasz

From 1997 to 1999, the CCAP conducted excavations in the Upper Plaza on Tomb 2 (Houk et al. 2010), Structure A-1 (Robichaux 1998, 2000; Robichaux et al. 2000), and Structure A-13 (Robichaux 2000), but only the Tomb 2 excavations were intensive. Since resuming operations in 2012, the CCAP has spent five seasons prior to 2018 investigating the Upper Plaza through remote sensing work (Walker 2012), Structure from Motion (SfM) mapping (Willis et al. 2014), and excavations (Gallareta Cervera et al. 2017; Herndon et al. 2014; Houk 2016; Kelley 2014; Kelley et al. 2012, 2013). In 2016, the CCAP began a three-year project in the Upper Plaza designed to answer a range of questions raised by previous investigations, and the Upper Plaza investigations are a major component of the 2016–2018 research agenda funded by the Alphawood Foundation. A primary focus of the renewed research is to establish a detailed construction chronology for the plaza and its surrounding structures by establishing a high-precision Bayesian chronology of the plaza development from bedrock to the modern ground surface. Related to this aim is the goal of understanding the development of the royal acropolis and its dynastic architecture subsequent to the establishment of a royal dynasty at the site ca. AD 150–250 and to examine how architecture reflects the evolving relationship between a political organization (i.e., divine kingship) and monumental construction.

In 2018, Tomás Gallareta Cervera directed the Upper Plaza investigations with assistance from Suboperation (Subop) Directors Bridgette Degnan, Cora Mikolajczyk, and Tyler Seale. Project Director Brett A. Houk assisted with planning and interpretations throughout the field season. A crew of hired workers and the project staff conducted the excavations. Near the end of the season, Molly Masterson and Rachel Naasz assisted with excavations and recording.

SUMMARY OF 2016 AND 2017 FIELD SEASON EXCAVATIONS

Valorie Aquino directed excavations in the Upper Plaza in 2016, and Houk (2016) summarized her findings. Under Operation (Op) CC-15, Aquino's crews excavated four suboperations and one suboperation extension to investigate a suspected buried platform first documented by Kelley (2014) in the northern part of the plaza and three more suboperations focused on chronology building (Houk 2016). Pertinent to the 2017 and 2018 investigations are Aquino's Subops CC-15-A and -G, which she placed in the northern part of the plaza to explore the poorly understood construction sequence and possible buried platform. As Houk (2016:17) notes, the two units "unexpectedly demonstrated that the northern part of the plaza has a much more complicated sequence of building events than previous

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excavations had suggested." Aquino's Subops CC-15-A and -G uncovered multiple buried walls—some oriented east-west and others north-south—north of the wall-like feature originally recorded by Kelley (2014) during her thesis research in 2012 and 2013, which we have subsequently dubbed Crystal. Subop CC-15-A exposed a small section of a battered platform face, made of white limestone blocks and sloping gently back to the north (Houk 2016). Excavations exposed only a 1-m section of this east-west feature, but Houk (2016:17) interpreted it to be part of a substructural platform that later plaza renovations had truncated. Immediately west of this feature, Aquino's team discovered an apparent cist or crypt containing the partial remains of at least two individuals (Houk 2016; Novotny et al. 2016). Due to time constraints, this feature in Subop CC-15-G could not be completely excavated, and some skeletal remains were left in situ and backfilled. Ceramic data and a radiocarbon date from charcoal in the fill of the feature suggested a Terminal Preclassic/early Early Classic date for the crypt (Houk 2016:19).

In 2017, Tomás Gallareta Cervera, Brett A. Houk, and Paisley Palmer (2017) directed excavations at the Upper Plaza. Continuing with Op CC-15, Gallareta Cervera's crew excavated 13 new suboperations and extended two more from previous years to continue documenting substructure Crystal (in Subop CC-15-A) and the burials located at the northern edge of the plaza (in Subop CC-15-G). The 2017 excavations established the presence of a substructure platform at the northern section of the plaza that we nicknamed Blanca. The rectangular platform was oriented east to west, had rounded corners and an axial outset, measured approximately 8.75 m east-west by 4.20 m north-south, and was built out of large rectangular blocks of cut, white limestone. Ceramic evidence associates Blanca to the Mamom (600–400 BC) and Chicanel (400 BC–AD 150) spheres, and, based on ceramic data and its architectural style, we estimated that Blanca dates to 400 BC (Gallareta Cervera et al. 2017). The platform was truncated prior to the construction of the last plaza floor and later damaged by the construction of Crypt 1. Materials associated with the outside fill of Blanca, including Burial CC-B17, date the dismantling of the structure to the Late Preclassic period.

Crypt 1 consists of a rectangular, 1.60 m east-west by 2.3 m north-south, intrusive, and in-filled chamber. Prior to its intentional infilling, the chamber was vaulted; its vault would have risen above the plaza floor level. We do not know if the chamber had some other function prior to being converted to a crypt. Steps from the plaza down through the north wall provided access to the chamber. The four sides of the chamber consisted of walls made of different styles and construction techniques and had evidence of eroded, painted plaster. The interior of the chamber sheltered at least two individuals, both located at floor level in the southern portion of the crypt. One of these individuals (Burial CC-B16B) was an elite adult male buried in an extended, supine position (Novotny et al. 2017), wearing two Spondylus shell ear flares and a serpentine helmet-bib head pendant as funerary regalia. An offering of a small Ixcanrio Orange Polychrome pedestal bowl constituted the only other non-perishable grave good. Materials from the chamber yielded a mix of Early Classic and Late Preclassic types, although six other radiocarbon samples from the crypt largely date to the Early Classic period, including a piece bone from Burial CC-B16B, which dates to cal AD 247–353 (Gallareta Cervera et al. 2017:53). Other individuals (Burials CC-B16A, CC-B16C, and CC-B16D) consisted of clusters of isolated, disarticulated, disturbed, and displaced bone fragments (see Novotny et al. 2017).

Excavations at the base of Structure A-1 in 2016 revealed the presence of what is possibly an earlier version of the structure dated to cal 766–540 BC and cal 749–407 BC as described by Houk (2016:11). In 2017, further excavations in this area indicated the presence of Late Classic period activity as well as a plastered step/terrace. However, a large number of artifacts (including more than 500 ceramic sherds) were recovered from Lot CC-15-I-4, pertaining to the collapse debris above the floor surface. Additionally, we exposed a set of limestone cobble steps (Lot CC-15-I-9) running east-west which belonged to a previously unknown substructure (Gallareta Cervera et al. 2017).

Other excavations in 2017 targeted chronological data from the plaza. Excavations along the eastern edge of the Upper Plaza (Subop CC-15-M) at the base of Structure A-13 documented a construction sequence of six plaster floors spanning from the Middle Preclassic period to the Late Classic period, as well as a deeply buried Middle Preclassic, cut stone platform. Excavators documented a posthole cut into bedrock that predated the Preclassic platform with an associated human tooth. Charcoal found on bedrock returned a date of cal 787–552 BC (Sample CC-15-S88), and charcoal from the fill inside the posthole returned a date of cal 730–411 BC (Sample CC-15-S127), suggesting the deepest deposits at Subop CC-15-M date to the Middle Preclassic period (Gallareta Cervera et al. 2017:Tables 2.2 and 2.3).

Excavations in the southeastern corner of the plaza (Subop CC-15-Q) yielded a construction sequence of five plastered floors dating from the Late Preclassic period to the Late Classic period (Gallareta Cervera et al. 2017:Table 2.8). Moreover, the unit also bore the presence of a rough stone platform oriented east-west, which was constructed before Floor 4 and, ergo, before 358–199 BC.

Excavations in the southwestern portion of the plaza, at the western base of Structure A-15, revealed the lower steps to Structure A-15 and its associated stucco floor dated to the Late Classic period. In total, Subop CC-15-L yielded three stucco floors. Below the three floors, we found at least three different fills levels before hitting a Late Preclassic substructure (211 cm below the Floor 1) that was constructed on top of bedrock (Gallareta Cervera et al. 2017:Figures 2.21 and 2.22). This substructure was aligned north-south, had four to five courses of semi-carved rocks and rose to a height of 65 cm above bedrock. Radiocarbon samples from inside and outside the feature returned date ranges of cal 182–52 BC and 358–185 BC, respectively (Gallareta Cervera et al. 2017:Tables 2.2 and 2.3).

2018 RESEARCH QUESTIONS

In 2018, we concluded our three-year research plan for investigating chronology and kingship at the Upper Plaza. The overarching research questions guiding our investigations during the 2016–2018 seasons in the Upper Plaza are:

- Are there linkages between the development of the institution of divine kingship and the architectural evolution of the Upper Plaza?
- Is it possible to identify the royal residence for the first king of Chan Chich based on iconographic elements or ritual deposits?

In 2018, CCAP continued the investigations of dynastic architecture in the Upper Plaza with a plan accounting for the results of the 2016 and 2017 seasons. Our objectives were to:

- Investigate Late Classic rooms on Structure A-1. We proposed to target two additional rooms on the Structure A-1 to supplement excavation data from rooms on the southwestern section of the building collected by Robichaux (2000) and Herndon et al. (2014). We proposed to expose the

interiors of two rooms to look for internal features (such as benches) and artifacts left behind to help assess the structure's function. Previous work determined that rooms are approximately 5.4 m long by 1.7 m wide (Herndon et al. 2014). We also proposed to conduct penetrating excavations in at least one room to expose earlier construction episodes and collect material for radiocarbon dating.

- Continue to explore the buried features known as Blanca and Crystal, the Preclassic wall-like feature south of Blanca. While we successfully exposed the southern face of Blanca, the platform appears to turn to the east in our easternmost excavation unit from 2017. Furthermore, we still do not understand how Blanca and Crystal relate stratigraphically or functionally. We also plan to collect dateable material from within Blanca and from below the floor on which it was constructed to refine our age estimate for the building. We also do not know if Blanca faces south or north because we have not yet found a stairway.

- Conduct additional exploration of the northern part of the Upper Plaza. Based on the significant features discovered in the east-central portion of the Upper Plaza, we proposed to excavate a 2-x-2-m unit in the northeastern corner of the plaza and another in the northwestern corner of the plaza.

METHODS

The Upper Plaza excavations in 2018 continued under Op CC-15 and involved the re-opening of all or portions of Subops CC-15-A,-G, -O, -P, and -R, as well as the establishment of 18 new excavations: Subops CC-15-T, -U, -V, -W, -X, -Y, -Z, -AA, -BB, -CC, -DD, -EE, -FF, -GG, -HH, -II, -JJ, and -KK (Table 2.1). Excavations, recording, and artifact/sample collecting procedures followed those described by Houk and Zaro (2015) for the CCAP. As discussed below, Subops CC-15-CC-T, -Y, -AA, and -BB consisted of excavations in the northern part of the Upper Plaza, specifically horizontal and vertical excavations at two of the rooms of Structure A-1E, the documentation of graffiti in Room 2, and the articulation of the rooms with the upper plaza. Subops CC-15-O, -P, -R, -W, -CC, -DD, -FF, -GG, -II, -JJ, and -KK consisted of horizontal excavations aimed to define the Blanca substructure, which we partially exposed in 2016 and 2017, and to correlate it stratigraphically to Crystal, another feature to the south. Subops CC-15-V, -X, -HH, and -EE corresponded to stratigraphic excavations in the northeastern part of the plaza, and Subops CC-15-U and CC-15-Z corresponded to stratigraphic excavations at the northwest part of the plaza. See Figure 2.1 for the location of all units.

RESULTS

Radiocarbon Sampling

To assist in developing a detailed construction history for the Upper Plaza, the 2018 season included a robust program of radiocarbon dating. In 2018, the project obtained 22 radiocarbon ages from a variety of contexts. In Tables 2.2 and 2.3, the contexts and ages of the 22 samples are organized by suboperation and lot number.

Excavations at Structure A-1E

The CCAP has conducted excavations on Structure A-1 in 1997, 1998, 1999 (Robichaux 1998, 2000, and Robichaux et al. 2000), 2012, 2013 (Kelley 2014; Kelley et al. 2012, 2013), 2014 (Herndon et al. 2014), 2016 (Houk 2016), and 2017 (Gallareta Cervera et al. 2018). Structure A-1 is the largest structure at Chan Chich and its located at the northern edge of the Upper Plaza and the southern end of the Main Plaza (Figure 2.2). Its size and its

Table 2.1. Descriptions of Op CC-15 Suboperations Excavated in 2018 by Area

Area	Suboperation	Dimensions (m)	Purpose
Northeastern Corner of the Plaza	CC-15-V	2 x 2	Research the stratigraphic sequence at the NE of the Upper Plaza
Northeastern Corner of the Plaza	CC-15-X	1 x 2	Research the stratigraphic sequence at the NE of the Upper Plaza
Northeastern Corner of the Plaza	CC-15-EE	2 x 2	Research the platform feature located at Lot CC-15-V-06
Northeastern Corner of the Plaza	CC-15-HH	3 x 1	Exploratory unit. Research the stratigraphic sequence at the NW of the Upper Plaza
Northern Block	CC-15-W	0.7 x 3.2	Research substructure Blanca, specifically its form and chronology
Northern Block	CC-15-CC	1.5 x 3	Define the west portion of Blanca and learn how far it extends
Northern Block	CC-15-DD	1.5 x 1.5	Uncover the NW corner of Blanca
Northern Block	CC-15-FF	3 x 1.2	Research the chronological relationship between Blanca and Crystal
Northern Block	CC-15-GG	2 x 2	Uncover the NE corner of Blanca
Northern Block	CC-15-II	1.5 x 0.5	Uncover the NW corner of Blanca
Northern Block	CC-15-JJ	2 x 2	Uncover the steps located at the NW portion of Blanca
Northern Block	CC-15-KK	1.5 x 0.6	Uncover the N of Blanca
Northwestern Corner of the Plaza	CC-15-U	2 x 2	Research the stratigraphic sequence at the NW of the Upper Plaza
Northwestern Corner of the Plaza	CC-15-Z	2 x 2	Research the stratigraphic sequence at the NW of the Upper Plaza
Structure A-1	CC-15-T	4 x 3	Locate the room from Str. A-1E, define its form, and how it articulates to the upper plaza
Structure A-1	CC-15-Y	3 x 2	Uncovering the Room 1 of Structure A-1E, and define its features
Structure A-1	CC-15-AA	1.5 x 2.5	Uncovering the Room 2 of Structure A-1E, and define its features
Structure A-1	CC-15-BB	1 x 1.5	Uncovering the Room 2 of Structure A-1E, and define its features

location fronting the Upper Plaza would have made it conspicuously visible from across the community (Robichaux 2000:68).

Explorations by Robichaux (2000) and Herndon et al. (2014) date the final phase of the structure, a terraced platform with two long tandem range once-vaulted superstructures on the top, to the Late Classic period. Robichaux (2000:63) designated these two large superstructures as A-1W, on the western half of the platform, and A-1E, on the eastern half. These consisted each of two rows of four vaulted rooms separated by a 2.85-m thick, east-west aligned medial (or spine) wall. One row of rooms faced the Main Plaza to the north, and another faced the Upper Plaza to the south. Structures A-1W and A-1E, hence, are hypothesized to have eight rooms each, separated by a 2.65-m wide central landing (Herndon et al. 2014). Access to the Upper Plaza from the Main Plaza is evidenced

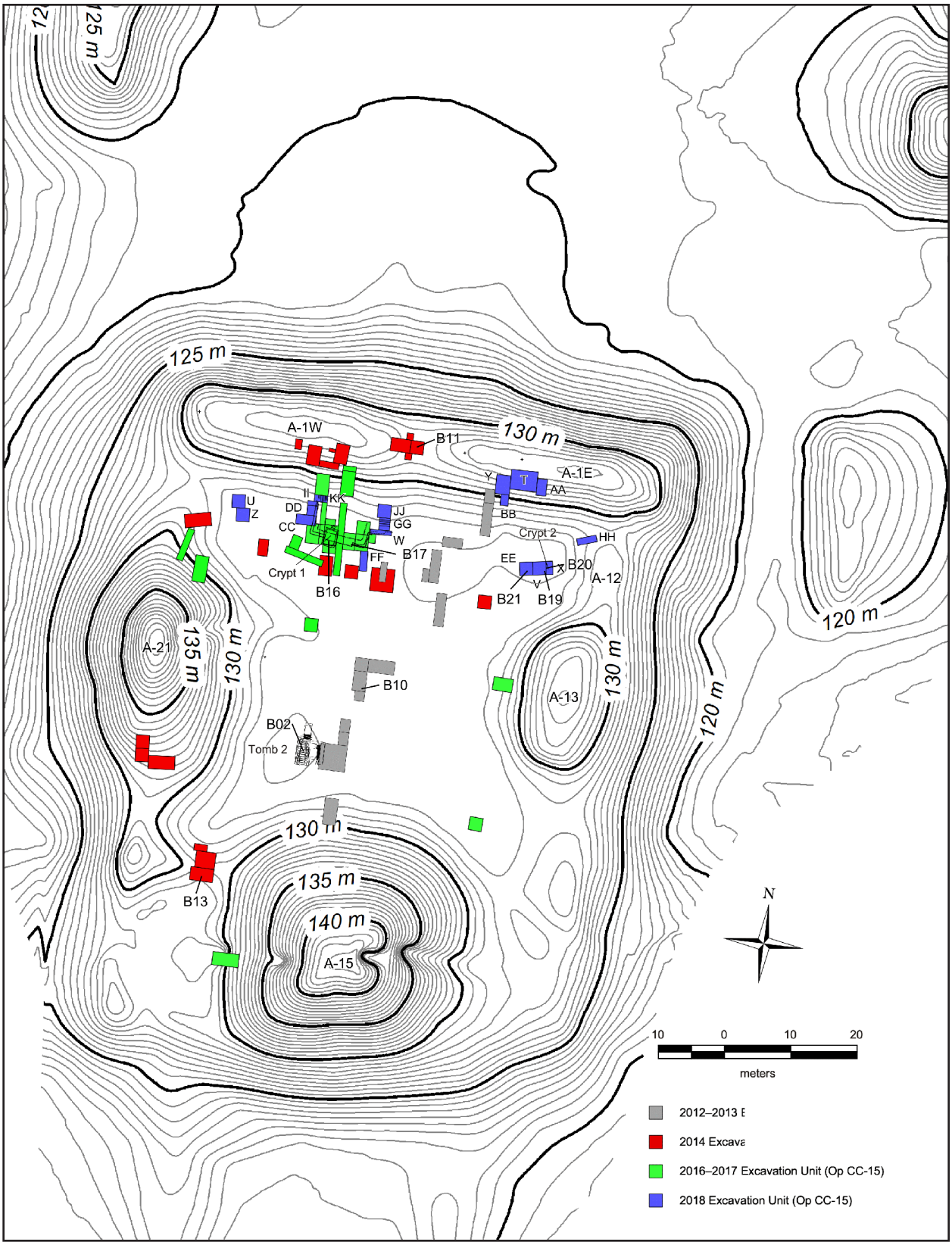

Figure 2.1. Topographic map of the Upper Plaza showing the locations of excavations from 2012–2018.

by a 15-m wide centerline staircase located on the north face of Structure A-1, which summited the structure at the landing. A narrower staircase led down from the landing into the Upper Plaza. Due to the location, arrangement, and lack of privacy, it is hypothesized that the rooms on Structure A-1 served administrative purposes, such as offices for bureaucrats or other public matters.

During the 2018 season, we placed units on the eastern portion of Structure A-1E with the purpose of exposing portions of two rooms to collect additional data on the building's form, function, and chronology. A summary of the suboperations, lots, and ceramic data recovered in 2018 can be seen in Table 2.4. Explorations uncovered portions of two rooms with benches on the southeastern side of Structure A-1E (Figures 2.3 and 2.4). Subops CC-15-Y and -BB exposed the westernmost room of our excavation, which we refer to from now on as Room 1, while Subops CC-15-T and -AA exposed the easternmost room, which we refer to from now on as Room 2 (Note: eastern and western are relative terms, as our excavations occupied the middle of the building, not either end). Debris from the collapse of the vaulted ceilings filled both rooms to a height of 3.5 m against the partially preserved spine wall of the building. Ceramic materials suggest that the collapsed fill dated to the Late and Terminal Classic periods. After removing the collapsed rubble, excavators exposed several architectonic features of the rooms including a 1.55-m thick masonry wall that separates the two rooms from one another. The wall was preserved to a maximum height of 115 cm above the stucco floor of Room 1 (Figure 2.5). This thick stucco floor (Lot CC-15-Y-3) ran underneath a bench on the eastern side of Room 1. Moreover, the northern wall had good preservation of its stucco surface.

Room 1

Room 1 measures 2.75 m from the west wall to its eastern bench. The bench is 1.28 m deep, and overall the excavated portion of the room is 3.72 m long; our excavations did not encounter the western wall of the room, but if we assume symmetry then the room is approximately 5.5 m long. The width of the room is 1.8 m from the north wall to the south wall. The start of the vault was 1.85 m above the room floor, although none of the vault was preserved. The room had burning evidence in the floor next to the northern wall at its central axis. However, we did not find any artifactual evidence associated with this burned surface. The entrance to Room 1 was located on the south. The doorway was marked by two jambs, preserved to a maximum height of 42 cm above the floor and set approximately 2 m apart. The southern wall is preserved to a width of approximately 100 cm. Our room size estimations correlate well with those made by Robichaux (2000:64) of 5.4 m long by 1.7 m wide rooms based on excavations on Structure A-1W.

Room 1 (Figure 2.5) had a bench made of carved stones with partially preserved stucco on its top and on its west face. The bench measured 1.8 m north-south, 1.28 m east-west, and 0.9 m high. Penetrating excavations through the bench encountered dry-laid cobble fill, but no burials or caches. Artifacts recovered from the bench's fill date the feature to the Late Classic period, however, a charcoal sample (Sample CC-15-S188) dates the fill of this bench to ca AD 544–605 suggesting it could be earlier.

A 1-x-1-m stratigraphic test pit (Lot CC-15-Y-03) in the doorway revealed that the room had at least a two-floor sequence. Materials recovered from under the room's floor were very eroded and likely date to the Late Classic period also. Floor 2 was roughly 6 cm below the room's final floor surface. Ceramic sherds from the room's second floor were also very eroded, but we estimate that they date to the

Table 2.2. Contexts of 2018 Radiocarbon Samples from the Upper Plaza Organized by Sample #

Sample	Lot	Context	Material
CC-15-S144	CC-15-V-09	Floor above Burial CC-B20	single charcoal
CC-15-S152	CC-15-Z-09	Floor 4 of NW UP	single charcoal
CC-15-S154	CC-15-Z-09	Floor 4 of NW UP	single charcoal
CC-15-S155	CC-15-Z-09	Floor 4 of NW UP	single charcoal
CC-15-S158	CC-15-Z-11	Floor 6 of NW UP	multiple charcoal
CC-15-S160	CC-15-Z-11	Floor 6 of NW UP	single charcoal
CC-15-S165	CC-15-Z-11	Floor 6 of NW UP	multiple charcoal
CC-15-S166	CC-15-Z-07	Floor 3 of NW UP	multiple charcoal
CC-15-S175	CC-15-V-19		single charcoal
CC-15-S177	CC-15-V-19		multiple charcoal
CC-15-S181	CC-15-V-20	Surface under Burial CC-B20	single charcoal
CC-15-S183	CC-15-V-21	Surface under Burial CC-B20	single charcoal

Table 2.3. Ages of 2018 Radiocarbon Samples from the Upper Plaza Organized by Sample #

Sample	PSUAMS#	14C Age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
CC-15-S144	5208	1775	20	AD 170–194	2.9	AD 170–336
				AD 211–336	92.5	
CC-15-S152	5209	2450	15	749–684 BC	36.8	749–415 BC
				667–641 BC	11.7	
				588–579 BC	1.1	
				561–415 BC	45.8	
CC-15-S154	5210	2455	20	752–682 BC	34.2	752–416 BC
				670–613 BC	16.4	
				593–428 BC	44.1	
				422–416 BC	0.8	
CC-15-S155	5211	2455	20	752–682 BC	34.2	752–416 BC
				670–613 BC	16.4	
				593–428 BC	44.1	
				422–416 BC	0.8	
CC-15-S158	5212	2375	25	534–529 BC	1	534–394 BC
				519–394 BC	94.4	
CC-15-S160	5213	2440	20	748–685 BC	24.6	748–409 BC
				666–642 BC	7.4	
				586–581 BC	0.5	
				556–409 BC	62.9	
CC-15-S165	5214	2405	20	703–696 BC	0.8	703–402 BC
				541–402 BC	94.6	
CC-15-S166	5215	2505	15	772–737 BC	19.4	772–548 BC
				689–663 BC	15.9	
				647–548 BC	60.2	
CC-15-S175	5216	2455	20	752–682 BC	34.2	752–416 BC
				670–613 BC	16.4	
				593–428 BC	44.1	
				422–416 BC	0.8	
CC-15-S177	5217	2510	20	784–732 BC	23.3	784–544 BC
				691–661 BC	15.8	
				650–544 BC	56.3	
CC-15-S181	5218	2655	20	837–797 BC	95.4	837–797 BC
CC-15-S183	5219	2555	20	801–751 BC	85	801–590 BC
				684–667 BC	4.5	
				636–626 BC	1	
				615-590 BC	5	

Table 2.2. Contexts of 2018 Radiocarbon Samples from the Upper Plaza (continued)

Sample	Lot	Context	Material
CC-15-S185	CC-15-Z-18	Bedrock of NW UP	single charcoal
CC-15-S188	CC-15-T-04	Fill in bench, Room 1, Str. A-1E	single charcoal
CC-15-S197	CC-15-AA-05	Fill in bench, Room 2, Str. A-1E	single charcoal
CC-15-S198	CC-15-KK-06	Inside steps of Blanca	single charcoal
CC-15-S201	CC-15-EE-07		single charcoal
CC-15-S203	CC-15-FF-11	Below Floor 3 of Crystal	multiple charcoal
CC-15-S206	CC-15-JJ-06	Steps associated with Blanca	single charcoal
CC-15-S208	CC-15-Z-08	Floor 3 of NW UP	multiple charcoal
CC-15-S209	CC-15-Z-08	Floor 3 of NW UP	single charcoal
CC-15-S212	CC-15-P-09	Below Floor 3 of Blanca	multiple charcoal
CC-15-S215	Lot CC-15-V-15	Burial CC-B20	XAD amino acids
CC-15-S216	Lot CC-15-EE-06	Burial CC-B21	XAD amino acids
CC-15-S217	Lot CC-15-G-14	Burial CC-B16D	XAD amino acids
CC-15-S218	Lot CC-15-U-07	Burial CC-B19	>30kDa gelatin
CC-15-S219	Lot CC-15-G-14	Burial CC-B16A	XAD amino acids
CC-15-S220	Lot CC-15-Z-12	Dates Floor 6 of NW UP	>30kDa gelatin
CC-15-S221	Lot CC-15-EE-04	Dates fill of platform, NE UP	XAD amino acids

Table 2.3. Ages of 2018 Radiocarbon Samples from the Upper Plaza (continued)

Sample	PSU #	14C Age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
CC-15-S185	5220	2550	15	798–756 BC	91.1	798–596 BC
				680–671 BC	2.5	
				605–596 BC	1.8	
CC-15-S188	5221	1495	15	AD 544–605	95.4	AD 544–605
CC-15-S197	5222	1230	15	AD 694–745	35.9	AD 694–875
				AD 764–780	16.8	
				AD 788–875	42.7	
CC-15-S198	5223	2430	20	735–689 BC	15.5	735–408 BC
				663–648 BC	3.8	
				546–408 BC	76.2	
CC-15-S201	5266	1645	20	AD 342–429	94.2	AD 342–505
				AD 497–505	1.2	
CC-15-S203	5225	2470	30	768–476 BC	92.4	768–431 BC
				464–453 BC	1.2	
				445–431 BC	1.8	
CC-15-S206	5226	2370	20	508–499 BC	2.3	508–395 BC
				492–395 BC	93.1	
CC-15-S208	5227	2460	20	756–679 BC	35.3	756–430 BC
				671–606 BC	20.1	
				600–430 BC	40	
CC-15-S209	5228	2480	15	761–540 BC	95.4	761–540 BC
CC-15-S212	5229	2445	20	750–648 BC	28.6	750–411 BC
				668–639 BC	9.4	
				590–577 BC	1.6	
				568–411 BC	55.8	
CC-15-S215	5453	1715	15	AD 257–298	30.7	AD 257–387
				AD 320–387	64.7	
CC-15-S216	5454	2145	20	351–302 BC	20.1	351–106 BC
				211–106 BC	75.3	
CC-15-S217	5455	1740	15	AD 243–346	95.4	AD 243–346
CC-15-S218	5443	1785	20	AD 140–197	14.1	AD 140–328
				AD 208–262	48.2	
				AD 277–328	33.1	
CC-15-S219	5456	1700	20	AD 257–296	15.7	AD 257–399
				AD 321–399	79.7	
CC-15-S220	5444	2620	25	826–782 BC	95.4	826–782 BC
CC-15-S221	5457	2170	15	355–292 BC	58.4	355–171 BC
				231–171 BC	37.0	

Table 2.4. Summary of Suboperations and Lots at Structure A-1E

Suboperation	Lot	Lot Description	Ceramic Sphere	Sherd Count
CC-15-T	1	Topsoil	Tepeu 3	5
	2	Collapse Debris	Tepeu 3	13
	3	Collapse Debris		1
	4	Bench		20
CC-15-Y	1	Topsoil	Tepeu 3	4
	2	Collapse Debris	Tepeu 2-3	14
	3	Floor	Tepeu 2-3?	9
	4	Floor		3
	5	Construction Fill		4
	6	Construction Fill	Chicanel?	11
CC-15-AA	1	Topsoil	Mamon to Chicanel	46
	2	Collapse Debris	Motmot 2	34
	3	Collapse Debris		
	4	Bench		
	5	Collapse Debris	Chicanel?	17
	6	Collapse Debris	Tzakol	21
	7	Collapse Debris	Tepeu 2-3	6
	8	Floor		
	9	Floor	Chicanel?	1
	10	Construction Fill	Tepeu 2-3 with Chicanel trace	6
CC-15-BB	1	Topsoil		
	2	Collapse Debris		

Late Preclassic period. We terminated the pit arbitrarily 63 cm below the floor in the room.

Room 2

Room 2 was only partially excavated, so we do not have its full measurements. From the information we gathered, we can conclude that it was similar to Room 1. The room measured 1.75 m from north to south, and its east to west wall is at least 2.40 m from the divider masonry wall. The northern and western walls were still partially covered with stucco. Room 2 also had a bench, which was larger than the bench in Room 1 and was located along the west wall. The bench measured 1.75 m north-south by 1.5 m east-west, and 0.9 m high. While plaster was preserved on the top western surface and the bottom edge of the bench, we noticed some anomalies. Careful excavations revealed that the bench had been looted before the vaulted ceiling collapsed. The presumably Prehispanic looters had removed much of the top of the bench and a significant percentage of its eastern face (Figure 2.6). Moreover, we observed a significant amount of charcoal and ash, suggesting the presence of fire although it is impossible to tell if the fire and the looting happened simultaneously. A charcoal sample (Sample CC-15-S197) dates this burned area to cal AD 694–875. The stucco floor of the room went underneath the bench (Lot CC-15-AA-08), which confirms that the room was constructed first, and the bench was later added. A rough floor patch was found at the northern portion of Room 2 below the bench fill near its northeastern corner. We excavated this area

Figure 2.2. Photograph of Structure A-1E before excavation, view to the north.

of approximately 70-x-70-cm area (Lot CC-15-AA-09), which yielded a layer of dry-laid unshaped large stones that were used as part of Structure A-1's construction fill. Unfortunately, we recovered a very small sample of ceramics, which tentatively date this context to the Late Preclassic period.

Graffiti in Structure A-1E Room 2

Three previous investigations at the site have yielded evidence of graffiti. Inspection of the upper west looters' trench of Structure A-15 in the Upper Plaza revealed the presence of graffiti carved in a possible fer-de-lance pattern into a plaster wall in a partially collapsed room (Houk 1998:94). Harrison (2000:81–82) documented two patolli boards incised in benches in Structure C-6 in the Western Plaza. Excavations at Structure C-2 in the Norman's Temple complex exposed a portion of the southwestern room, which yielded evidence of preserved graffiti on the spine wall and portions of the western interior wall. Although individual elements were difficult to interpret due to inconsistent preservation, a portion of the preserved graffiti consisted of a triangular shaped design with hatch marks, which are hypothesized to represent a perishable structure on top of a building (Booher 2016:54).

While removing the collapsed debris from Room 2, we noticed that the stucco on the northern wall presented grooves and scratches that appear to be patterned (Figure 2.7). The stucco surface of the wall was very fragile and badly eroded, so we cleaned it using light brushes and softwood tools. By using flashlights from multiple angles at night we confirmed the presence of at least four different graffiti drawings or images. Identifying the pattern was not easy since a lot of the grooves were very shallow and difficult to recognize. We used

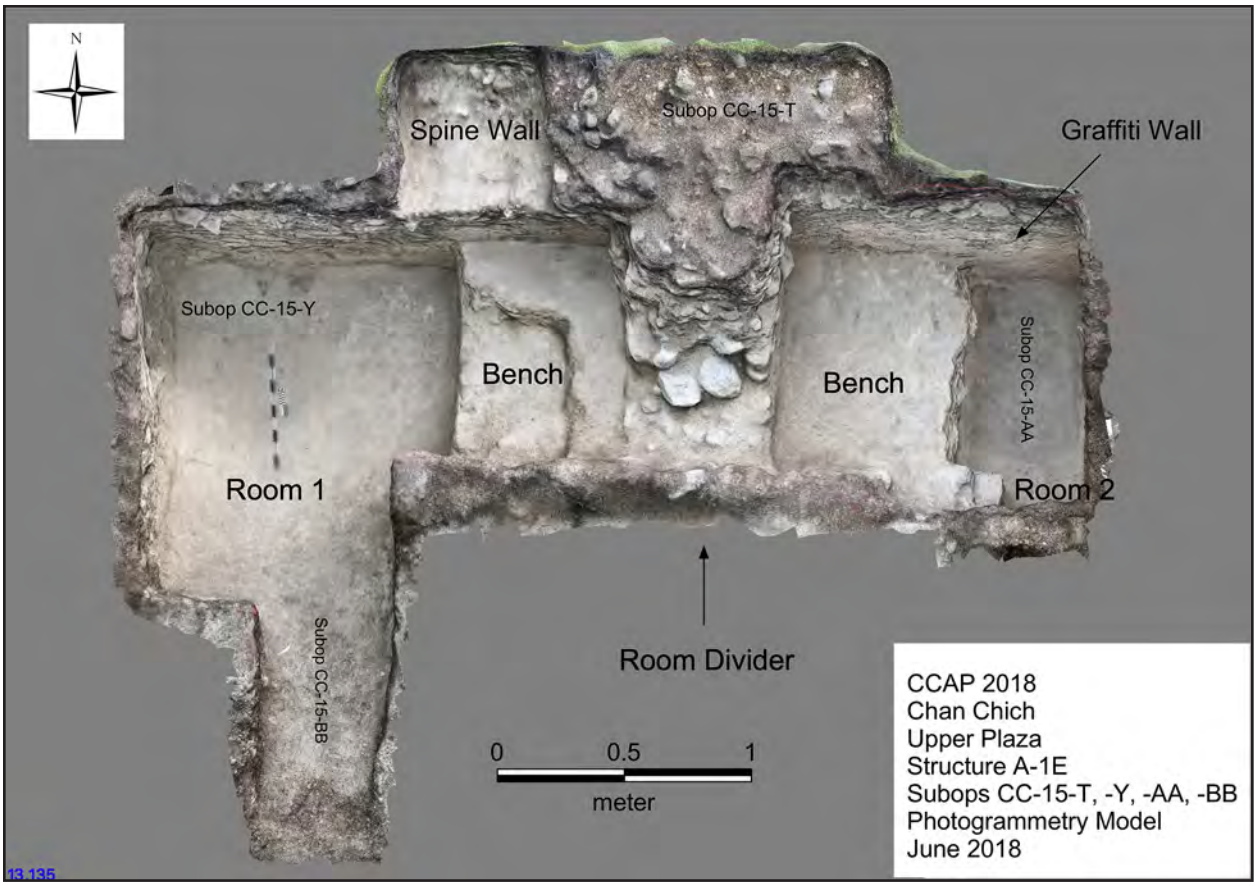

Figure 2.3. Orthomosaic of Structure A-1E after excavation, view to the north.

multiple methods to document these grooves including a flatbed scanner and SfM capture with high and low-resolution photography with no suitable results. For this report, we imported photographs in RAW format into LightRoom and masked the shallow grooves with a high contrast filter.

Image 1 (Figure 2.8) was located directly north of the room's stucco floor and consisted of the body of a large individual, with male characteristics, without a head. The individual is raising both of his arms in arch form, multiple groove lines located on the top of the torso might suggest armpit hair, blood, or perhaps the scraping of a previous design. The individual's torso and stomach have a teardrop shape, with a belt and perhaps a loincloth. The individual's legs and feet are pointing east. Grooving pattern on the legs may suggest a correction by the artist (or another artist) or perhaps an attempt to create the illusion of movement.

Image 2 (Figure 2.9) was complex. It consists of two long vertical lines with small fringed lines, angled about 45 degrees, throughout its length. One of the lines has on its base a circle with a cross inside it. Additionally, two lines at 45-degree angles flank this image on both sides.

Image 3 (Figure 2.10), on the north wall above the bench, consisted of a well carved "mat design." This motif appears to carry a strong reference to the woven mat, a symbol of authority, rulership, and power in ancient Maya iconography (Robicsek 1975:184). The design is described by Robicsek (1975:186, Figure 179-15) as a mat with an incised-multiple twist.

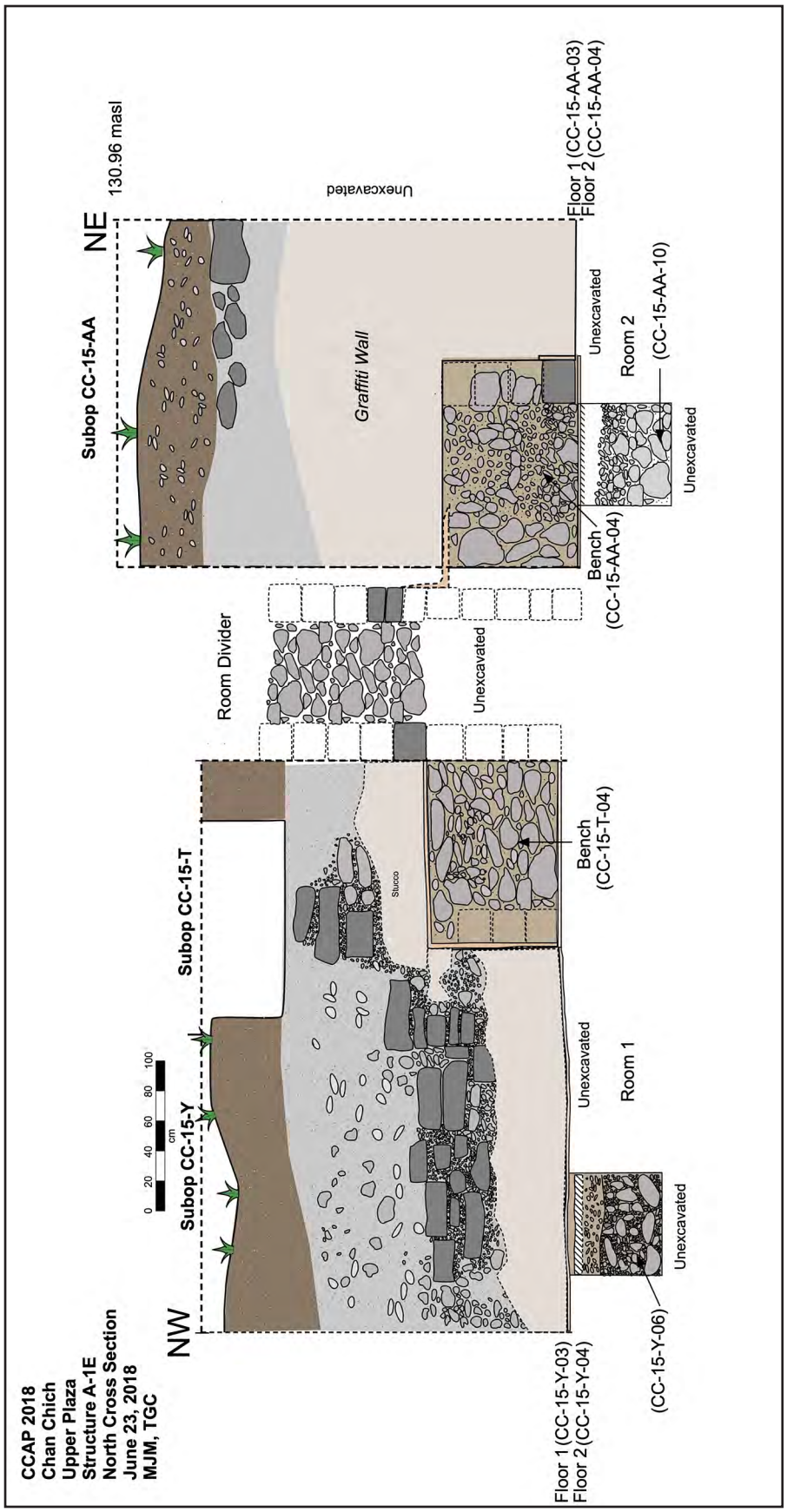

Figure 2.4. Structure A-1E north cross section.

Figure 2.5. Photograph of Structure A-1E, Room 1, view to the southeast.

Figure 2.6. Photograph of the looted bench during excavations in Structure A-1E, Room 2, view to the southwest.

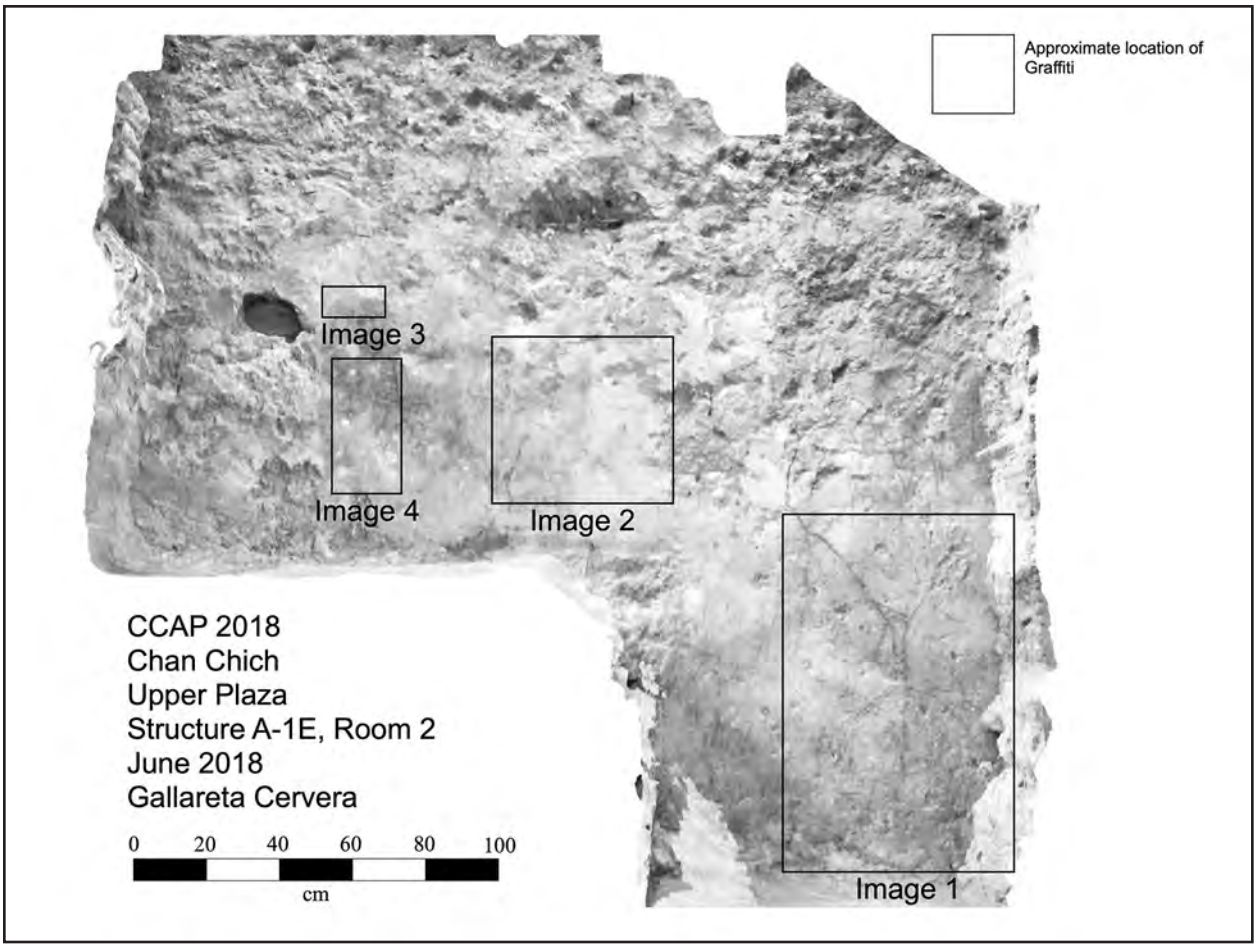

Figure 2.7. Key map of graffiti locations on north wall of Room 2 in Structure A-1E. See Figures 2.8–2.11 for Images 1–4.

Image 4 (Figure 2.11) consists of a small individual (ca. 10 cm tall) in a similar style to the figure in Image 1. His arms are extended to his sides, arching, with his left arm showing evidence of feathers hanging on the bottom. This individual is also facing east. Finally, other seemingly amorphous grooves are scattered in other parts of the northern wall. The different stucco grooving skills presented on the graffiti drawings makes us hypothesize that there might be more than one artist. This is especially visible while contrasting the rough groves observed on the "big headless man" and the refined lines observed in the "mat design." The easternmost room of Structure A-1 was not excavated completely, so the graffiti probably continues farther east.

Backfilling Rooms 1 and 2

Upon completing the excavations and graffiti documentation, we carefully backfilled both rooms. To protect the plaster wall with the graffiti, workers gradually built a retaining wall, approximately 15 cm in front of the graffiti wall, using cut stones from the collapse debris. They filled the space between the graffiti wall and the retaining wall with dirt from our excavations, periodically adding height to the retaining wall as they simultaneously backfilled the room.

Crystal and Blanca

Excavations by Kelley (2014) and Herndon and colleagues (2014) at the north-central sector of the Upper Plaza revealed the remains

Figure 2.8. Graffiti Image 1 on north wall of Room 2 in Structure A-1E.

Figure 2.9. Graffiti Image 2 on north wall of Room 2 in Structure A-1E.

Figure 2.10. Graffiti Image 3 on north wall of Room 2 in Structure A-1E.

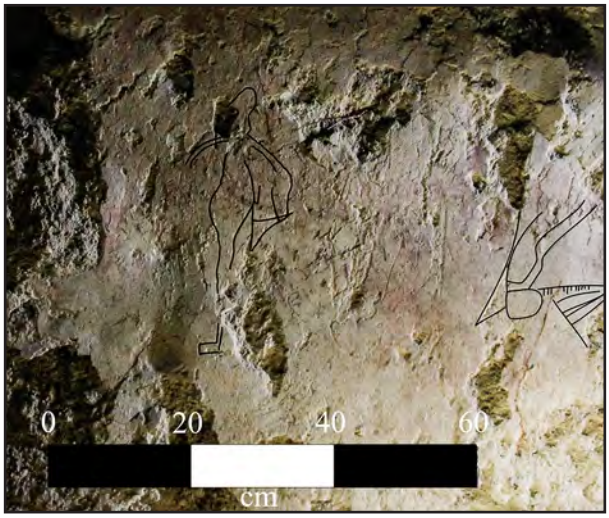

Figure 2.11. Graffiti Image 4 on north wall of Room 2 in Structure A-1E.

of a low wall-like feature, nicknamed Crystal by Gallareta Cervera and colleagues (2017:44), of ca. 1.25 m high and oriented east-west. A particular feature of this wall is that while its basal course is made of large and fine cut rectangular blocks of limestone, the upper courses consists of uncut large boulders. Herndon et al. (2014) hypothesized this feature could have been the remains of a construction pin. We now believe the lower portion of the feature, which comprises large, cut limestone blocks similar to those used in Blanca's facing masonry, is likely the remains of another truncated substructural platform, and the

crude boulders forming the upper portion of the feature are a later addition, likely part of a construction pen as proposed by Herndon et al. (2014). The feature also lacks any remains of plaster covering either side. However, excavations at Subop CC-12-O yielded the presence of at least nine plastered floors below Crystal (see Herndon et al. 2014). The few ceramics from these floors were heavily eroded but appeared to be Late Preclassic in age, although we consider this to be a provisional conclusion.

In 2016 and 2017 excavations at the northern sector of the Upper Plaza yielded a slightly battered (sloping) and truncated platform face in Subop CC-15-A nicknamed Blanca (Gallareta Cervera et al. 2017; Houk 2016). Blanca was constructed from large rectangular, white blocks of cut limestone, and the uncovered section of the structure from 2017 measures 8.75 m east-west by 4.20 m north-south (Gallareta Cervera et al. 2017: Figure 2.4). Blanca's form is complex and difficult to determine due to its partial dismantling, damage by the intrusion of Crypt 1, and general poor preservation. The structure consists of possibly three tiers with a projecting axial outset, which would have measured 4.5 m wide. Its overall shape is rectangular with rounded corners. The axial outset is battered, while the other faces are not. The lowest two tiers may be steps, while a possible third tier is indicated by a stone alignment located north of the lower tiers and axial outset. Based on architectonic style and associated ceramic materials we suggest that Blanca was constructed around 400 BC (Gallareta Cervera et al. 2017:47).

Excavations in 2018 at the north-central part of the Upper Plaza focused on defining both the form and the chronology of Blanca, as well as relating Blanca stratigraphically and chronologically to Crystal. A summary of the Suboperations, lots and ceramic data can be observed in Table 2.5. Our excavations targeted roughly three areas: Subops CC-15-D, -P, -CC, -II, and -KK to define the northwest portion of Blanca, Subops CC-15-O and -FF in the central-north section of the plaza, and Subops CC-15-W, -GG, and -JJ to define the eastern limits of Blanca.

The earliest feature observed at northwestern portion of Blanca consisted of a stucco floor (Lots CC-15-KK-05 and -06) dated to the Middle to Late Preclassic period (Figure 2.12). On top of this floor, the Maya constructed a stone staircase that climbed from east to west (Figure 2.13). The staircase had at least five rows of steps made of small rough carved stones. The stones varied in size and had a plaster cover while they were in use. Charcoal Samples CC-15-S198 and CC-15-S206 recovered from inside the stairs date them to calibrated 546–408 BC and 492–395 BC, respectively. Excavations also yielded the presence of an alignment of large semi-carved stones at the northwest portion of Blanca, the last stone of which, perhaps a corner, can be observed directly at the south of the Middle Preclassic staircase. The alignment is oriented north to south and was observed in Subops CC-15-CC and -DD where we can see at least two rows of stones, the first made of at least five small rough stones, while the second was made of four rough stones. The alignment constitutes the northern continuation of the western edge of Blanca which was also uncovered in 2017 (Subop CC-15-P).

Excavations at the central-north section of the plaza were complex and encountered an alignment of four large semi carved rocks (Lot CC-15-GG-03) associated to a compact surface, possibly a deteriorated stucco floor. The surface reached a second alignment of stones approximately 60 cm to the north of unit CC-15-GG. This second alignment was at a slightly higher altitude, about 10 cm, and was also associated with a stucco floor which extended to the north of Suboperation CC-

Table 2.5. Summary of Suboperations in the North-Central Plaza Block

Suboperation	Lot	Lot Description	Ceramic Sphere	Sherd Count
CC-15-W	1	Topsoil	Tepeu 2	3
	2	Construction Fill		70
	3		Chicanel	
CC-15-CC	1	Topsoil	Chicanel	64
	2	Construction Fill	Chicanel	231
CC-15-DD	1	Topsoil	Motmot 3	14
	2	Construction Fill	Chicanel with Tepeu trace	284
CC-15-FF	1	Topsoil	Chicanel and Tepeu 2 mix	23
	2	Collapse Debris	Chicanel	31
	3	Collapse Debris		
	4	Collapse Debris	Chicanel	23
	5	Construction Fill	Chicanel with Mamon trace	42
	6	Construction Fill	Chicanel	54
	7	Construction Fill	Mamon to Chicanel	26
	8	Construction Fill	Chicanel	61
	9	Construction Fill	Chicanel	190
	10	Construction Fill	Chicanel and Mamon mix	12
	11	Construction Fill	Chicanel	5
CC-15-GG	1	Topsoil	Tepeu 3	5
	2	Collapse Debris?	Tepeu 2 with Chicanel trace	10
	3		Tepeu 2-3	9
	4		Mamon to Chicanel	78
CC-15-II	1	Topsoil	Tepeu 3	5
	2	Construction Fill	Tepeu 2 with Chicanel trace	19
	3	Collapse Debris	Chicanel	89
	4	Floor	Chicanel	38
CC-15-JJ	1	Topsoil	Tepeu 3	4
	2	Topsoil		
	3	Floor	Tepeu 2	27
	4	Step (Riser/Tread)	Chicanel	76
	5	Construction Fill	Mamon to Chicanel	34
	6	Step (Riser/Tread)		
	7	Construction Fill	Chicanel	86
CC-15-KK	1	Topsoil	Tepeu 3	6
	2	Collapse Debris	Chicanel	16
	3	Step (Riser/Tread)	Chicanel	20
	4	Other		
	5	Floor	Chicanel	6
	6	Construction Fill	Mamon to Chicanel	34

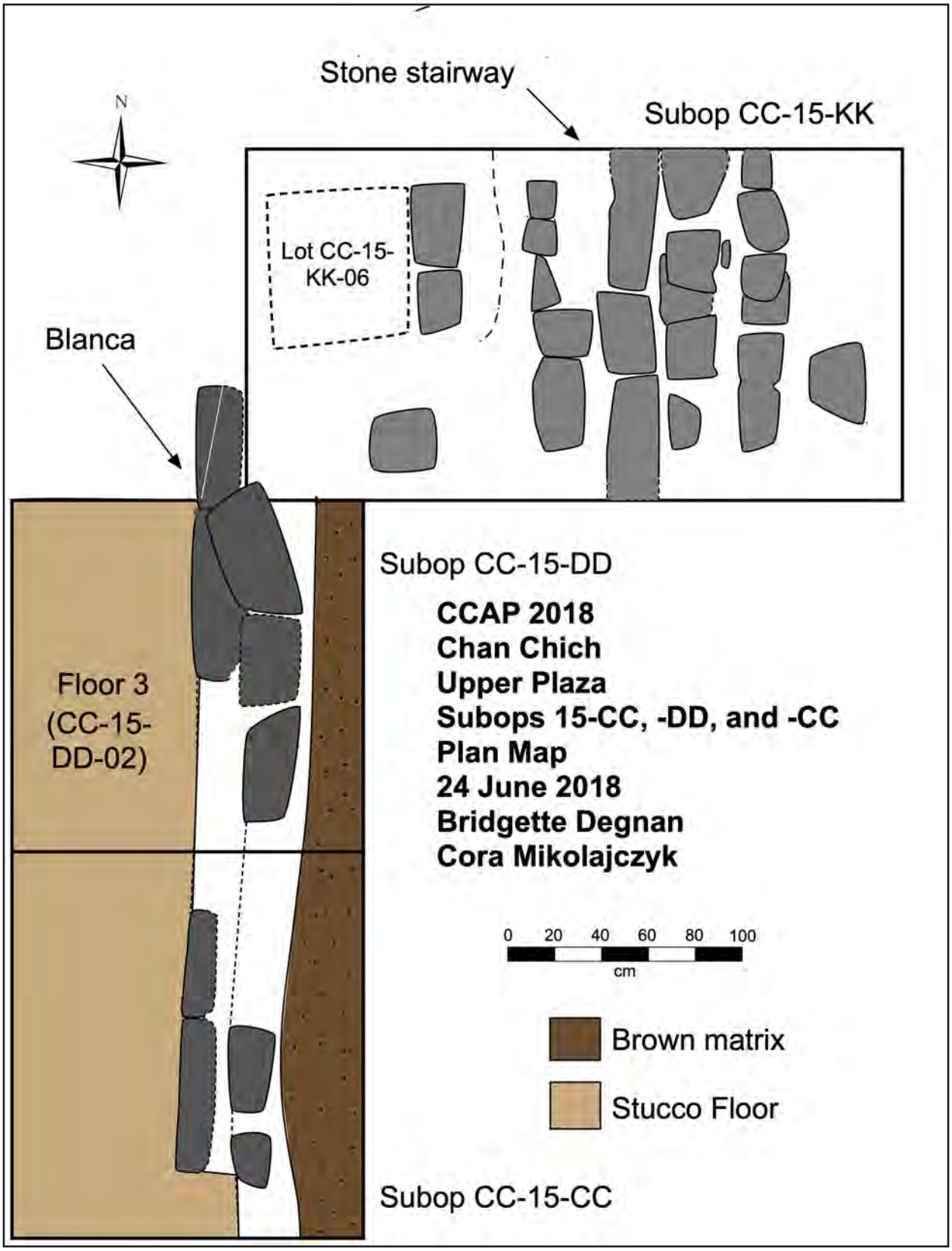

Figure 2.12. Plan map of Subops CC-15-CC, -DD, and -KK.

Figure 2.13. Photograph of stairway north of Blanca in Subop CC-15-KK, view to the east.

15-JJ (Figure 2.14). Material recovered from the fill of the surface of both alignments date to the Mamon and Chicanel ceramic spheres (Lot CC-15-GG-04 and Lot CC-15-JJ-05, respectively). However, a charcoal sample (CC-15-S206) dates this feature to ca 492–395 BC, the latter half of the Middle Preclassic period. This suggests that these two rock alignments might have been part of the same architectural feature, perhaps a two-tier stuccoed platform (Figure 2.15). The fill of both alignments is contemporary with Blanca and perhaps was part of an earlier version of Structure A-1W, feasibly the same structure located at Subop CC-15-KK. A final stucco floor was present in the north edge of the unit (Lot CC-15-JJ-03), but both its associated Late Classic ceramic material (CC-15-JJ-03) and location make it more likely that it was part of Structure A-1 and not the Preclassic platform described earlier. Subop CC-15-W yielded evidence of Blanca's poorly preserved east wall (Figure 2.16). However, its exact extension to the east was not possible to determine due to its extreme deterioration/destruction.

The central-south portion of Blanca was explored in Subops CC-15-O, -P, and -FF to understand the relationship between this structure and Crystal. Excavations determined that elevation of bedrock was very different at Subop CC-15-O (210 cm below Datum O) and Subop CC-15-F, where it was 167 cm below Datum O (Figure 2.17). The different elevations were leveled with grayish brown dirt, sealed by a stucco floor on top of which Blanca was constructed early in the Late Preclassic period. An additional test pit in front of Blanca (Lots CC-15-P-08 and -09) yielded dates from the Middle to the Late Preclassic periods. However, Samples CC-15-S203 and CC-15-S212, extracted from Lots CC-15-FF-11 and -P-09, also located between Blanca and Crystal, and specifically below Blanca's base stucco floor, Floor 3, yielded date ranges of 768–476 cal BC and 568–411 cal BC, respectively. Floor 3 was covered with 20 cm of brown dirt and small stones and then sealed with a second stucco floor (Floor 2). Floor 2

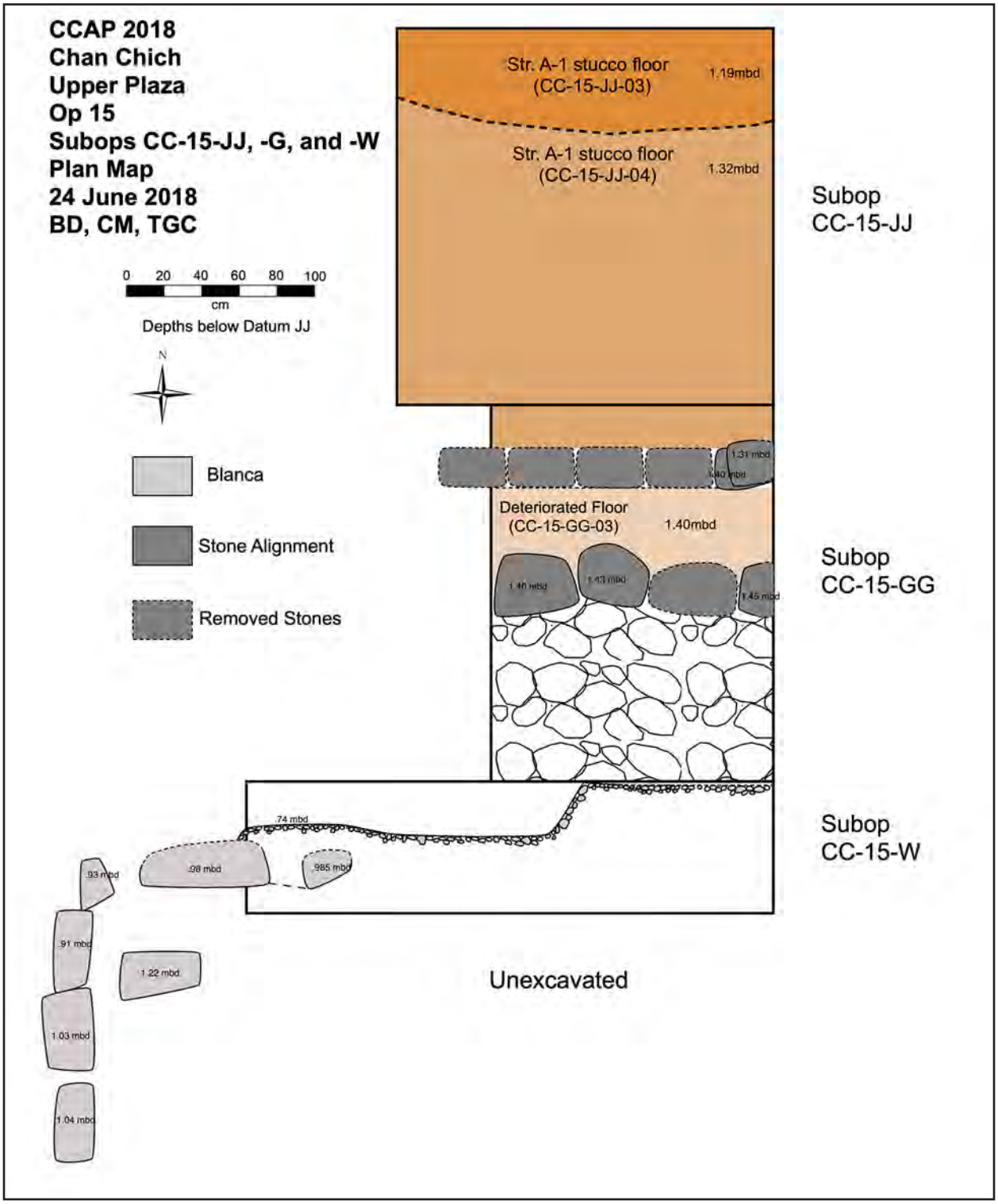

Figure 2.14. Plan map of Suboperations CC-15-JJ, -GG, and -W

Figure 2.15. Closing photograph of Lot CC-15-GG-03, view to the north.

Figure 2.16. Closing photograph of Lot CC-15-W-03 showing preserved stones from Blanca and a section where the platform face was not preserved, view to the north.

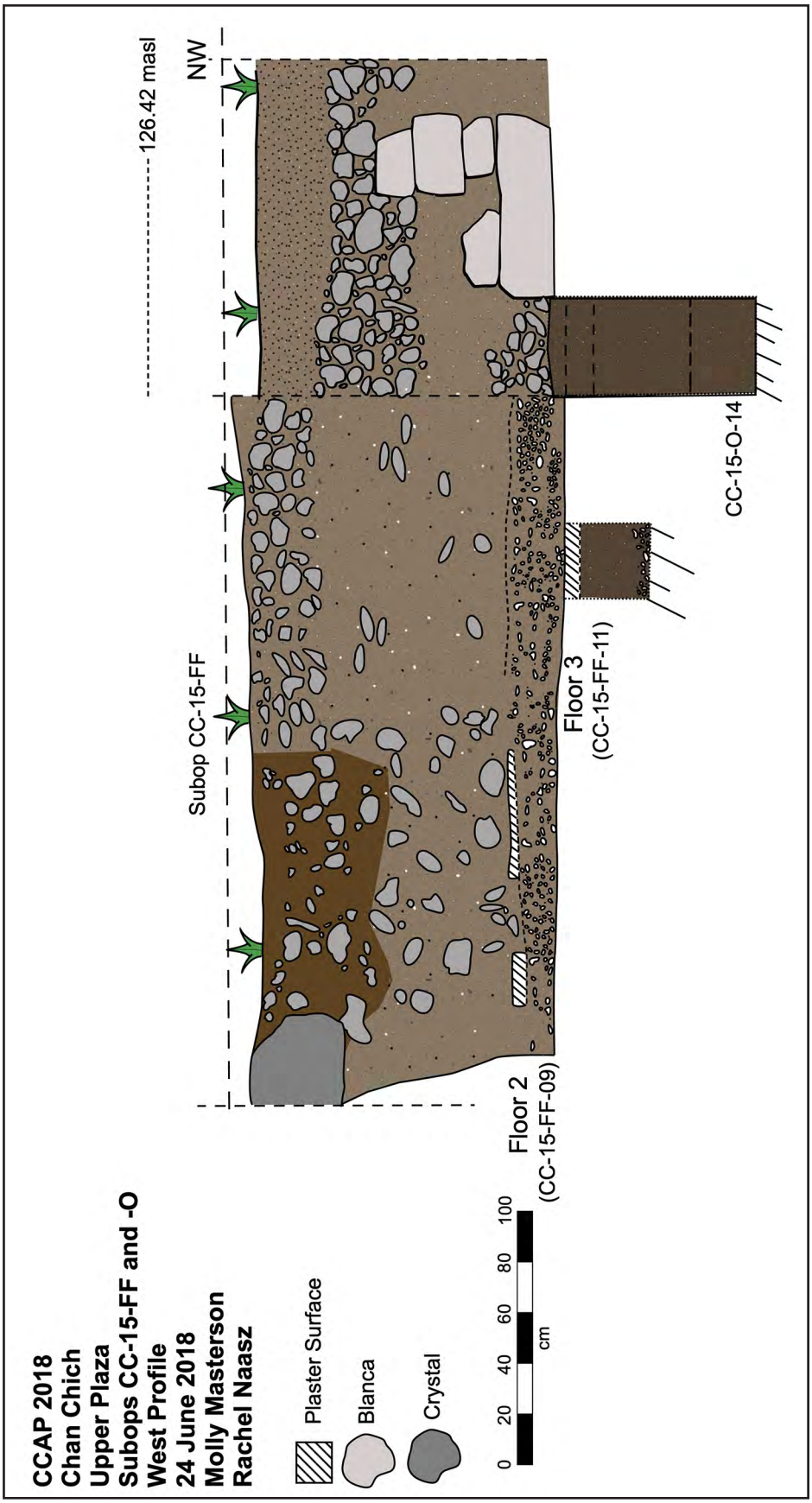

Figure 2.17. West profile of Subops CC-15-FF and -O.

(Lots CC-15-FF-07 and -09) was the base of Crystal and was associated with a mixed deposit of Middle to Late Preclassic period ceramics. Just as exposed in excavations last year, Crystal was constructed out of two rows of large carved stones capped by a third row of rough stones, which probably dates to a later period (Figure 2.18). This stucco floor continued south and connected Crystal with Blanca, indicating that the latter was constructed at an earlier date, but that Crystal and Blanca were both in use concurrently for some period of time. We still do not know what the basal stones of Crystal represent, but Herndon et al. (2014) determined the alignment extends for at least 23.5 east-west, spanning almost the entire width of the

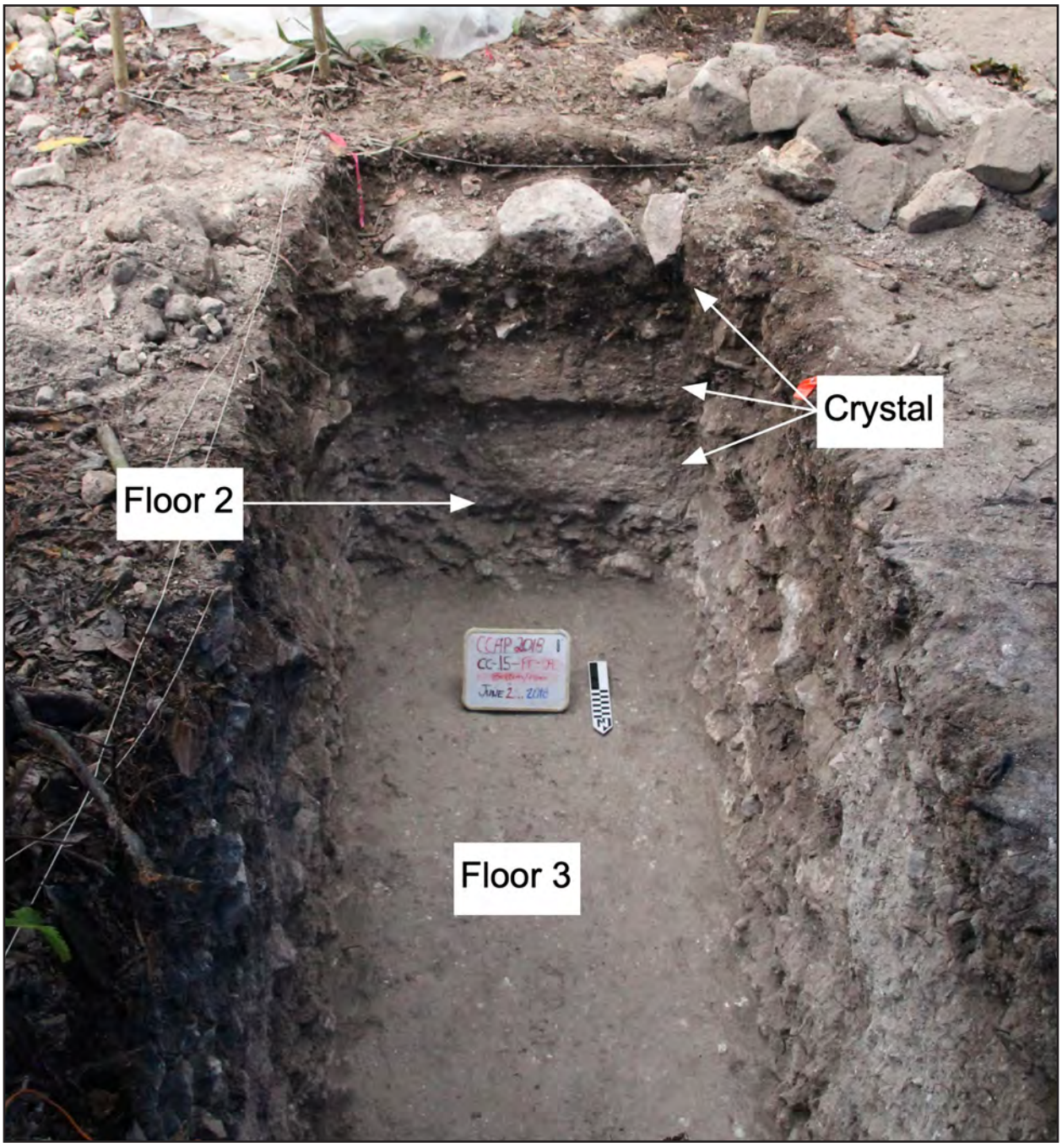

Figure 2.18. Photograph of Subop CC-15-FF showing Crystal and floor sequence, view to the south.

Upper Plaza. Crystal was truncated and buried sometime in the Late Preclassic, perhaps during the same renovation that resulted in the destruction and burial of Blanca.

Excavations from the 2018 archaeological season uncovered new information regarding the form and stratigraphy of Blanca, as well as its relationship with Crystal (Figure 2.19). Evidence from samples recovered from under floors suggests that Blanca was constructed on top of Floor 3 as early as 768 cal BC (Sample CC-15-S203) and within the range of the Mamom ceramic sphere (however, Sample CC-15-S119/120 dates the Upper Plaza's earliest floor to 931-833 cal BC). Floor 3 extended to the south, west, and east of Blanca, as well as under the structure. Two Middle and Middle to Late Preclassic features, a staircase and a stepped platform (located in Subops CC-15-KK, -GG, and -JJ), suggest that Blanca might have extended farther north and its form might have been more complex and not symmetrical as was previously thought. Alternatively, a still undiscovered substructure of Structure A-1W might be located to the north. This might be especially true for the two-stepped platform located in Subop CC-15-GG due to its extension to the north and long landing. Unfortunately, later construction and generally poor preservation prevent us from knowing its exact form and extension. Blanca was used from as early as the Middle Preclassic period to no later than cal 154 BC–AD 47 (Sample CC-15-S143), when Burial CC-B17 was placed in the fill capping the truncated Blanca substructure. Excavations in 2018 also suggest little to no constructions in this area of the Upper Plaza during the Early Classic period aside from the construction of Crypt 1 since materials in our explorations "leap" from Mamon-Chicanel to Tepeu 2 or 3 materials.

Excavations in the Northeastern Corner of the Plaza

The objective of Subop CC-15-V was to recover stratigraphic evidence of the northeastern section of the upper plaza since there have been no test pits opened in this corner of the plaza. Originally planned as a single 2-x-2-m unit, the excavations in this part of the plaza ultimately included a 5-x-3-m block comprising three adjacent Subops (CC-15-V, -X, and -EE). The crew first opened Subop CC-15-V as a 2-x-2-m chronological test pit, but shallowly buried architectural features and multiple burials required first a 1-x-2-m extension to the east (Subop CC-15-X) and second a 2-x-2-m extension to the west (Subop CC-15-EE). Additionally, we explored the final architectural phase on Structure A-12, the low mound that encloses the northeastern corner of the plaza between Structures A-1 and A-13 through a 3-x-1-m trench (Subop CC-15-H) placed nearby.

Subops CC-15-V and CC-15-X were excavated in 21 lots based on natural and cultural stratigraphic layers (Table 2.6). The suboperations, along with Subop CC-15-EE, which extended the block of units to the east, uncovered two architectonic features including a platform that measured at least 2 m north-south and 1.34 m east-west and two construction pen walls, which contact the platform on its southeast corner (Figure 2.20). Moreover, excavations uncovered three burials. The first (Burial CC-B20) consisted of a single individual, extended, prone and encapsulated by a cist directly on the Floor 5 surface. The second (Burial CC-B19) and third (Burial CC-B21) burials were secondary; one was clustered in the fill inside the platform and another in the fill outside this feature (see Figure 2.20).

Chronologically, the first feature of the unit is a 40-cm thick fill of very packed dark brown (almost black) dirt and construction fill made

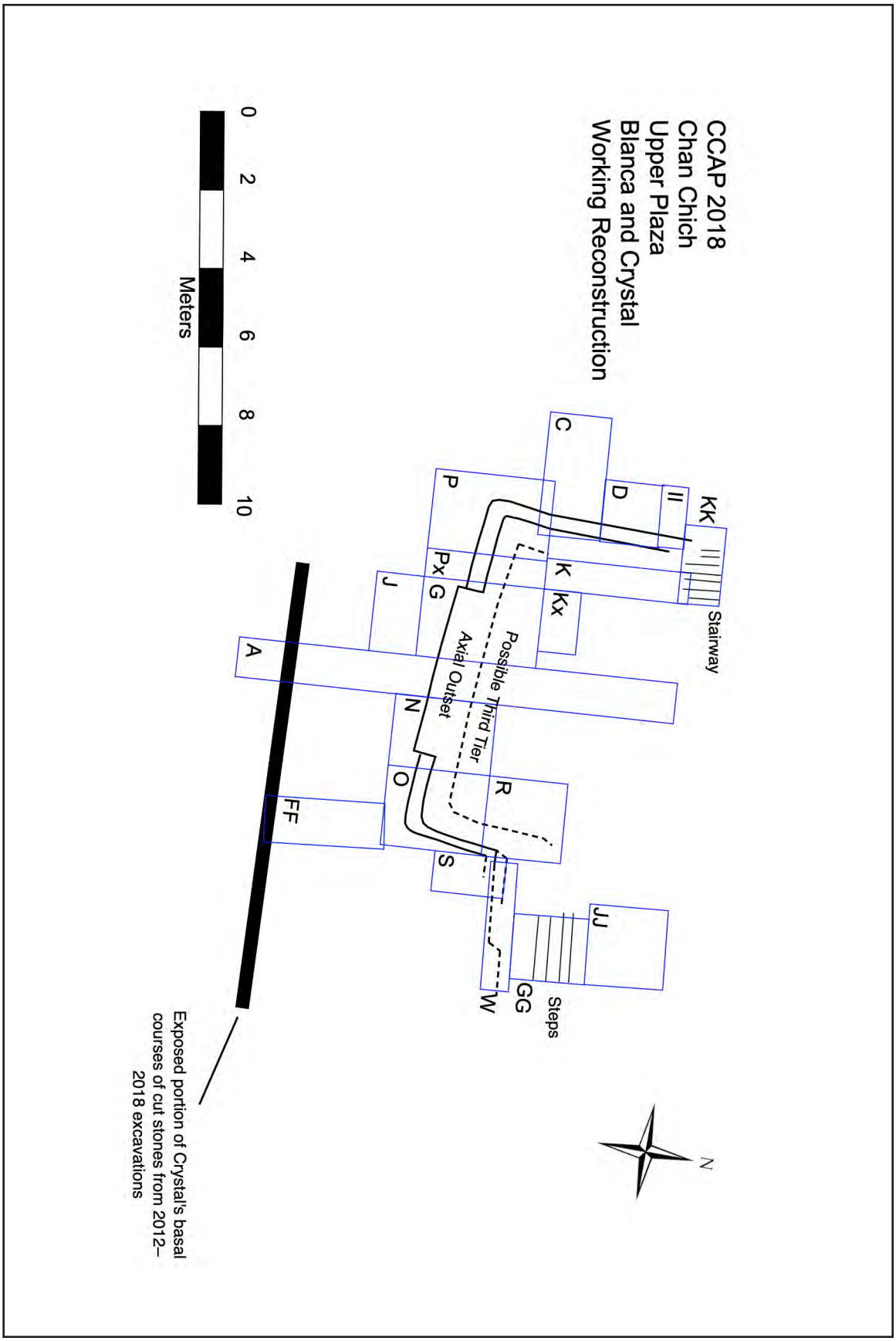

Figure 2.19. Plan map of exposed portions of Blanca and Crystal substructures in 2017 and 2018 excavation units.

Table 2.6. Summary of Suboperations and Lots in the Northeastern Corner of the Plaza

Suboperation	Lot	Lot Description	Ceramic Sphere	Sherd Count
CC-15-V	1	Top Soil	Motmot 3	31
	2	Top Soil	Floral Park to Tepeu 2	40
	3	Floor	Chicanel to Tepeu 1	472
	4	Construction Fill	Floral Park to Tzakol	357
	5	Construction Fill		
	6	Construction Fill	Chicanel and Floral Park	12
	7	Burial		
	8	Construction Debris	Chicanel to Tzakol	673
	9	Construction Fill	Tzakol with Chicanel admix	42
	10	Construction Fill	Chicanel and Floral Park	79
	11	Collapse Debris	Chicanel and Floral Park	55
	12	Other Surface	Tzakol	19
	13	Other		
	14	Wall		1
	15	Burial		
	16	Burial	Chicanel	24
	17	Floor	Mamon	24
	18	Floor	Mamon	103
	19	Floor	Floral Park	20
	20	Construction Fill	Chicanel	21
	21	Construction Fill		1
	22	Construction Fill	Chicanel	36
	23	Construction Fill	Mamon to Chicanel	237
	24	Other		
	25	Other		
CC-15-X	1	Top Soil	Tepeu 2-3	76
	2	Floor	Tepeu 2	33
	3	Construction Fill	Chicanel to Tepeu 1	407
	4	Construction Fill		
	5	Collapse Debris		
CC-15-EE	1	Topsoil		
	2	Floor		
	3	Construction Fill	Mamon to Floral Park	71
	4	Construction Fill	Mamon to Tzakol	87
	5	Construction Fill	Chicanel to Tzakol	116
	6	Burial		
	7		Chicanel with Mamon trace	249
CC-15-HH	1	Topsoil	Tepeu 2-3	6
	2	Collapse Debris	Tepeu 2-3	94

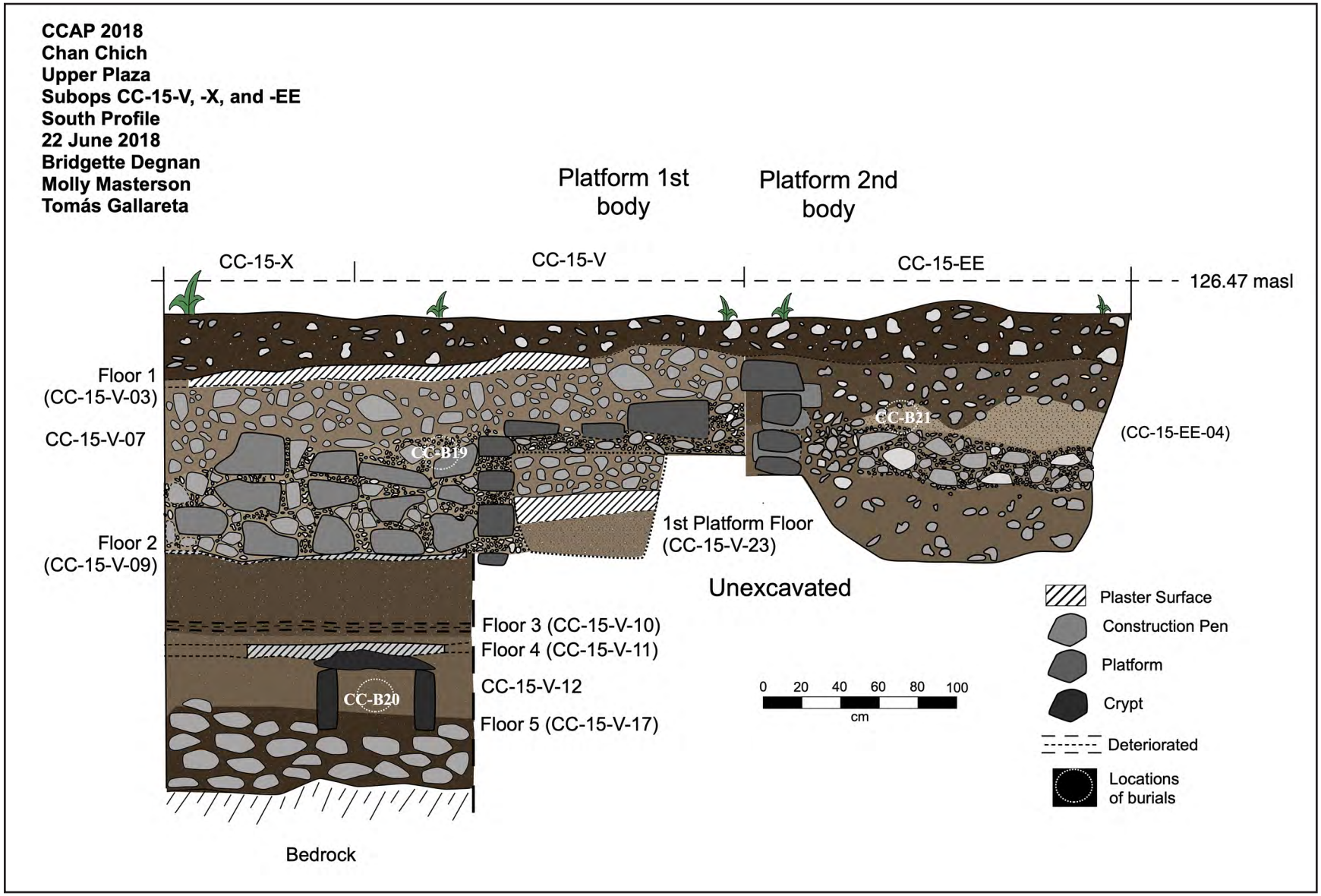

Figure 2.20. South profile of Subops CC-15-V, -X, and -EE showing the stratigraphic relationship among Burials CC-B19, -B20, and -B21.

of medium and large rocks placed on bedrock. In this corner of the plaza, bedrock is 232 cm below the plaza surface (or 296 cm below Datum B) at an elevation of 129.13 m above sea level. The fill contained Middle Preclassic ceramics, and four charcoal samples (Samples CC-15-S177, CC-15-S181, CC-15-S183, and CC-15-S185) dated this context to 650–544 cal BC, 837–797 cal BC, 801–751 cal BC, and 789–756 cal BC, respectively. Burial CC-B20 was located on top of this surface, however, it associated to ceramic materials dated to the Late Preclassic to Early Classic period, suggesting that the surface, which we are calling Floor 5, was constructed much earlier than when Burial CC-B20 was deposited. The burial consisted of a single individual buried inside a cist with capstones. The cist consisted of seven vertically-oriented, large, roughly-shaped rocks, four to the east and three to the west, that surrounded the individual and three large irregular chert boulders that served as capstones (Figure 2.21). The cist's walls and capstones, as well as the overlying floors and fill, completely sealed the cist and prevented sediment from infilling it. The individual was articulated, supine, extended, oriented northeast to southwest, with its head oriented to the south. Burial CC-B20 had no visible funerary offerings. Recovered charcoal samples date the surface under Burial CC-B20 to 837–797 cal BC and 801–751 cal BC (Samples CC-15-S181 and -S183, respectively). Sherds recovered inside the cist a part of the fill (Lot CC-15-V-16) date Burial CC-B20 to the Late Preclassic period, while sherds recovered outside date to the Early Classic (Lot CC-15-V-12). See Novotny et al. (this volume) for more information on this burial.

Sometime after Burial CC-B20 was capped, it was covered first with dry fill of cobbles (Lot CC-15-V-13) and afterward with very compact dirt and cobble fill (Lot CC-15-V-12) sometime during the Late Preclassic period before it was sealed by a floor surface (Floor 4, Lot CC-15-V-11) dated to the Terminal Preclassic-Early Classic period. Afterward, this surface was renovated (Floor 3, Lot CC-15-V-10) and later covered with a dark grayish brown fill and mixed ceramic sherds dated to the Late Preclassic and Early Classic periods. This fill layer raised the height of the plaza by 38 cm and was sealed by a stucco floor (Floor 2, Lot CC-15-V-09). Charcoal Sample CC-15-S144 dates this episode to cal. AD 211–336. This stucco level was associated with the construction of two architectonic features. The first feature consisted of a square platform with at least two construction phases. The first construction phase is evidenced by a stucco floor (Lot CC-15-V-23). The stucco floor did not preserve in Subop CC-15-EE to the west, but it may be contemporaneous with a compact surface and fill (Lot CC-15-EE-07). This would suggest that the platform was 30 cm high from the floor level and extended at least 317 cm to the west. A charcoal sample (Sample CC-15-S201) extracted from this context dated Lot CC-15-V-23, the stucco floor, to cal AD 505–609. The second construction phase of this platform had two bodies, or smaller platforms, and was constructed out of large carved stones (approximately 35 cm by 20 cm by 20 cm deep). As seen in Figures 2.22 and 2.23, the easternmost body (Lots CC-15-V and -X) consisted of a platform that was four courses high (70 cm from the floor level), oriented roughly east-west and north-south. Excavations inside this feature yielded a mixed context dated from the Middle to Late Preclassic period (Lot CC-15-V-23). As seen in Figure 2.23, the westernmost body (Lot CC-15-EE-03) consisted of a stone alignment made of at least six large rough stones oriented south to northeast and measured 172 cm north to; this body was higher, at 70 cm from the floor level of the platform's first construction phase. The second alignment of stones was observed in the northwest corner of Subop CC-15-V, roughly at

Figure 2.21. Perspective orthomosaic of Burial CC-B20, view to the southwest, after the capstones had been removed.

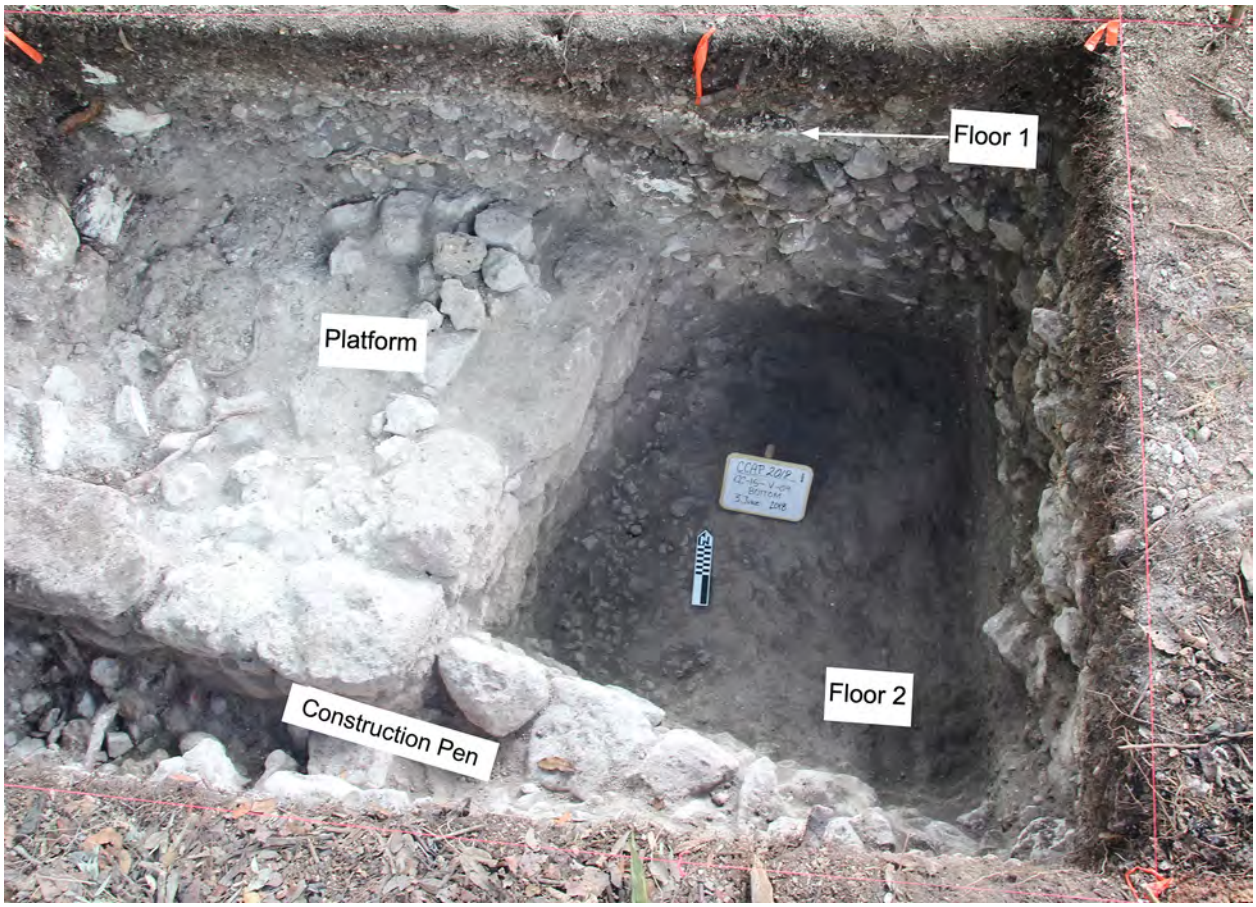

Figure 2.22. Photograph of Subops CC-15-V (left) and -X (right), showing some of their main architectural features, view to the north.

the same level as the east platform. Moreover, a secondary burial, Burial CC-B21 (Lot CC-15-EE-06), was found inside the construction fill and covered by a ceramic fragment. The surrounding fill (Lot CC-15-EE-05) dates the burial to between the Late Preclassic and the Early Classic period. See Novotny et al. (this volume) for more information on Burial CC-B21.

The stone wall made of large semi-carved rocks oriented roughly east to west, located south of the masonry platform described earlier. This wall is located on top of the same Terminal Preclassic-Early Classic period plaster surface (Floor 2, Lot CC-15-V-09) on which the masonry platform stands. This wall meets the platform's southeastern corner, which suggests that this feature was a later addition and perhaps a construction pen used when the platform was covered in the Early Classic period (see Figure 2.23). Slightly outside of the masonry platform to the east, we uncovered another secondary burial (Burial CC-B19, Lots CC-15-V-07 and -09) that also dates to the Early Classic, when the platform was covered with fill for the construction of the Upper Plaza's surface. See Novotny et al. (this volume) for more information on this burial.

A rough stucco surface (Floor 1, Lot CC-15-V-03) which tilted downwards on the east, probably for draining the water away from the plaza characterized, was evidence of the last construction episode in the northeast construction sequence of the Upper Plaza (Figure 2.24). The fill of this floor yielded mixed context with ceramic types that range

Figure 2.23. Photograph of Subops CC-15-EE (left), -V (center-right), and -X (far right), showing some of their main architectural features, view to the north/northeast.

Figure 2.24. Photograph of sloping stucco floor located at bottom of Lot CC-15-X-01, view to the west.

from the Late Preclassic to Late Classic periods. The large quantity of ceramic sherds recovered from the fill below this plaza floor in the northwest portion of Subop CC-15-V, near the edge of the platform (n=472 in Lot CC-15-V-03 and n=357 in Lot CC-15-V-04), as well as debitage (n=150 in Lots CC-15-V-03 and -04), suggests that this context might have been a midden or the fill itself is a transposed midden.

Finally, we opened an exploratory 3-x-1-m unit, oriented east to west, on the western face of Structure A-12, a 1.5-m high mound that encloses the northeastern corner of the Upper Plaza, connecting to Structure A-1 and Structure A-13 (Figure 2.25). This unit (Subop CC-15-HH) encountered entirely collapse debris above the final plaza floor. The floor had a thick layer of white melted marl on its top. Ceramic artifacts recovered on top of this stucco floor from collapse debris date to the Late Classic period. The unit failed to encounter any architecture associated with Structure A-12.

Figure 2.25. Photograph of final plaza floor in Subop CC-15-HH, view to the east.

Excavations at the Northwestern Corner of the Plaza

Excavations at the northwestern part of the plaza focused on chronology. As was the case with the northeastern corner, the initial 2-x-2-m test pit, Subop CC-15-U, encountered buried architecture that required expanded excavations. Ultimately, we excavated two 2-x-2-m suboperations, with Subop CC-15-Z placed immediately south of the first unit with an offset of 0.75 m to the east (Figure 2.26). Subops CC-15-U and -Z were excavated in eight lots based on natural and cultural stratigraphic layers (Table 2.7), which revealed six different plaster floors dated from the Middle to Late Preclassic periods (Floors 2, 3, 4, 5, and, 6) and the Late Classic (Floor 1).

The earliest human activity detected on this unit consists of Middle and Late Preclassic period ceramics mixed within approximately 60 cm of dirt (Lot CC-15-Z-18) placed on top of bedrock. During this same period, the Maya built a north-south wall made of roughly shaped stones that we encountered in the eastern side of Subop CC-15-Z (Figure 2.27). The wall was two courses high, or 36 cm from its base, and was standing on bedrock 194 cm from the surface (at an elevation of 124.7 m above sea level). Ceramic evidence dates this feature as early as the Middle to Late Preclassic period. The wall was covered by 65 cm of construction fill comprising small to medium sized cobbles in a grayish-brown matrix and sealed by Floors 6 and 5 (Lots CC-15-Z-10 and -11), also during the Middle to Late Preclassic periods (Figure 2.28). Samples CC-15-S158, -S160, and -S165) date Floor 6 to 519–394 cal BC, 556–409 cal

Figure 2.26. Photograph of Subops CC-15-U (top) and -Z (bottom), view to the north.

BC, and 541–402 cal BC, respectively. It is likely that Floor 5 was a renovation of Floor 6 since it is located directly on top of the other. A 20-cm thick layer of grayish-brown dirt and Floor 4 (Lot CC-15-Z-09) covered Floor 5. A 15-cm thick layer of the same type of dirt fill and Floor 3 (Lot CC-15-Z-06) covered Floor 4. Charcoal samples yielded a date range for Floor 4 of 561–425 cal BC (Sample CC-15-S152) and a date range for Floor 3 of 647–548 cal BC and 761–540 cal BC (Samples CC-15-S166 and -S209, respectively). Moreover, the ceramic evidence corroborates these sample and dates these floors to between 600–400 BC. It is worth noticing that both floors presented evidence of damage, had overall poor preservation, presented mixed ceramics, and included a significant quantity of jute (n=ca. 100) and charcoal throughout the fill.

Floor 2 and 14 cm of dirt fill capped Floor 3. This Late Preclassic floor covered Subop CC-15-Z and extended north to Subop CC-15-U, where a 1.3-m thick masonry wall that ran in a north to south direction was constructed on it. This feature, which is mostly visible in Subop CC-15-U, consisted of two rows of squared stones, measuring about 30 cm tall by 20 cm wide, separated by a compact wall core of small amorphous stones (Figure 2.29, also see Figure 2.26). Excavations of this architectonic feature in Subop CC-15-U yielded evidence of a stucco floor (Lot CC-15-U-6, Floor 2) only on the east, the side that faces the Upper Plaza. A large amount of mixed ceramics was observed within the wall (n=220). This Late Preclassic period wall was covered with medium to small rocks and soil, and a plaster floor (Floor 1) was constructed during the Late Classic period (AD 600–700). Although this stucco floor was very well preserved throughout Subop CC-15-U,

Table 2.7. Summary of Suboperations and Lots in the Northwestern Corner of the Plaza

Suboperation	Lot	Lot Description	Ceramic Sphere	Sherd Count
CC-15-U	1	Top Soil	Motmot 3	27
	2	Floor	Tepeu 2	73
	3	Construction Fill		
	4	Construction Fill	Mamon to Floral Park	82
	5	Construction Fill	Mamon to Floral Park	183
	6	Wall		
	7	Construction Fill		
	8	Wall	Chicanel	6
CC-15-Z	1	Top Soil	Tepeu 2-3?	5
	2	Floor	Tepeu 2-3	41
	3	Construction Fill	Floral Park to Tepeu 2	16
	4	Other Surface	Chicanel to Floral Park	53
	5	Floor	Mamon to Chicanel	148
	6	Midden	Mamon	96
	7	Other Surface	Mamon	135
	8	Construction Fill	Mamon	43
	9	Floor	Mamon	83
	10	Floor	Mamon to Chicanel	130
	11	Floor	Mamon to Chicanel	197
	12	Construction Fill	Mamon	41
	13	Wall	Mamon to Floral Park	66
	14	Wall		6
	15	Wall	Mamon	5
	16	Construction Fill		
	17	Construction Fill		
	18	Bedrock	Chicanel	2

it was damaged in Subop CC-15-Z. Materials on top of this floor, corresponding to the contemporary surface of the Upper Plaza, date to the Terminal Classic period.

FINAL COMMENTS

The last archaeological excavation of three planned seasons of work to document the construction history of the Upper Plaza built on and expanded the data recovered from the 2016 and 2017 seasons. Data recovered from this season improved our understanding of the construction sequences of the northeast and northwest portions of the Upper Plaza, areas that were previously unexplored. Our explorations corroborate the presence of multiple buried structures dating to the Middle and Late Preclassic periods.

During the Middle Preclassic, Chan Chich was a small village, which occupied primarily the north and central portions of the plaza. Our excavations suggest two large structures, Blanca and Crystal, were constructed during the early Late Preclassic period and a third previously unknown substructure, of which we only uncovered its staircase, was built even before during the Middle Preclassic. Moreover,

Figure 2.27. Photograph of Middle to Late Preclassic stone wall located on bedrock in Subop CC-15-Z, view to the north.

the northeastern and northwestern sections of the Upper Plaza yielded evidence of multiple architectonic features, such as a multi-body Late Preclassic-Early Classic platform in the northeastern part of the plaza and at least two walls dated to the Middle to Late Preclassic and Late Preclassic to Early Classic periods in the northwestern part of the plaza. This evidence corroborates that the Upper Plaza was a constructed landscape since the earliest occupation of the site and had multiple growth spurs, especially during the Late Preclassic and Late Classic periods. Excavations at Structure A-1E suggest that two of its rooms were vaulted and had benches dated to Late Classic period. As we mentioned elsewhere (Gallareta Cervera et al. 2017), by the Terminal Preclassic period the elite turned the village into a small kingdom and used the plaza as a royal necropolis for an early king (Tomb 2) and a likely successor (Crypt 1) in the Terminal Preclassic and Early Classic periods, respectively.

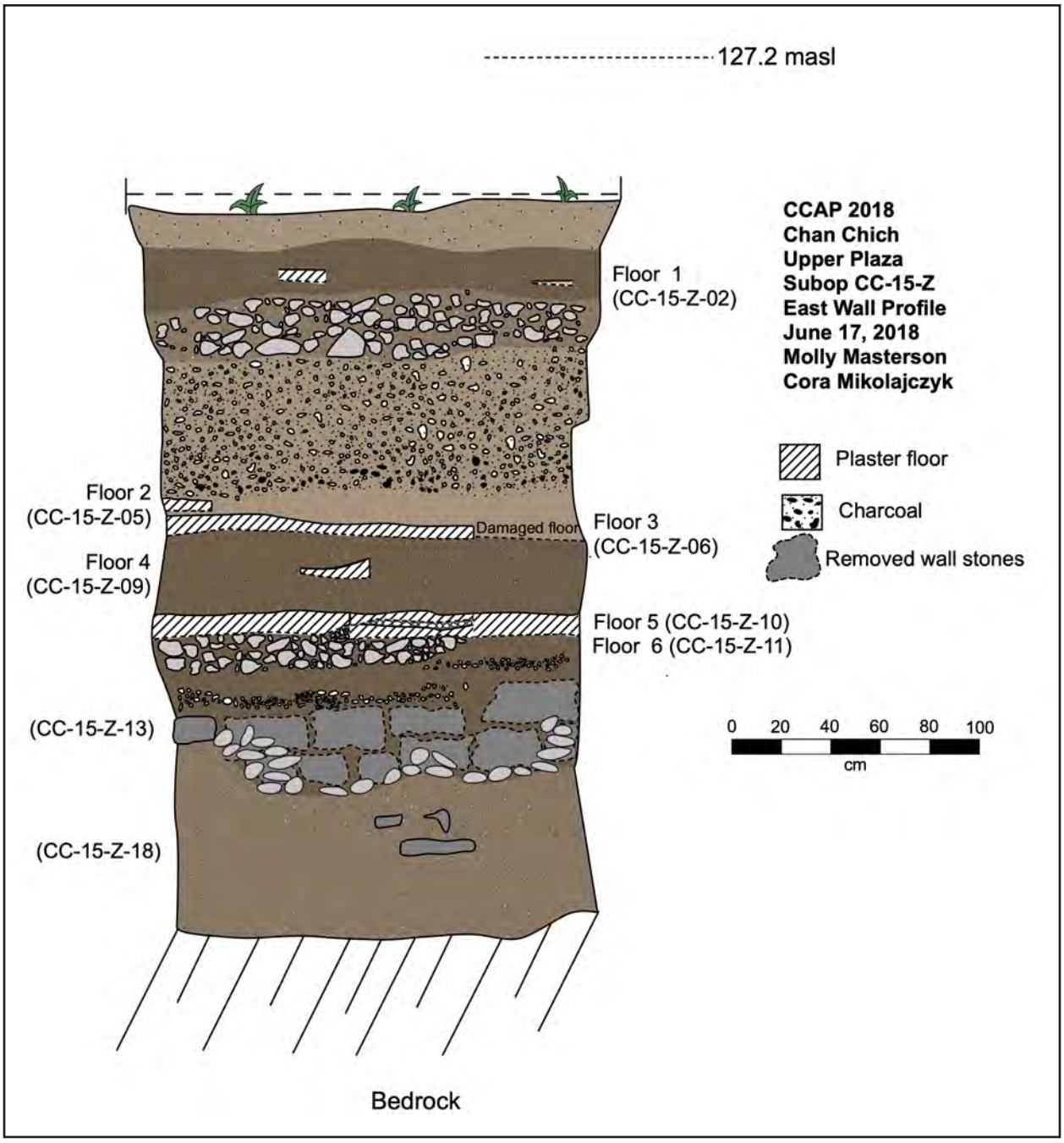

Figure 2.28. East profile of Subop CC-15-Z.

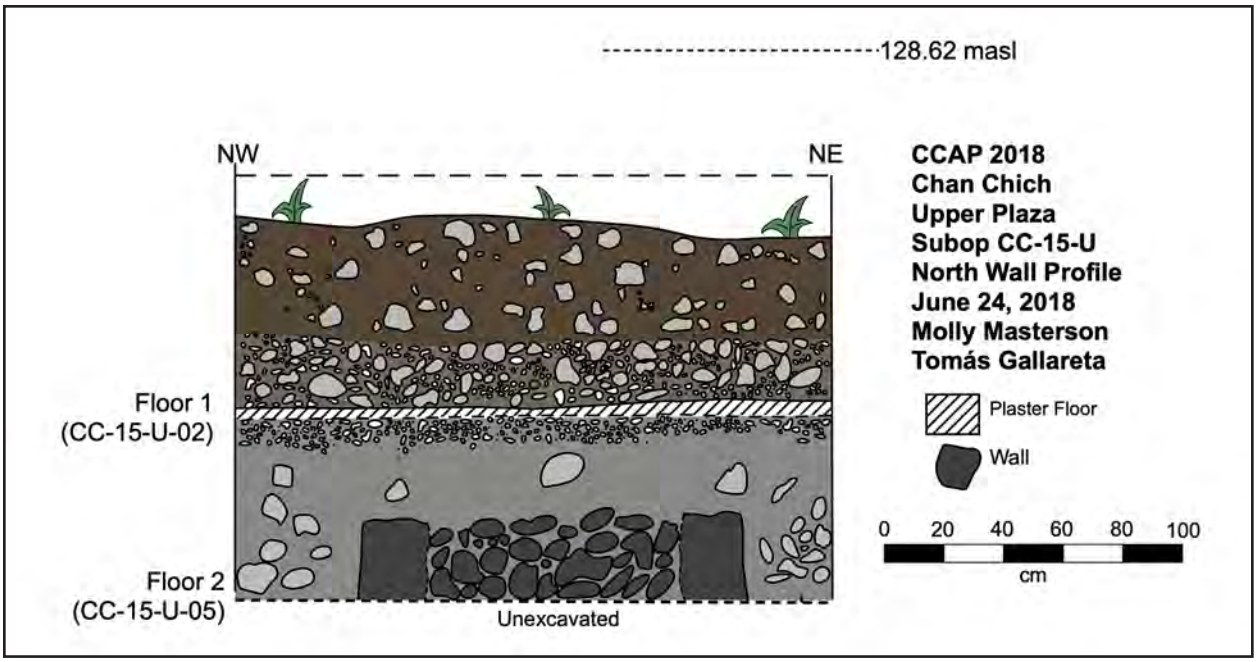

Figure 2.29. North profile of Subop CC-15-U.

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Continued Investigations at an Epicentral Lithic Workshop in the North Plaza at Chan Chich, Belize

Bridgette Degnan and Brett A. Houk

In 2017, the Chan Chich Archaeological Project (CCAP) began investigations into the nature of lithic production at an epicentral workshop and its associated deposit located on and adjacent to the eastern structure (Structure A-6) in Chan Chich's North Plaza (Degnan et al. 2017). In 2018, the CCAP expanded on the previous season's work to determine if production activities also took place in the open plaza floor of the North Plaza. The 2017 and 2018 investigations are the start of a long-term research objective of the CCAP to determine if the North Plaza functioned as a marketplace during the Late Classic period. In addition, these excavations explore the relationship between lithic production in an urban center and lithic production in household groups, such as that already excavated at Group H and that which has been surveyed at Group B (Figure 3.1).

Degnan and colleagues' (2017) investigations confirmed that artisans used Structure A-6, located on the eastern edge of the North Plaza, as a lithic workshop during the Late Classic period. Here, artisans reduced preforms made from locally available chert and chalcedony cobbles into finished bifaces. Likely in an effort to keep their workplace clean, the flint knappers appear to have swept or dumped the waste products of their work, including debitage, microdebitage, and broken tools, broken tools off the north end of the structure and down the eastern face of the North Plaza's platform.

The 2018 investigations had a two-part focus: to determine if comparable lithic production activity occurred elsewhere on the open plaza floor and to determine the northern limits of the debitage deposit. The eastern part of the North Plaza floor is mostly manacured grass and landscaping associated with Chan Chich Lodge, and in many areas debitage is visible on the surface. Numerous lodge-related features and impacts, discussed below, unfortunately prevent extensive investigations of the entire plaza floor. These modern features particularly impact the central and western thirds of the North Plaza, which contain two casitas, the manager's house, and other structures and impacts. Therefore, we limited our 2018 excavations to two units on the eastern portion of the plaza and several shovel tests within the debitage deposit.

As described below, the 2018 excavations were designed to provide a comparative dataset to that obtained from excavations at Structure A-6 in 2017 (Degnan et al. 2017). Additionally, we wished to compare the North Plaza workshop to a contemporaneous lithic workshop located in a suburban neighborhood group, Group H, over 1 km away. In 1998, Meadows and Hartnett (2000) investigated lithic production in this neighborhood group by testing two of four recorded debitage deposits and an associated structure (see also Houk and Zaro 2015a). To better compare our results, Degnan reanalyzed column samples from the Group H assemblage, curated at Texas Tech University's archaeology

Degnan, Bridgette, and Brett A. Houk
2019 Continued Investigations at an Epicentral Lithic Workshop in the North Plaza at Chan Chich, Belize. In *The 2018 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 67–92. Papers of the Chan Chich Archaeological Project, Number 13. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

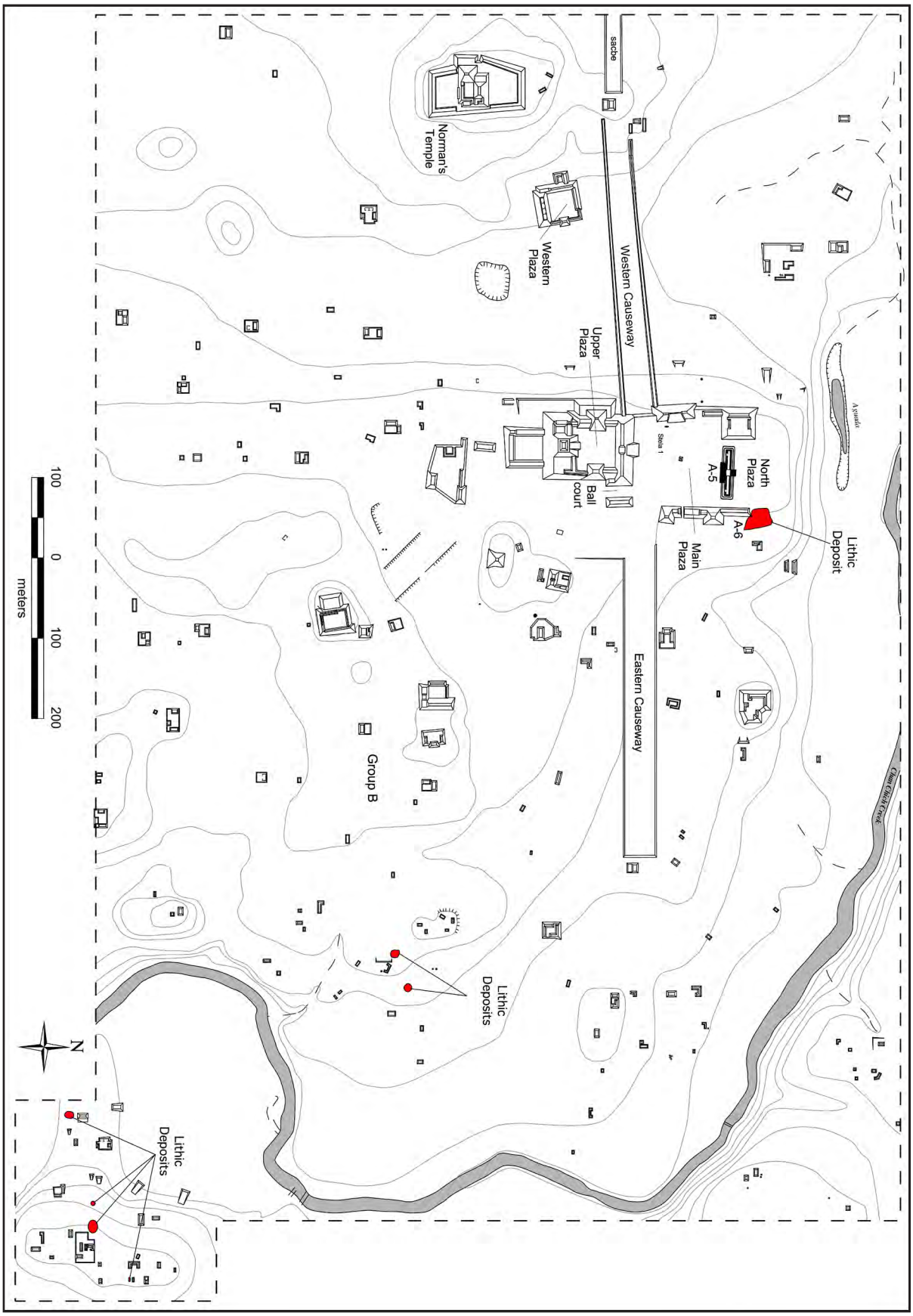

Figure 3.1. Map of Chan Chich showing the locations of known debitage deposits in Groups A, B, and H.

laboratory. This chapter presents the results of the 2018 excavations and artifact analysis, introduced above, as well as the results of Degnan's re-examination of Group H debitage.

OPERATION CC-18: RESEARCH DESIGN AND FIELD METHODS

The 2018 excavations of Op CC-18 occurred on June 23, 2018, under the direction of Bridgette Degnan with field assistance from Cora Mikolajczyk and hired crew. Project Director Brett A. Houk assisted with the design and interpretation of the day's work, mapping the excavation units, delineating the boundaries of the debitage deposit, and lab analysis.

The guiding research questions for the season's excavations were:

- Does evidence of lithic production extend beyond Structure A-6 and onto the North Plaza floor? If so, to what extent and intensity?
- What is the northern limit of the North Plaza debitage deposit?

To investigate our first research question, we proposed to excavate a single 2-x-2-m unit on the North Plaza floor, north of Structure A-6 and several meters west of the debitage deposit's eastern limit. To explore our second, we conducted systematic shovel testing on a north-south line running through the deposit. Modern impacts associated with Chan Chich Lodge riddle the North Plaza, limiting potential excavation areas. In the northeastern portion of the plaza, impacts include two casitas, the swimming pool, the pool house, the laundry room, a septic tank, stone footpaths, and the start of a hiking trail. In addition, unmarked underground utilities cross the plaza. Consequently, we required two 2-x-2-m suboperations to fulfill the research goals, as a buried utility line impacted the first unit.

In the field, the excavation team collected all ceramics and stone tools noticed during excavations. Consistent with the 2017 field methods, we sifted a 25-percent sample of the matrix through a ¼-inch screen to collect a consistent debitage sample (the first of every four buckets). For all field methods beyond those specified here, see Houk and Zaro (2015b).

The North Plaza debitage deposit lies north of Structure A-6 and along the eastern edge of the plaza. Dense, native brush covers the eastern edge of the plaza and the entire debitage deposit, obscuring its limits. The 2017 investigations identified the western and southern limits of the debitage deposit but failed to establish the feature's northern limit. The eastern boundary is similarly unknown due to modern impacts from the lodge including an access road, the pool pump house, and a dense brush pile that spills down the eastern side of Structure A-6 and a portion of the plaza's edge. Nevertheless, Degnan and colleagues (2017) documented that the deposit drapes the sloping eastern face of the plaza's platform for at least 20 m.

To determine the northern limits of the deposit, Houk excavated small probes with a post-hole digger along a north-south line approximately 2 m inside the brush and 1 m from the edge of the plaza. These probes penetrated the topsoil and tested for the presence or absence of a dense layer of debitage. Houk spaced the probes approximately 3 m apart; they were not mapped, numbered, or screened.

2017 EXCAVATIONS SUMMARY

Bridgette Degnan directed excavations on Structure A-6 and the adjacent debitage deposit during the 2017 field season (Degnan et al. 2017). Under Op CC-18, Degnan and crew first excavated three suboperations on Structure A-6, two centered on the structure, running east-west down the western platform face,

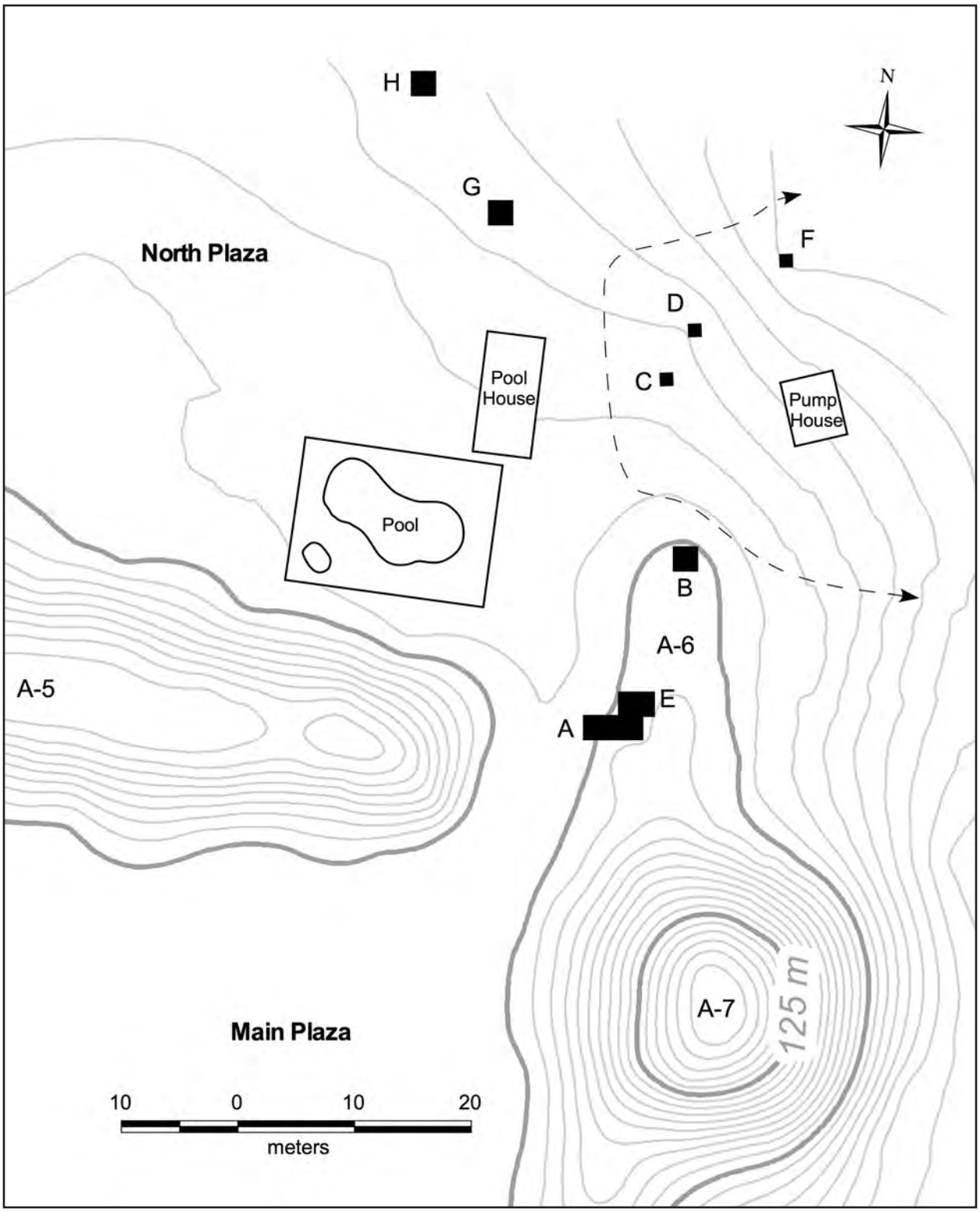

Figure 3.2. Map of the eastern section of the North Plaza and Op CC-18 with 2017 excavations (Subops CC-18-A–F) and 2018 excavations (Subops G and H). Note, due to incomplete topographic data, the contour lines in the northeastern part of the map are provisional.

and a third placed directly onto the structure's summit (Figure 3.2).

These excavations documented Structure A-6 to be a low, two-tiered platform with two earlier construction phases. Ceramics dated the first construction phase to the Late Preclassic period, and the later two to the Late Classic period. The ratio of artifacts was heavily skewed toward lithics, particularly in the Late Classic construction phases, with some ceramic sherds and obsidian blades present. The large quantity of debitage intermixed with lithic tools supports the hypothesis that activity on the structure consisted of on-site lithic production, after which refuse could be easily swept off the platform and into the debitage deposit. Due to the high amount of lithic debris in the construction fill under the terminal architecture, including mostly debitage but also bifaces and production tools, it is likely that lithic production activity occurred on the previous construction phase as well, also dating to the Late Classic.

Excavations then turned to the debitage deposit north of Structure A-6. The deposit slopes down to the east; crews excavated three suboperations, each measuring 1 x 1 m, at the top, middle, and bottom of the slope to understand the deposit's vertical composition and thickness. These three units were designated Subops CC-18-C, -D, and -F, respectively. The units were excavated in 10-cm levels, with a 10-x-10-x-10 cm column sample taken from one or two corners and processed in the lab. These samples allowed us to measure the density of lithic material, and specifically the density of microdebitage present, which would otherwise be lost through the screen. The thickness of the deposit ranged from 50 to 30 cm, and analysis determined the majority of the debitage comprised late-stage production flakes. Degnan and colleagues (2017) inferred that lithic production at the site was centered on late-stage production of preforms transported to the plaza as well as, potentially, on-site maintenance of used tools.

2018 EXCAVATIONS

This section describes Op CC-18 excavations from the 2018 excavation season. Both suboperations lay in the North Plaza, several meters to the northwest of Structure A-6 (see Figure 3.2). The goal of these units was to determine if lithic production extended beyond Structure A-6 and onto the North Plaza floor. This required minimal excavations; across the two suboperations, we excavated 0.68 m^3 total.

Subop CC-18-G

The first suboperation was Subop CC-18-G, a 2-x-2-m unit placed northwest of the debitage deposit, oriented north-south, and offset a meter or two from a modern stone path that leads into the 'front lawn' of the casitas. Its datum was placed in a tree to the northwest of the unit at 119.84 m above sea level.

Our initial goal was for Subop CC-18-G to be the sole suboperation this season, however excavations encountered a utility trench that had been refilled with sand and gravel only a few centimeters below the modern surface. The presence of the trench was not surprising considering the modern footprint in the North Plaza. Due to this disturbance, we quickly closed Subop CC-18-G and opened Subop CC-18-H nearby to continue our investigations. We collected and cataloged artifacts from Subop CC-18-G but only analyzed ceramics (Tables 3.1 and 3.2). In total, we excavated 0.22 m^3 of matrix before closing and backfilling the unit.

Subop CC-18-H

We placed Subop CC-18-H a few meters to the northwest of Subop CC-18-G. Its design and methods mirrored that of the first suboperation; it was a 2-x-2 m unit oriented north-south with

Table 3.1. Summary of 2018 Suboperations and Lots at Op CC-18

Subop	Lot	Lot Description	% of Matrix Screened	Ceramic Data
CC-18-G	01	Humus	25	Tepeu 2-3
CC-18-H	01	Humus	25	Tepeu 2?
CC-18-H	02	Construction Fill	25	Tepeu 2?

Table 3.2. Artifact Recovery from 2018 Lots

Subop CC-	Lot	Ceramics	Deb. *	Deb. Weight (g)	Stone Tools	Possible Utilized Flakes	Obsidian
18-G	01	3	736	N/A**	2	N/A**	0
18-H	01	17	1572	2854.8	1	23	2
18-H	02	24	623	1139.6	1	7	4
* Does not include possible utilized flakes							
** Debitage unanalyzed in lot							

a 25-percent screened sample. Datum H was placed in a tree to the southwest of the unit, at an elevation of 119.00 m above sea level.

The first lot in this suboperation again encountered a modern disturbance, though less threatening than that prior. In 2012, archaeologists placed a short piece of PVC pipe in the ground with the innocent desire to pass time playing washers, not realizing that 6 years later future project members would discover it near the south wall of an excavation unit. We determined this pipe posed no threat to the integrity of the unit and simply removed it.

Roughly 10 cm under the ground surface the matrix changed from topsoil with small cobble inclusions to a rocky fill with medium sized cobble. We interpreted the contrast in matrix to be remnant of the since-eroded floor of the North Plaza and switched lots. At the end of the work day, we arbitrarily closed the lot and suboperation.

Both lots included a large number of lithic flakes and few other artifacts (see Table 3.2), from which we infer the presence of lithic production activity associated with the terminal and possibly penultimate phases of occupation/construction in the North Plaza. Ceramics date both lots to the Late Classic period, signifying lithic activity in the North Plaza was concurrent with that at Structure A-6 (see Table 3.1).

Debitage Deposit Limits

Beginning 3 m north of Subop CC-18-C, Houk excavated a line of three positive post-hole probes and one negative probe to determine that the debitage deposit extends approximately 23 m from the northern edge of Structure A-6. Based on these results and the known limit to the west, the deposit minimally covers 585 m^2. The deposit could extend farther south, off the back side of Structure A-6, and farther east than estimated, but modern disturbances and dense debris piles prevent additional testing.

Summary of Excavations

In summary, the 2018 Op CC-18 excavations confirm the presence of lithic production activity on the North Plaza floor minimally 45 m northwest of Structure A-6 (see Figure 3.2). This expands our previous understanding of the

extent of lithic production in the site core and brings into question the overall purpose of the North Plaza—did the Late Classic Maya use it exclusively as a lithic production locale or did they conduct other activities there as well?

ARTIFACT ANALYSIS

As presented in Degnan et al. (2017), Op CC-18's lithic artifact analysis focuses on investigating the following research questions (updates in italics):

- What types of lithic tools were being manufactured or refurbished at Structure A-6 *and the associated production area on the North Plaza floor*?
- What types of lithic tool production were employed at Structure A-6 *and the associated production area on the North Plaza floor*?

Methodology

The following two sections briefly recount the methods used for flake and lithic tool analysis. For a more detailed account refer to Degnan et al. (2017).

Debitage Analysis

Bridgette Degnan conducted debitage analysis on July 3–4, 2018. The authors developed the analysis methods in 2017 with the assistance of Kevin Miller (Degnan et al. 2017). Our methods mirrored the flake analyses employed by Whittaker et al. (2009) and Heindel et al. (2012) at the respective Maya sites of El Pilar and Buenavista del Cayo, although we altered them to focus on isolated physical attributes rather than classification into a flake typology (see Sullivan and Rozen 1985).

All flakes smaller than ¼ inch are classified as microdebitage, which are weighed as a whole but not analyzed further. All flakes greater than ¼ inch are classified as macrodebitage and analyzed as follows. Degnan first examined each flake to determine its raw material: either chert or chalcedony. Then, she categorized flakes according to four attributes (Figure 3.3). These attributes are hierarchical, in that categorization of each attribute is reliant on the one that comes before it. First, Degnan sorted each flake into one of four size grades by its largest dimension: smaller than 2 cm, 2.01–4 cm, 4.01–6, and 6.01 cm and larger. Next, she examined each flake for evidence of a platform and then further analyzed all flakes with a platform for percent of visible dorsal cortex (either 0–25 percent or 25.01–100 percent) and the number of flake scars on its dorsal surface, hereafter referred to as dorsal scars (either 0, 1, 2, or 3+). After she had sorted each flake in a lot into the appropriate category, Degnan counted and weighed each subdivision as a whole. Finally, Degnan analyzed lithic flakes that displayed signs of utilization the same as non-utilized flakes but classified them as "possible utilized flakes" until use-wear analysis can confirm utilization.

Lithic Tools Analysis

Houk analyzed the lithic tools on July 5, 2018. Lab director Hannah Hughes processed and catalogued all tools in the lab prior to analysis. As we have for prior studies, CCAP employs the morphological lithic tool typology used by Shafer and Hester (1983, 1991) at the site of Colha as we have for prior analyses at Group H (McDow 2000; Meadows and Harnett 2000) and Structure A-6 (Degnan et al. 2017). In addition to grouping tools under a typology, Houk observed or measured the following attributes for each tool: raw material type and quality; weight; maximum length, width, and thickness (in cm); completeness of the tool; and evidence of battering and burning. Furthermore, for bifaces, Houk recorded production stage, percent of visible cortex, evidence of use/reuse, and, if broken, the type of fracture the

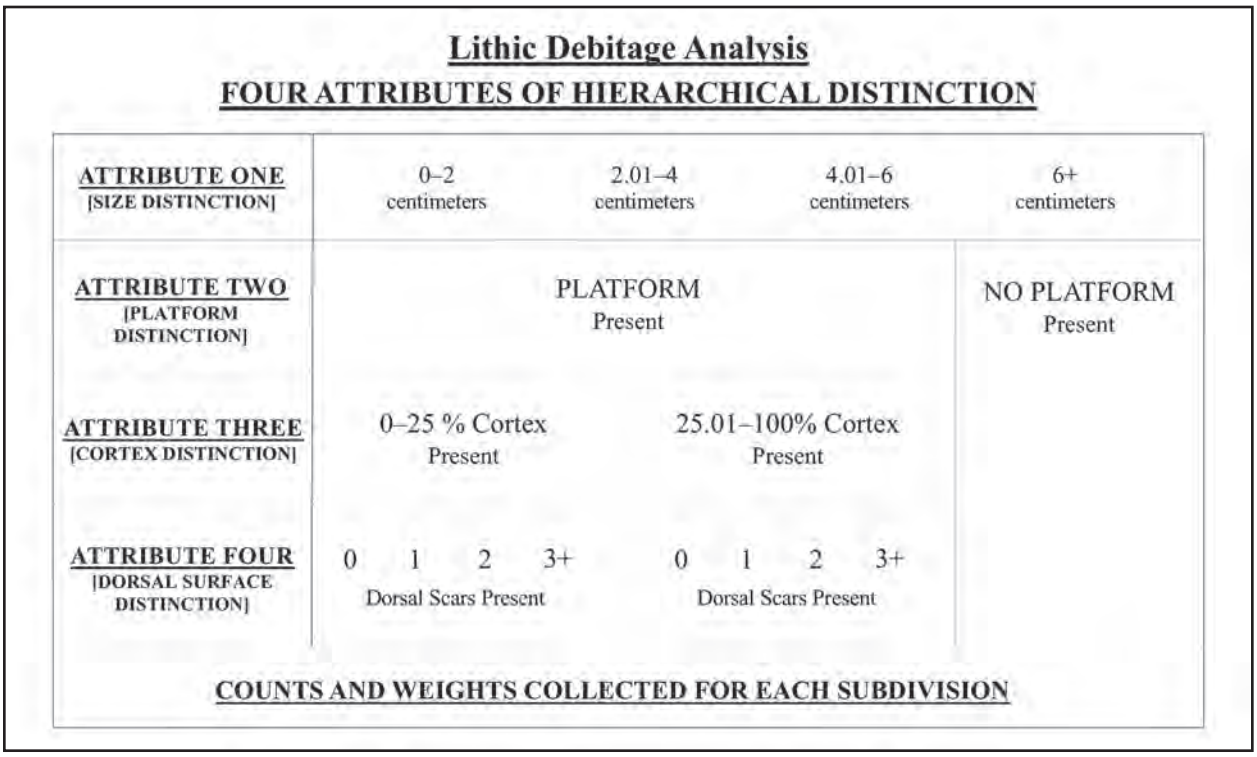

Figure 3.3 Lithic debitage analysis attributes employed in this study.

tool suffered. Finally, Houk photographed each tool and recorded additional notes as necessary.

Results

All recovered artifacts are reported in Table 3.2, but the following sections describe only those artifacts we analyzed: debitage and lithic tools. Please refer to Appendix A, Tables A.1 and A.2, at the end of this report for additional data generated by these analyses.

Debitage

In total, we recovered 2,931 pieces of debitage, including the 30 identified as possible utilized flakes (see Table 3.2). The 736 flakes recovered from Subop CC-18-G were not analyzed, and Table 3.3 breaks down the other 2,195 flakes recovered from Lots CC-18-H-01 and -02. Table 3.3 shows that roughly 50 percent of the analyzed flakes have a platform and 67 percent are chert. Some microdebitage was recovered during excavations (10.3 g total), though it is likely that much of it fell through the ¼ inch screen in the field. The presence of microdebitage is often used as an argument for on-site lithic production (Cap 2001; Whittaker et al. 2009), but as we did not collect a column sample of the matrix we cannot quantify the density of microdebitage. Table A.2 presents the data for 1,101 non-platforming bearing flakes from Subop CC-18-H.

Figures 3.4 and 3.5 summarize the results of the dorsal scars and size categories across the two analyzed lots (see Table A.1). These figures display five panels each subdivided by the four size grades. The first four panels display the percentage of the total number of flakes in the lot for each size grade by the number of dorsal scars. The fifth panel is the aggregate of the first four panels and shows all flakes by size grade. These figures clearly display the large majority of flakes were small, <4 cm flakes with two or more dorsal scars. Figure 3.6 uses the same format to display results from 2017's excavations of Structure

Table 3.3. Analyzed Debitage Summary for Subop CC-18-H, Excluding Possible Utilized Flakes

Lot CC-18-	Total Count	Total Weight	Platform Count	Platform Weight (g)	No Platform Count	No Platform Weight (g)	Chert Count	Chert Weight (g)	Chalcedony Count	Chalcedony Weight (g)	Microdebitage Weight (g)
H-01	1572	2854.8	758	1708.8	814	1146	1088	1931.7	484	923.1	8.2
H-02	623	1139.6	336	783.9	287	355.7	387	731.6	236	408	2.1

A-6's terminal architecture. All three figures are consistent with late-stage lithic production of preforms transported to the North Plaza. The raw data used to make these charts can be found in Appendix A.

Table 3.4 presents the breakdown of cortex percentage for the analyzed debitage. The vast majority of flakes (85.7 percent) had less than 25 percent cortex present on their dorsal surfaces. This indicates that lithic production occurred on locally imported, prepared blanks.

In total, we recovered 30 possible utilized flakes from Subop CC-15-H. Of these, 20 had platforms (Table 3.5), all of which had 3 or more dorsal scars. Ten possible utilized flakes did not have platforms (Table 3.6).

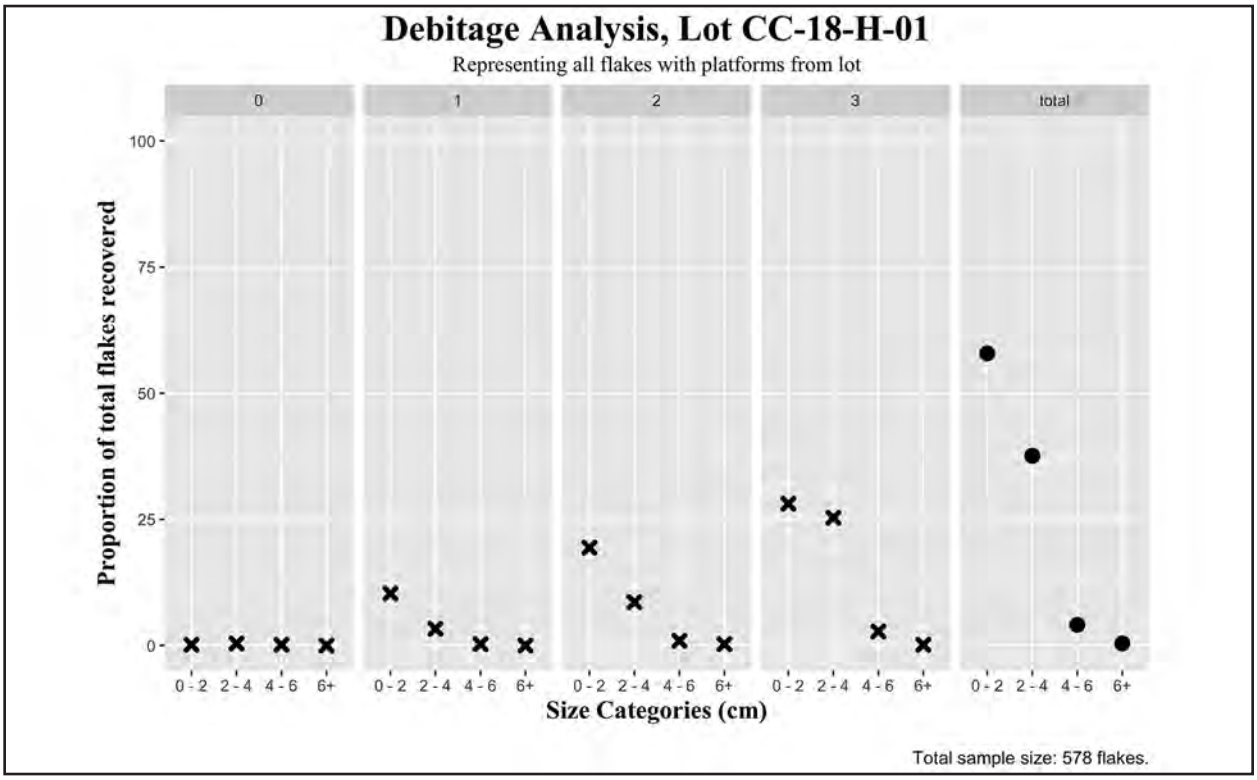

Figure 3.4. Distribution of flake size by the number of dorsal scars on the debitage recovered from Lot CC-18-H-01.

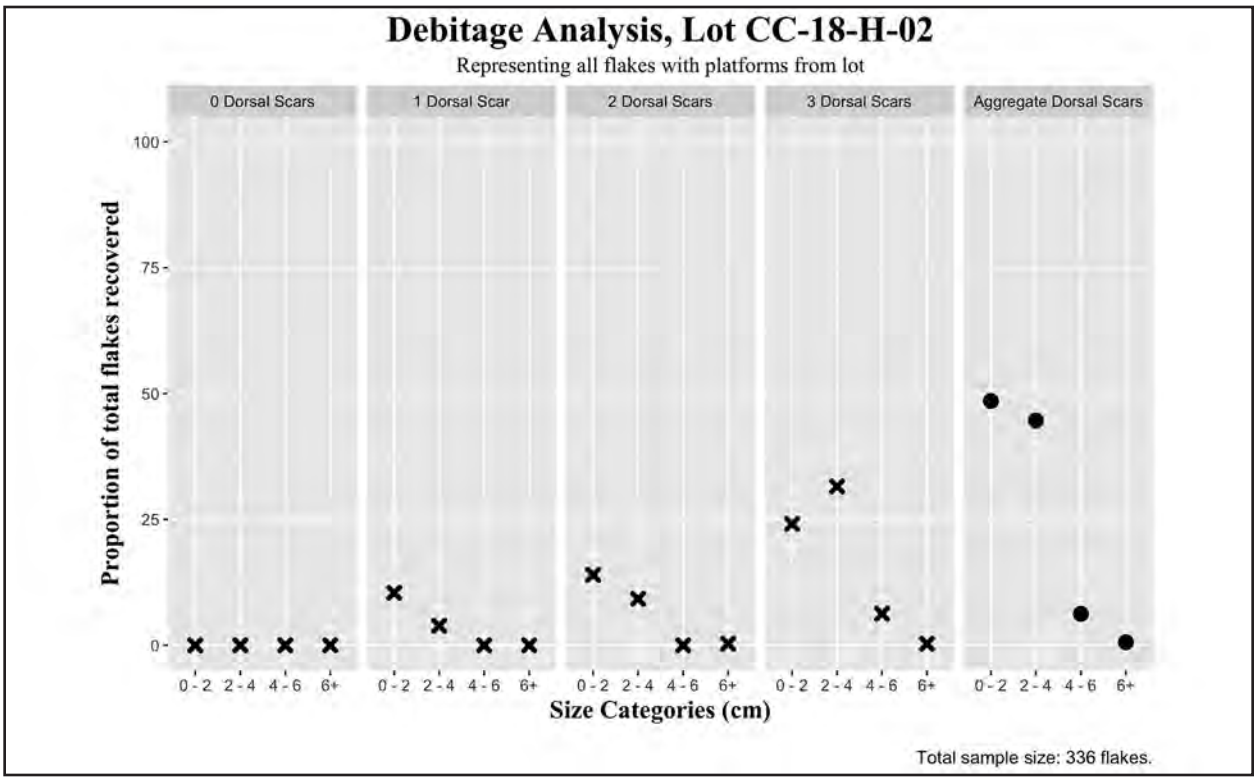

Figure 3.5. Distribution of flake size by the number of dorsal scars on the debitage recovered from Lot CC-18-H-02.

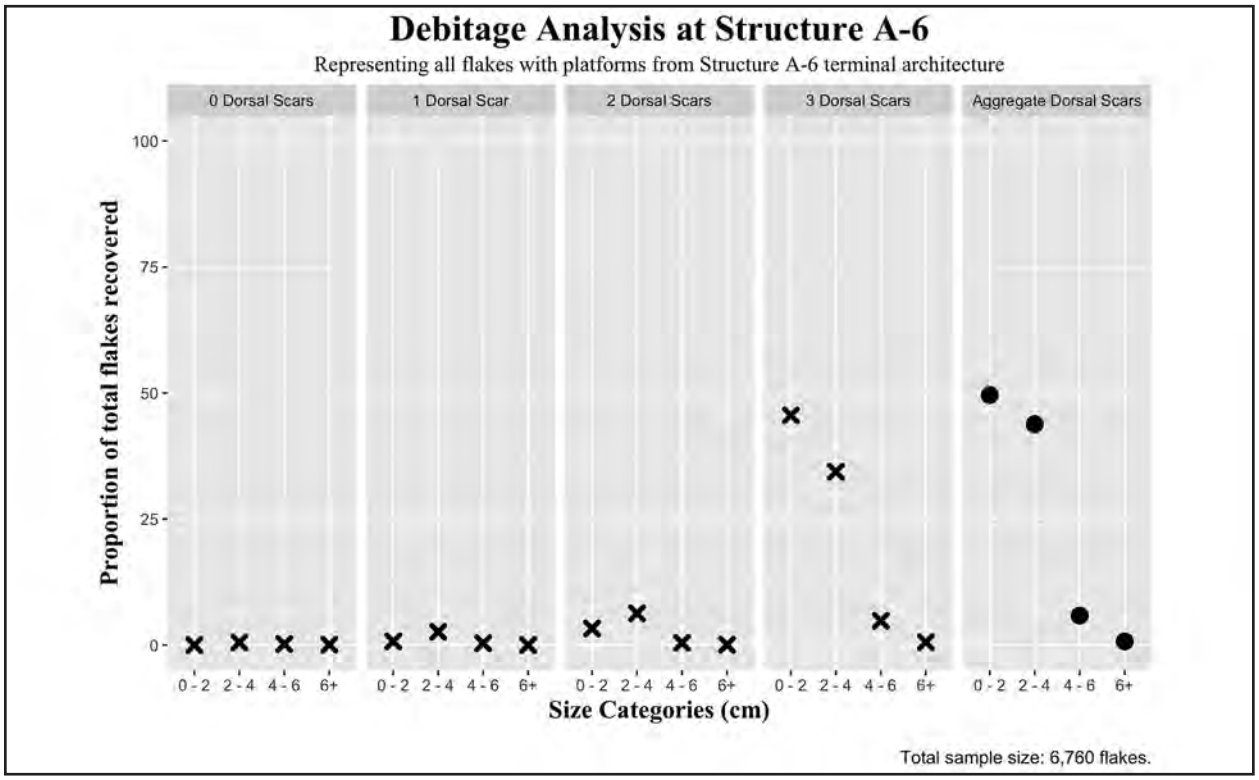

Figure 3.6. Distribution of flake size by the number of dorsal scars on the debitage recovered from North Plaza debitage deposit in 2017.

Table 3.4. Distribution of Cortex Percentage on Flakes from Subop CC-18-H

	Raw Counts		Proportions	
Lot CC-18-	**0-25%**	**25.01–100%**	**0-25%**	**25.01–100%**
H-01	636	122	83.91	16.09
H-02	294	42	87.5	12.5
		Mean	85.70	14.30
		Standard Dev	2.54	2.54

Table 3.5. Possible Utilized Flakes with Platforms from Subop CC-18-H

Lot CC-18-	Raw Material	Cortex Percentage	Debitage Size	Platform Flake Total	W (g)
H-01	Chert	0-25%	0-2 cm	1	1.9
H-01	Chert	0-25%	2-4 cm	7	22.3
H-01	Chert	0-25%	4-6 cm	1	8
H-01	Chalcedony	0-25%	0-2 cm	1	1.4
H-01	Chalcedony	0-25%	2-4 cm	1	2.8
H-01	Chert	25-100%	2-4 cm	2	11.5
H-01	Chalcedony	25-100%	2-4 cm	2	10.1
H-02	Chert	0-25%	0-2 cm	1	1.5
H-02	Chert	0-25%	2-4 cm	2	6.3
H-02	Chalcedony	0-25%	2-4 cm	1	3.5
H-02	Chert	25-100%	4-6 cm	1	19.1

Table 3.6. Possible Utilized Flakes without Platforms from Subop CC-18-H

Lot CC-18-	Raw Material	Debitage Size	Non-Platform Flake Total	W (g)
H-01	Chert	0-2 cm	2	2.3
H-01	Chert	2-4 cm	4	17.9
H-01	Chalcedony	0-2 cm	1	1.3
H-01	Chalcedony	2-4 cm	1	8.3
H-02	Chert	2-4 cm	1	1.7
H-02	Chalcedony	2-4 cm	1	3.1

Lithic Tools

In total, we recovered three bifaces and one core from Subops CC-18-G and -H. The core is a recycled general utility biface (GUB) fragment, and the bifaces consist of one oval biface, one narrow biface, and one biface of unknown form. The analysis results are presented in Table 3.7.

DISCUSSION

The Case for a Marketplace

The 2018 investigations in the eastern area of the North Plaza confirmed that lithic tool production activities occurred on the North Plaza floor as well as on Structure A-6 (see Degnan et al. 2017). The presence of microdebitage in Subop

Table 3.7. Lithic Tools Recovered from Subop CC-18-H

Lot CC-18-	Spec. # CC	Form	Subform	Raw Material	Raw Material Quality[1]	Battering	Completeness[2]	L (cm)	W (cm)	Th (cm)	Weight (g)	Burning	Cortex[3]	Fracture[4]	Production Stage[5]	Use/Reuse
G-01	3798-01	Biface	Narrow Biface	Chert	FG	None	P	6.38	3.93	2.17	60	N	1F	S	F	Unknown
G-01	3798-02	Core	Multi-directional	Chert	FG	Along margins	C	6.51	5.54	3.06	129.9	N	N			GUB recycled into core
H-01	3797-01	Biface	Oval	Chert	CG	None	M	4.3	5.45	1.85	54.1	N	1F	P	F	Unknown
H-01	3795-01	Biface	Unknown	Chal-cedony	CG	None	M	3.48	3.01	1.48	17.1	Y	1F	U	U	Unknown

1. Raw Material Quality: FG = Fine Grained; CG = Coarse Grained
2. Completeness: P = Proximal fragment; C = Complete; M = Medial fragment
3. Cortex: 1F = Present on one Face; N = None
4. Fracture: S = Snap; P = Perverse; U = Unknown
5. Production Stage: F = Finished tool; U = Uknown

CC-18-H, recorded but not fully quantified, is evidence for in situ production activities. Although our chronological data are scant, the ceramics from Lot CC-18-H-01 suggest flint knappers used at least the eastern part of the plaza during the Late Classic period. We propose that this production area functioned as part of a Late Classic marketplace, although additional testing is necessary to identify other commercial activities that may have taken place in the plaza. Furthermore, it appears that the artisans using this production area kept their work areas relatively clean and disposed of their debitage by dumping it along the eastern edge of the plaza, resulting in the large debitage deposit, which blankets the edge and spills down the face of the plaza's platform.

Production Estimates

Using data from the 2017 excavations, it is possible to estimate the total amount of debitage in the deposit and the total number of tools represented by that debitage. Based on the column samples from Subops CC-17-C, -D, and -F, we estimate the average density of the North Plaza debitage deposit to be 796 kg/m^3. Compared to other workshop debitage deposits, this density is very low (Table 3.8). Based on the thickness of the deposit in the three test units, we estimate that on average the deposit is 43 cm thick, and our mapping data suggest it covers minimally 585 m^2. Using these estimates, the debitage deposit contains 200,233.8 kg of debitage (585*0.43*796=200,233.8). As part of a study of a lithic workshop at El Pilar, Whittaker and colleagues (2009) replicated oval bifaces using locally available raw material, starting with roughed out quarry blanks, such as those likely used by the artisans at the North Plaza. They concluded that, conservatively, the manufacture of one biface results in 1,000 to 1,500 g of debitage waste (Whittaker et al. 2009:150). Using those estimates, the debitage deposit at the North Plaza represents the waste from manufacturing 133,490 to 200,234 bifaces.

Although not as dense as the debitage deposits at Group H, the North Plaza's more extensive spread of debitage resulted from the production of more tools than did the individual workshops at Group H. Overall, however, the artisans at Group H collectively produced a greater number of bifaces than did their counterparts at the North Plaza. Unfortunately, we lack the data necessary to estimate how long it took the North Plaza debitage deposit to form and, thus, we cannot estimate the number of tools produced each year.

Table 3.8. Comparison of Tool Production Estimates for Debitage Deposits at Chan Chich and El Pilar

Site	Debitage Deposit	Volume (m3)	Density (kg/m3)	Weight of Debitage	Min. Tools	Max. Tools	Source
Chan Chich	North Plaza	251.55	796	200233.8	133,490	200,234	This study
Chan Chich	Group H, DD-1	77.5	2007	155542.5	103,695	155,543	Houk and Zaro (2015a:Table 1)
Chan Chich	Group H, DD-3	96.8	1781	172400.8	114,934	172,401	Houk and Zaro (2015a:Table 1)
El Pilar	LDF Workshop	240.0	1069	256560.0	171,040	256,560	Whittaker et al. (2009:150)

OPERATION CC-6: RESEARCH DESIGN, METHODS, AND RESULTS

As noted above, Meadows and Hartnett (2000) conducted excavations, designated Op CC-6, at Group H, a residential neighborhood approximately 1.25 km east/southeast of the Main Plaza (see Houk and Zaro [2015a] for a discussion of Group H as a neighborhood). In addition to limited architectural investigations, Meadows and Hartnett (2000) tested two dense debitage deposits, collecting 1,000-cm^3 column samples from each 10-cm thick excavation level (Figure 3.7). The CCAP exported these column samples in 1998 for more detailed analysis. While Meadows conducted some debitage analysis in 1999, his methodology differed from that conducted at Structure A-6 (see Meadows and Harnett 2000). To facilitate comparative analysis between the two locations, Degnan analyzed a sample of debitage from Group H using the same methods as presented above. The sample consisted of three 10-x-10-x-10-cm column samples collected from Lots CC-6-B-04, -06, and -08 in Debitage Deposit 1.

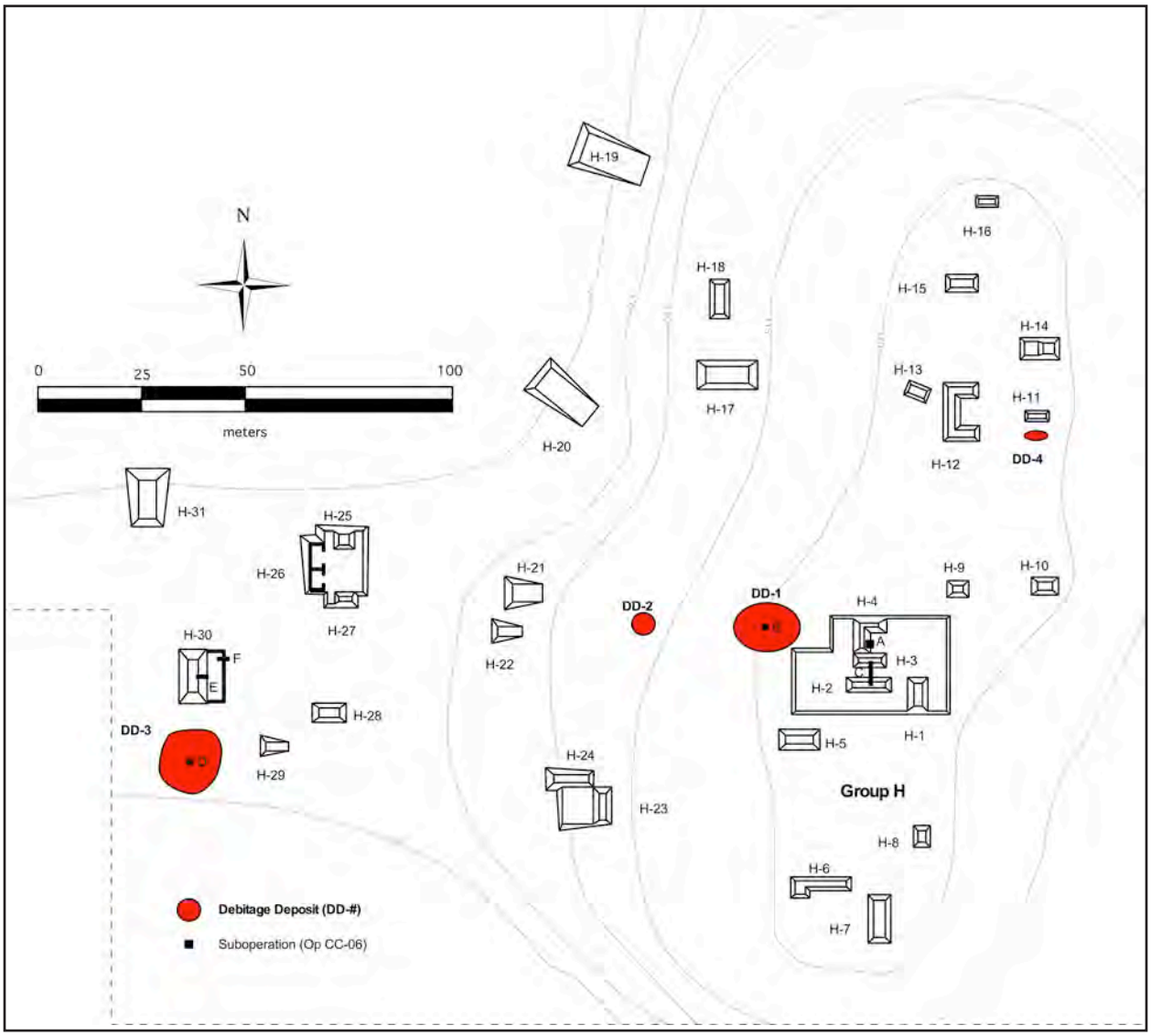

Figure 3.7. Map of Group H showing locations of debitage deposits and 1999 excavation units (after Meadows and Hartnett 2000:Figure 2.1).

Methodology

Degnan conducted analysis of the Group H debitage sample between January and February of 2018. She implemented an identical methodology to that described above for Op CC-18 except that she did not record the raw material or weight of flakes due to limitations on time and resources. The analysis identified three small biface fragments and three possible utilized flakes, which Degnan (2018) noted but did not analyze further.

Results

In total, we analyzed 5,973 flakes from Lots CC-6-B-04, -06, and -08. A summary of the results for each lot is presented in Table 3.9, which gives subtotals for the number of flakes with and without platforms in each lot. Tables A.3 and A.4 present additional data on the Subop CC-6-B debitage. Figure 3.8 summarizes the analysis of flake size and dorsal scars across the three lots, and Table 3.10 gives the breakdown of cortex percentage.

COMPARING LITHIC PRODUCTION AT THE NORTH PLAZA AND GROUP H

This section gives a brief comparison of the North Plaza debitage deposit with Debitage Deposit 1 at Group H. Considering the debitage and tools from the North Plaza deposit (Subops CC-18-C, -D, and -F) as one assemblage and comparing that to the debitage from the re-analyzed columns samples and tool analysis at Group H's Debitage Deposit 1 (Subop CC-6-B; Meadows and Hartnett 2000), provides insight into the differences and similarities between the two workshops in terms of production methods, intensity of production, and waste disposal.

Debitage Characteristics

Based on the analyzed macrodebitage with platforms from the two workshops, the debitage at both workshops is dominated by small flakes (Table 3.11). At both deposits, 96.8 percent of the platform-bearing flakes are smaller than 4 cm. Furthermore, 71.8 percent of the Group H flakes are smaller than 2 cm, compared to 73.9 percent from the North Plaza deposit. Similarly, both deposits are dominated by flakes with less than 25 percent cortex (Table 3.12) and two or more dorsal scars (Table 3.13).

Debitage Density

Because the debitage from the two workshops comprises similarly sized flakes, we can compare the density of flakes—number of all flakes including platform and non-platform bearing flakes per m^3—between the two deposits. As Table 3.14 shows, the average density at Group H, Debitage Deposit 1 is 1,973,667 flakes per m^3, more than double the densest estimate for the North Plaza deposit from Subop CC-18-C, which is 767,625 flakes per m^3 (also see Table A.5). In general, the North Plaza deposit's debitage is about one-third as dense as Group H, Debitage Deposit 1, but there is vertical topographic differentiation in the North Plaza's density calculations. The deposit is densest on the summit of the North Plaza (represented by Subop CC-18-C), becomes progressively less dense down the side of the plaza's platform (Subop CC-18-D), until it collects in denser

Table 3.9. Analyzed Debitage Summary: Subop CC-6-B

Lot CC-6-	Total Analyzed Debitage Count	Platform Count	No Platform Count
B-04	2977	1500	1477
B-06	1339	696	643
B-08	1605	806	799

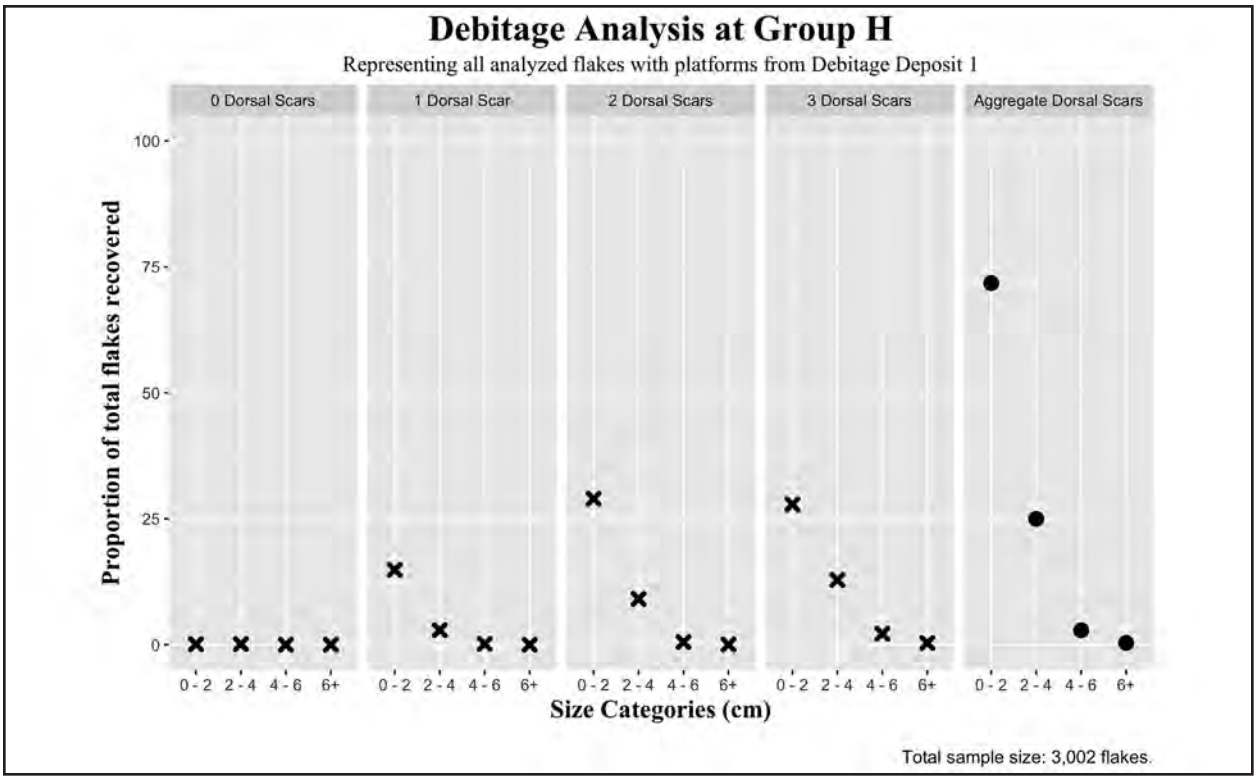

Figure 3.8. Distribution of flake size by the number of dorsal scars on the debitage recovered from Lots CC-6-B-04, -06, and -08.

Table 3.10. Distribution of Cortex Percentage on Flakes in Analyzed Lots of Subop CC-6-B

	Raw Counts		Proportions	
Lot CC-18-	0-25%	25.01–100%	0-25%	25.01–100%
B-04	1500	496	75.15	24.85
B-06	696	189	78.64	21.36
B-08	805	236	77.33	22.67
		Mean	77.04	22.96
		Standard Dev	1.76	1.76

mass at the bottom of the slope (Subop CC-18-F). As discussed below, this is likely related to how the deposit formed.

Tool Density

While the debitage assemblages look very similar between the two deposits, the tools recovered from the test pits at Group H and the North Plaza workshops show considerable variation. As Table 3.15 demonstrates, the two deposits that Meadows and Hartnett (2000) tested at Group H had higher numbers of tools/m^3 of deposit, lower ratios of preforms, and higher ratios of tools broken during reworking.

Discussion

The debitage at the two workshop areas indicates that knappers at both locales worked with primarily decorticated blanks, which had been partially reduced elsewhere—likely near

Table 3.11. Comparison of Size of Platform-bearing Flakes from the North Plaza Debitage Deposit and Re-analyzed Column Samples from Group H, Debitage Deposit 1

Size (cm)	Group H, Debitage Deposit 1		North Plaza Debitage Deposit	
	# of Flakes	Percentage of Total	# of Flakes	Percentage of Total
0–2	2155	71.8%	5167	73.9%
2–4	750	25.0%	1602	22.9%
4–6	86	2.9%	202	2.9%
6+	11	0.4%	18	0.3%
Total	**3002**	**100%**	**6989**	**100%**

Table 3.12. Comparison of Cortex Percentages on Platform-bearing Flakes from the North Plaza Debitage Deposit and Re-analyzed Column Samples from Group H, Debitage Deposit 1

Cortex %	Group H, Debitage Deposit 1		North Plaza Debitage Deposit	
	# of Flakes	Percentage of Total	# of Flakes	Percentage of Total
0–25%	2802	93.3%	6034	86.3%
25–100%	200	6.7%	955	13.7%
Total	**3002**	**100.0%**	**6989**	**100.0%**

Table 3.13. Comparison of Flake Scars on Platform-bearing Flakes from the North Plaza Debitage Deposit and Re-analyzed Column Samples from Group H, Debitage Deposit 1

Workshop	0 Flake Scars	1 Flake Scars	2 Flake Scars	3+ Flake Scars	Platform Flake Total
Group H count	7	538	1160	1297	3002
Group H %	0.2%	17.9%	38.6%	43.2%	100.0%
North Plaza count	113	1003	1598	4275	6989
North Plaza %	1.6%	14.4%	22.9%	61.2%	100.0%
Total count	120	1541	2758	5572	9991
Total %	1.2%	15.4%	27.6%	55.8%	100.0%

Table 3.14. Comparison of Average Flake Density by Count for the North Plaza Debitage Deposit and Re-analyzed Column Samples from Group H, Debitage Deposit 1

Workshop	Average Flakes/m^3	Percentage of Maximum Density
Group H, Subop CC-B-04	1973667	100%
North Plaza, Subop CC-18-C	767625	39%
North Plaza, Subop CC-18-D	550500	28%
North Plaza, Subop CC-18-F	481000	24%
North Plaza Deposit Weighted Average	632235	32%

Table 3.15. Comparison Average Flake and Tool Density by Counts for Structure A-6 Debitage Deposit and Re-analyzed Column Samples from Group H, Debitage Deposits 1 and 3

Deposit	Excavated Volume of Deposit (m^3)	Debitage Density of excavations (kg/m^3)	Estimated Debitage Density of Deposit ($\#/m^3$)	Lithic Tool Density ($tools/m^3$)	Proportion of Preforms	Proportion of Maintenance Failures
North Plaza	1.275	796	632235	5.50	86%	14%
Debitage Deposit 1	3.375	2,007	1973667	21.93	39%	42%
Debitage Deposit 3	2.250	1,781	N/A*	18.22	15%	71%

the source of the stone. Although we do not know if the two workshops used different raw material sources, a subjective assessment of the materials from both areas suggests knappers worked primarily with locally available raw material with no obvious quality difference between Group H and the North Plaza.

We suspect the differences in debitage density between Group H and the North Plaza reflect different disposal practices and taphonomic processes. Specifically, the decreasing density from the edge of the North Plaza (Subop CC-18-C) to units down the slope of the plaza's platform (Subops CC-18-D and -F) suggest flakes fell and washed down hill after knappers dumped or swept their debris to the edge of the plaza during routine cleaning. The Group H deposits reflect primary deposition of knapping debris that have not been subjected to the same processes.

We can posit a number of hypothesis to explain the disparity in tool density between workshop areas—the Group H debitage deposits had approximately 3.3 to 4 times more tools/m^3 than did the North Plaza deposit. First, it is possible that knappers in the North Plaza disposed of broken tools differently than they disposed of debitage, perhaps dumping them separately in a special location. Second, it is possible that the more skilled knappers, less prone to mistakes, worked in the epicentral North Plaza workshop. A third possibility is that the North Plaza workshop functioned primarily as a production facility, while the artisans at the Group H workshops engaged in both tool production and frequent tool maintenance work. Under this scenario, consumers with broken bifaces may have brought their tools for repair to the flint knappers at Group H, who discarded many of them in the debitage deposit. The higher percentage of preforms at the North Plaza—although the sample size of tools is only seven—and the higher percentages of maintenance failures at the Group H deposits support this hypothesis (see Table 3.15).

CONCLUSIONS

Our small-scale investigations of the North Plaza in 2018 successfully addressed our research questions. We determined that lithic production took place in the eastern part of the plaza floor and was not solely confined to Structure A-6. Our preliminary conclusion is that both production locales utilized the debitage deposit on the eastern edge of the plaza as a location for depositing the waste flakes. We also conclude that flint knappers primarily produced oval bifaces from blanks that they or other workers quarried and shaped elsewhere. We better defined the spatial limits of the debitage deposit, determining that it covers at least 585 m^2. While not as dense as the deposits

Meadows and Hartnett (2000) tested at Group H, the North Plaza debitage deposit contains more debitage and resulted from the production of at least 133,000 bifaces.

A re-examination of three column samples from Debitage Deposit 1 at Group H showed that the debitage from the Group H workshops is similar to that from the North Plaza deposit in terms of flake size, dorsal flake scars, and cortex. The higher density and greater variety of tools at Group H, however, suggests the flint knappers at the rural workshops engaged in a wider range of activities including making multiple types of bifaces and repairing or reworking broken tools. The artisans at the North Plaza specialized in oval biface production and may have been more skilled than their counterparts, based on the lower density of tools in their debris.

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Appendix

Table A.1. Platform-bearing Flakes from Subop CC-18-H

Lot CC-18-	Raw Material	Cortex Percentage	Debitage Size	0 Flake Scars	1 Flake Scar	2 Flake Scars	3+ Flake Scars	Platform Flake Total	W (g)
H-01	Chert	0–25%	0-2 cm	0	39	100	156	295	154.3
H-01	Chert	0–25%	2-4 cm	0	5	30	115	150	402.3
H-01	Chert	0–25%	4-6 cm	0	0	3	13	16	194.3
H-01	Chert	0–25%	6+ cm	0	0	0	1	1	124.5
H-01	Chalcedony	0–25%	0-2 cm	0	16	35	52	103	52.8
H-01	Chalcedony	0–25%	2-4 cm	0	1	15	54	70	190.7
H-01	Chalcedony	0–25%	4-6 cm	0	0	0	1	1	10.1
H-01	Chert	25–100%	0-2 cm	0	13	8	1	22	24.2
H-01	Chert	25–100%	4-6 cm	1	2	2	6	11	129.6
H-01	Chert	25–100%	6+ cm	0	0	1	0	1	62.1
H-01	Chert	25–100%	2-4 cm	3	12	13	15	43	158.4
H-01	Chalcedony	25–100%	0-2 cm	1	10	4	4	19	16.8
H-01	Chalcedony	25–100%	2-4 cm	0	7	7	8	22	103
H-01	Chalcedony	25–100%	4-6 cm	0	0	2	1	3	37.5
H-01	Chalcedony	25–100%	6+ cm	0	0	1	0	1	48.2
H-02	Chert	0–25%	0-2 cm	0	16	29	49	94	45
H-02	Chert	0–25%	2-4 cm	0	2	16	63	81	202.5
H-02	Chert	0–25%	4-6 cm	0	0	0	14	14	158.2
H-02	Chalcedony	0–25%	0-2 cm	0	12	15	31	58	27.7
H-02	Chalcedony	0–25%	2-4 cm	0	1	8	35	44	96.1
H-02	Chalcedony	0–25%	4-6 cm	0	0	0	3	3	24
H-02	Chert	25–100%	0-2 cm	0	3	2	0	5	4.9
H-02	Chert	25–100%	2-4 cm	0	8	7	5	20	58.7
H-02	Chert	25–100%	4-6 cm	0	0	0	3	3	30.5
H-02	Chalcedony	25–100%	0-2 cm	0	4	1	1	6	4.3
H-02	Chalcedony	25–100%	2-4 cm	0	2	0	3	5	18.8
H-02	Chalcedony	25–100%	4-6 cm	0	0	0	1	1	7.8
H-02	Chalcedony	25–100%	6+ cm	0	0	1	1	2	105.4

Table A.2. Non-platform-bearing Flakes from Subop CC-18-H

Lot CC-18-	Raw Material	Debitage Size	Non-Platform Flake Total	W (g)
H-01	Chert	0–2 cm	386	170
H-01	Chert	2–4 cm	155	350
H-01	Chert	4–6 cm	7	85
H-01	Chert	6+ cm	1	77
H-01	Chalcedony	0–2 cm	185	88
H-01	Chalcedony	2–4 cm	76	154
H-01	Chalcedony	4–6 cm	3	85
H-01	Chalcedony	6+ cm	1	137
H-02	Chalcedony	0–2 cm	81	35
H-02	Chalcedony	2–4 cm	35	82.5
H-02	Chalcedony	4–6 cm	1	6.4
H-02	Chert	0–2 cm	97	45.4
H-02	Chert	2–4 cm	69	149.7
H-02	Chert	4–6 cm	4	36.7

Table A.3. Platform-bearing Flakes from Subop CC-06-B

Lot CC-06-	Cortex Percentage	Debitage Size	0 Flake Scars	1 Flake Scar	2 Flake Scars	3+ Flake Scars	Platform Flake Total
B-04	0–25%	0–2 cm	0	83	215	185	483
B-04	25–100%	0–2 cm	0	10	7	1	18
B-04	0–25%	2–4 cm	0	12	67	67	146
B-04	25–100%	2–4 cm	3	12	7	3	25
B-04	0–25%	4–6 cm	0	0	2	20	22
B-04	0–25%	6+ cm	0	0	1	1	2
B-06	0–25%	0–2 cm	0	189	393	418	1000
B-06	25–100%	0–2 cm	3	23	22	7	55
B-06	0–25%	2–4 cm	0	29	127	202	358
B-06	25–100%	2–4 cm	0	14	15	12	41
B-06	0–25%	4–6 cm	0	1	8	23	32
B-06	25–100%	4–6 cm	0	3	2	5	10
B-06	0–25%	6+ cm	0	0	0	4	4
B-08	0–25%	0–2 cm	0	127	223	220	570
B-08	25–100%	0–2 cm	0	14	10	5	29
B-08	0–25%	2–4 cm	0	13	49	99	161
B-08	25–100%	2–4 cm	1	7	8	3	19
B-08	0–25%	4–6 cm	0	0	3	17	20
B-08	25–100%	4–6 cm	0	1	1	0	2
B-08	0–25%	6+ cm	0	0	0	4	4
B-08	25–100%	6+ cm	0	0	0	1	1

Table A.4. Non-platform-bearing Flakes from Subop CC-06-B

Lot CC-06-	Debitage Size	Non-Platform Flake Total
B-04	0–2 cm	516
B-04	2–4 cm	117
B-04	4–6 cm	10
B-06	0–2 cm	1217
B-06	2–4 cm	244
B-06	4–6 cm	15
B-06	6+ cm	1
B-08	0–2 cm	645
B-08	2–4 cm	140
B-08	4–6 cm	12
B-08	6+ cm	2

Table A.5. Comparison of Column Sample Flake Density by Count for Structure A-6 Debitage Deposit and Re-analyzed Column Samples from Group H, Debitage Deposit 1

Workshop	Lot	Total Analyzed Debitage Count	Flake Density (Flakes/m^3)
Group H	B-04	2977	2977000
Group H	B-06	1339	1339000
Group H	B-08	1605	1605000
Group H, Subop CC-06-B Total			1973666.67
North Plaza	C-01 SW	438	438000
North Plaza	C-02 SW	404	404000
North Plaza	C-03 SW	521	521000
North Plaza	C-03 SE	1134	1134000
North Plaza	C-04 SW	1160	1160000
North Plaza	C-04 SE	1473	1473000
North Plaza	C-05 SW	100	100000
North Plaza	C-05 SE	911	911000
North Plaza, Subop CC-6-C Average			767625
North Plaza	D-01 NW	719	719000
North Plaza	D-02 NW	351	351000
North Plaza	D-03 NW	57	57000
North Plaza	D-04 NE	1075	1075000
North Plaza, Subop CC-6- Average			550500
North Plaza	F-01	259	259000
North Plaza	F-02	808	808000
North Plaza	F-03	912	912000
North Plaza	F-04	249	249000
North Plaza	F-05	177	177000
North Plaza, Subop CC-6-F Average			481000
North Plaza Debitage Deposit Average			635059.211

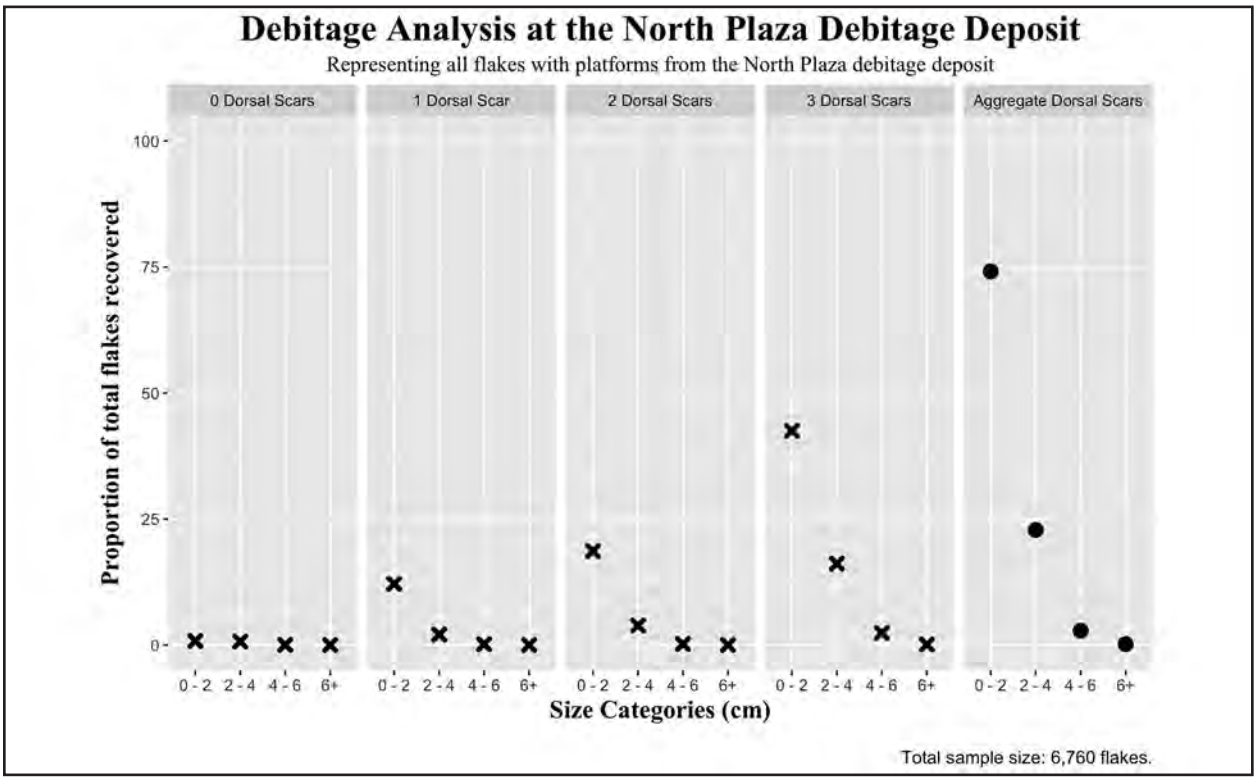

Figure A.1. Distribution of flake size by the number of dorsal scars on the debitage recovered from the North Plaza debitage deposit (Subops CC-18-C, -D, and -F).

Bioarchaeological Analysis of Human Skeletal Remains from Chan Chich, Belize: The 2018 Field Season

Anna Novotny, Hannah Hughes, and Tomás Gallareta Cervera

INTRODUCTION

This report covers the preliminary osteological analysis of human remains excavated during the 2018 field season from the ancient Maya site of Chan Chich. All of the burials recovered in 2018 came from the Upper Plaza (Figure 4.1). Burials are listed below according to burial number and provenience and are described beginning with the archaeological context from which the remains were recovered. Details of the archaeological context include grave location, time period in which the interment occurred, position and orientation of the skeleton, and any grave goods recovered. The following section records the osteological analysis of each individual including the approximate percentage of the remains recovered, age at death, biological sex, dentition, and skeletal pathologies, if any were observed.

All skeletal data were collected in accordance with the *Standards for Collection of Data from Human Skeletal Remains* (Buikstra and Ubelaker 1994). *Standards* is a compilation of techniques used in osteological analysis that outlines methods of determining age at death, biological sex, pathological conditions, and cultural modifications to the body. As much of these data as possible were collected for each individual. Analysis of the dentition was done according to *Standards* and supplemented by Simon Hillson's (1996) text *Dental Anthropology* and Timothy D. White's and Pieter A. Folkens' (2005) text *The Human Bone Manual*. Pathologies were identified with reference to *Identification of Pathological Conditions in Human Skeletal Remains* (Ortner 2003). We have refrained from citing the above texts in the report except where necessary.

BURIAL CC-B19, LOT CC-15-V-07 (TWO INDIVIDUALS)

Archaeological Context

Burial CC-B19 was recovered from the Upper Plaza of the Chan Chich site core. The 2018 excavations continued to document the architectural chronology of the site core (Gallareta Cervera et al., this volume; Houk, this volume). Suboperation (Subop) CC-15-V explored the northeastern corner of the Upper Plaza, which had not yet been excavated (see Figure 4.1). These excavations uncovered the remains of Burial CC-B19 from construction fill along the east face of an Early Classic platform or construction pen (Figures 4.2 and 4.3). There were no indications of formal grave construction within the construction fill, so the remains were likely placed in a simple pit. Burial CC-B19 was approximately 70 cm below ground surface in a space approximately 20 cm by 20 cm. Ceramics recovered from Burial CC-B19 context suggest an Early Classic period date, and an AMS radiocarbon date on bone from the burial returned a cal AD 140–328 (see Gallareta Cervera et al., this volume). Burial

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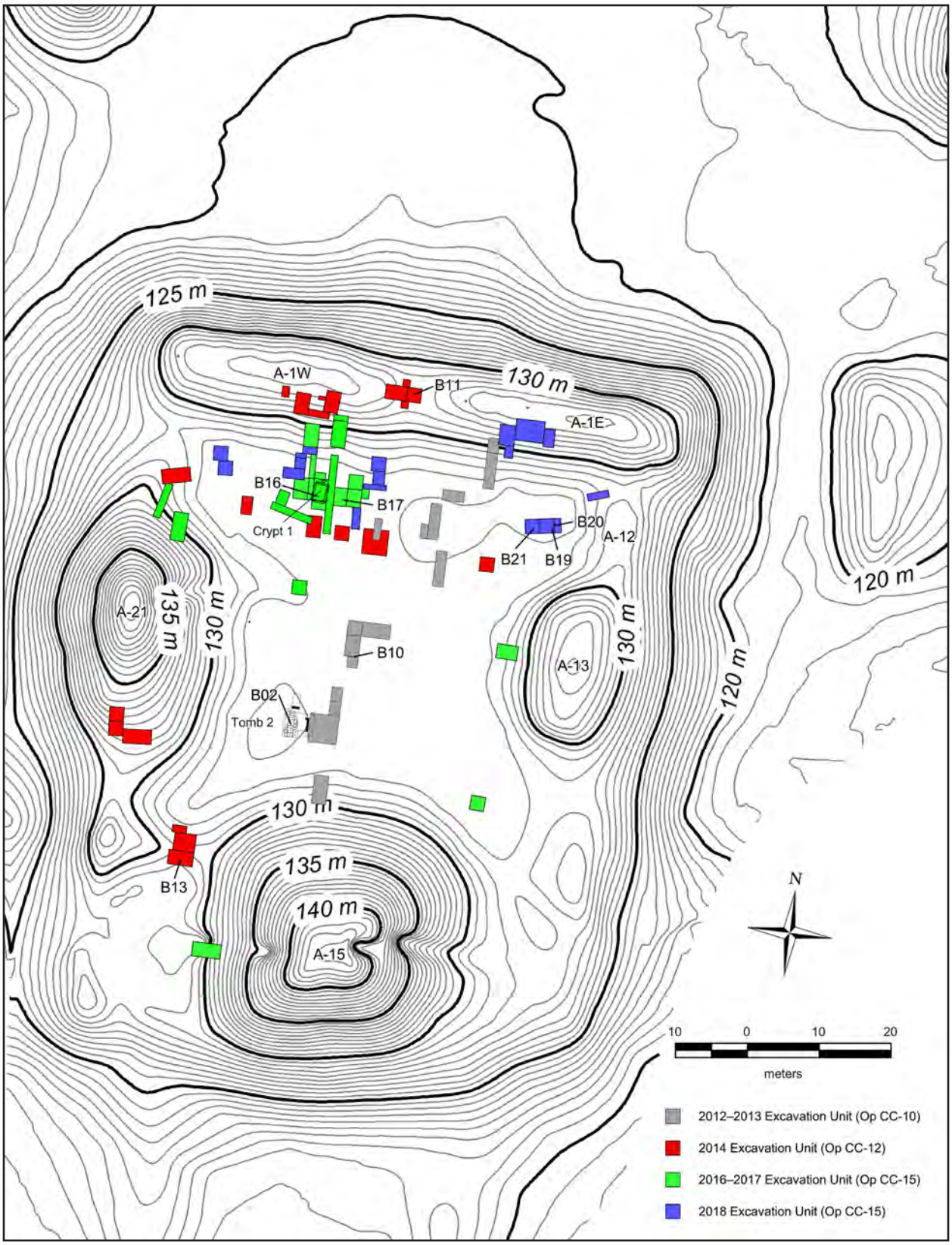

Figure 4.1. Map of burials excavated in the Upper Plaza at Chan Chich. The 2018 burials include Burials CC-B19–21.

Figure 4.2. Photograph of Burial CC-B19, skeletal remains, camera facing north.

CC-B19 was located about 1 m above and to the west of the crypt containing Burial CC-B20, which dates to the Early Classic, and 2.15 m west of Burial CC-B21, another secondary burial dating to the Late Preclassic.

The context of both secondary burials near a possible construction pen and without formal grave architecture suggests that their primary graves were disturbed during construction and the bones were re-buried within the new construction. Skeletal elements from nearly every part of the body were recovered in Burial CC-B19, from skull to tarsals and pedal phalanges. Burial CC-B21 consisted of bones of the upper arms and skull fragments only. Future reconstruction and analysis will address whether the two deposits contain the remains of the same individuals.

Osteological Analysis

Skeletal elements recovered from the Burial CC-B19 context include fragments of cranium, thorax, and lower legs. The remains were not articulated, and many elements were not represented, suggesting that it was a secondary deposit. There were at least two redundant skeletal elements—two left clavicles and two occipitals with the internal occipital protuberance. A minimum of two individuals were deposited in this context. All of the recovered teeth, except one, are likely from the same individual, given the morphology of the teeth and pattern of dental attrition.

Age and Sex

Two very fragmented, individuals were represented in Burial CC-B19. All skeletal elements were from adult individuals, but we

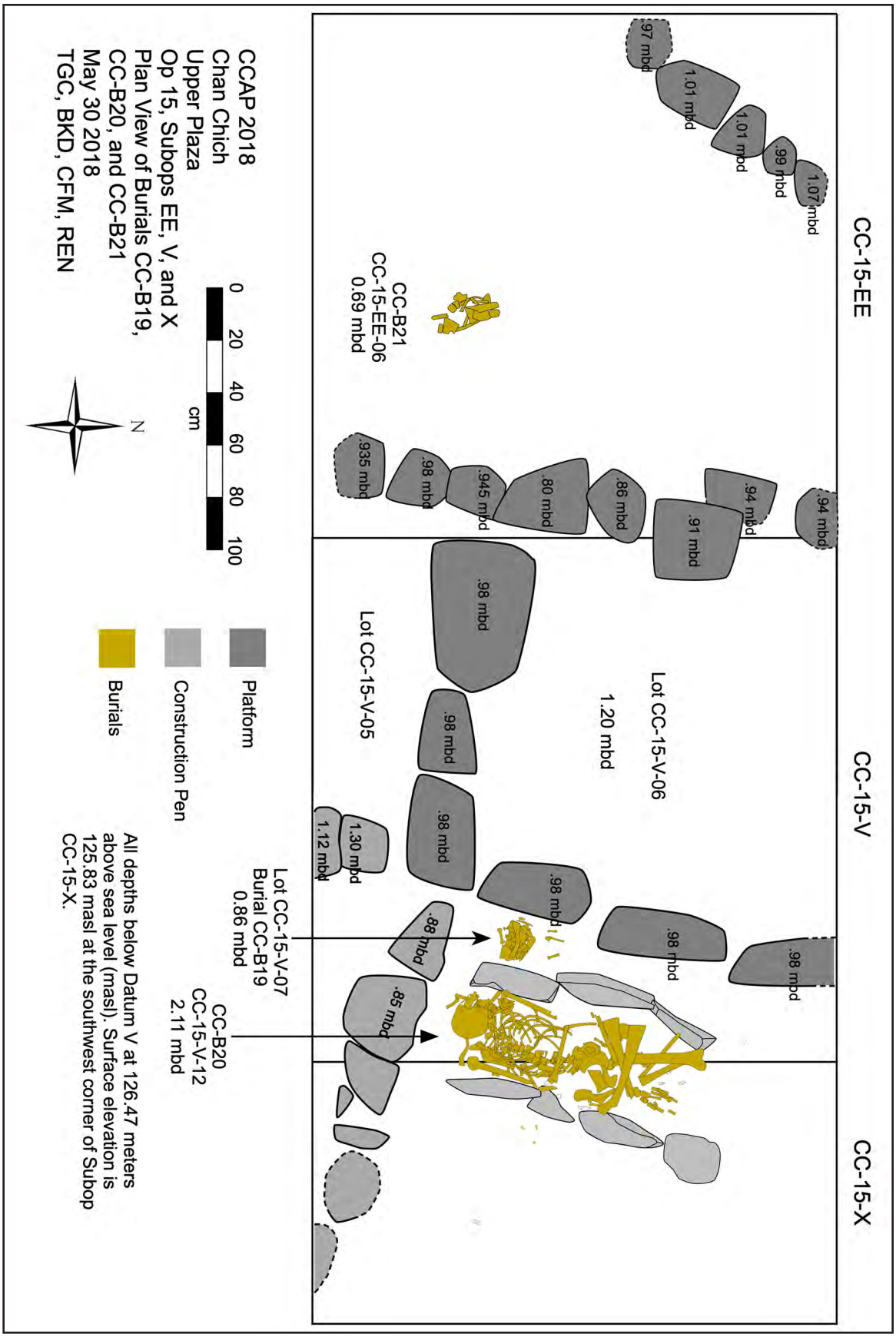

Figure 4.3. Plan map of Burials CC-B19, CC-B20, and CC-B21.

could not make more specific estimations of age at death from the bones present.

The dentition was likely from the same individual, with one exception, and dental attrition was moderate. Age estimate based on dental attrition is young adult (age 17–25; Hillson 1996) for one of the individuals.

Two skeletal elements were present that are diagnostic for sex—the left temporal with the mastoid process and a mandible with the mental eminence. The mastoid process was ambiguous, but the ridging of the mental eminence was strong, suggesting a male individual. Sex was estimated to be probable male for the individual who possessed the mandible.

In sum, the deposit represents the remains of two adults. The remains represent at least one young adult and one possible male individual.

Dentition

An incomplete dentition was recovered from Burial CC-B19. None of the teeth were in occlusion. As noted above, the teeth were only moderately worn and seemed to belong to the same individual, with one exception—a second LM^2 (Table 4.1, indicated by the asterisk) that is taphonomically very different from the other teeth. As there are several redundant skeletal elements, this tooth could be from a second (or third) individual.

The RI_2 has a circular cavity for a dental inlay, although the inlay is missing. The inlay type is B4 (Romero 1958).

Pathology and Trauma

No evidence of pathology or trauma was observed on any elements from Burial CC-B19.

Conclusion

The remains of two adults were recovered from Early Classic construction fill in the northeast corner of the Upper Plaza, one young in age and one possibly a male. The bones were in a secondary context, and it is not clear how they came to be commingled. The color and root etchings on the bone surface are similar but could be due to their common deposition in the primary context from which they were recovered. Ceramics from the context suggest these individuals were deposited in the Early Classic period, and a single radiocarbon date suggests one of the individuals died near the end of the Late Preclassic period or the beginning of the Early Classic period.

BURIAL CC-B20, LOT CC-15-V-16 (ONE INDIVIDUAL)

Archaeological Context

Burial CC-B20 was recovered from excavations in the northeastern corner of the Upper Plaza in the Chan Chich site core (Gallareta-Cervera et al., this volume). Excavations aimed to establish the chronology of the northeast section of the Upper Plaza, which had previously not been tested (see Figure 4.1). Burial CC-B20 was encountered beneath construction fill within a platform. The body was interred in a stone crypt, designated Crypt 2, with capstones (Figures 4.3–4.5) that was built on

Table 4.1. Dentition Present in Burial CC-B19

RM^3	RM^2	RM^1	RP^4	RP^3	RC^1	RI^2	RI^1	LI^1	LI^2	LC^1	LP^3	LP^4	LM^1	LM^2	LM^3
				X	X	X				X			X	X*	
		X		X		X				X					
RM_3	RM_2	RM_1	RP_4	RP_3	RC_1	RI_2	RI_1	LI_1	LI_2	LC_1	LP_3	LP_4	LM_1	LM_2	LM_3

Figure 4.4. Photograph of Burial CC-B20, cist capstones, camera facing west.

top of Floor 5. The top of the capstones was 1.62 m below the surface. The crypt measured approximately 130 cm long, 60 cm wide, and 30 cm deep. The grave did not fill with dirt after interment of the body, and many of the joints were loosely articulated. There were no grave inclusions. The burial consisted of a single, primary individual in a supine, loosely flexed position with head oriented to the southeast. Ceramic sherds collected from the fill within the crypt date to the Late Preclassic, and there were Early Classic sherds recovered from the construction fill surrounding the cist. A single AMS date on bone from the burial returned a cal AD 257–387 date range for the individual's death, suggesting an Early Classic date for the interment.

Osteological Analysis

The skeletal material form Burial CC-B20 was remarkably well preserved—over 75 percent of the skeletal elements were recovered. The bones of the thorax, ribs, and vertebrae were not well preserved, but many fragments were recovered. There were no redundant elements, confirming that this was the interment of a single individual. The cranium of Burial CC-B20 was modified in the tabular erect style (Tiesler 2014:72–74), a common style in the central and eastern Maya Lowlands during the Classic period (Tiesler 2014: 200–201).

Age and Sex

Sex was estimated as possible female based on morphology of the pelvis and skull. Only the left pubic symphysis was available for observation. The long bones were also gracile which is consistent with a female individual.

The left pubic symphysis, right auricular surface, and all cranial sutures suggested an adult of advanced age. The system developed

Figure 4.5. Photograph of Burial CC-B-20, skeleton during excavations, camera facing west.

by Hartnett (2007) indicated an age at death range of 56–86, with a mean of 72 years. The cranial sutures were predominantly open, with the exception of those of the hard palate, suggesting a mean age at death of 36 (Buikstra and Ubelaker 1994). Morphological changes to the pelvis are considered more accurate than cranial suture closure. In addition, the individual in Burial CC-B20 was missing a number of teeth for a long period of time premortem, which is consistent with an older individual.

Dentition

Four teeth were found in association with the Burial CC-B20 skeletal remains (Table 4.2). Only one, the RP_3 was in alveolar bone. All mandibular and maxillary molars, with the exception of LM^2 were lost premortem, and the alveolar bone was well healed; the individual lived for an extended period of time without those teeth. It is likely that the anterior teeth, particularly the incisors, from the mandible and the maxilla were also missing long premortem. However, there was some damage to the alveolar bone, which made it difficult to see clearly the extent of the healing.

Table 4.2. Dentition Present in Burial CC-B20

RM^3	RM^2	RM^1	RP^4	RP^3	RC^1	RI^2	RI^1	LI^1	LI^2	LC^1	LP^3	LP^4	LM^1	LM^2	LM^3
														X	
				X					X	X					
RM_3	RM_2	RM_1	RP_4	RP_3	RC_1	RI_2	RI_1	LI_1	LI_2	LC_1	LP_3	LP_4	LM_1	LM_2	LM_3

Pathology and Trauma

The basilar portion of the occipital, right side, had a mixed reaction of healed and newly forming bone. The digastric groove, located between the foramen magnum and the mastoid process, was covered with a well-formed bridge of bone. It seems as though this would have impeded motion of the digastric muscle. The porosity is non-specific, so the cause of the reaction is unknown.

Healed porosity was visible on several of the long bones, as well: left radius, left fibula, left tibia, right tibia, right fibula, and left humerus. Neither femur had healed porosity. Again, this type of reaction is non-specific so it is not possible to state a cause of the reaction. Because it was observed on multiple elements, the porosity suggests this may suggest a systemic infection from which the individual recovered.

The left ulna, while not well preserved, showed advanced osteoarthritis of the proximal epiphysis. The fourth and fifth lumbar vertebrae also showed osteoarthritic changes.

The right humerus showed pronounced development of the deltoid and teres major muscle attachments. These could have been the result of habitual use of the right arm performing a task that required the individual to extend and raise the arm laterally and anteriorly. The teres major, located inferior to the scapula on the back, inserts on the proximal diaphysis of the humerus. It is responsible for adducting the arm, bringing the extended arm closer to the body. The left arm did not have the same muscle development, and future research will assess which types of activities may have produced to this particular morphology.

Conclusion

Burial CC-B20 was the primary interment of an older individual, possibly a female, in a stone-lined crypt with capstones. The crypt was constructed on an earlier floor, Floor 5, within a platform in the northeast corner of the Upper Plaza. The burial did not include grave goods. The skeletal elements were extremely well preserved, particularly the skull, but it is not immediately clear why the bones were so well preserved in this context. The lack of soil surrounding the bones, which is acidic and remains damp in the tropical climate of Belize, may have contributed to their good preservation. There were several pathologies identified, but none that were acute or unexpected for an individual of advanced age. The interment dates to the Early Classic period.

BURIAL CC-B21, LOTS CC-15-EE-06 (ONE INDIVIDUAL)

Archaeological Context

Excavations documenting the architectural chronology of the Chan Chich site core uncovered Burial CC-B21 in the previously unexplored northeast corner of the Upper Plaza (see Figure 4.1). The remains were deposited in a simple pit measuring approximately 15 cm wide by 25 cm long and 15 cm deep. The pit was located approximately 70 cm below the surface. Ceramics recovered from the burial indicated that the interment was placed between the Late Preclassic and Early Classic periods, but a single AMS date on bone from the burial returned an age range of 351–106 cal BC, put the individual's death in the Late Preclassic period (see Gallareta-Cervera et al., this volume). Burial CC-B21 was deposited approximately 2.15 m west of Burial CC-B19, also a secondary deposit of human remains (see Figure 4.3). It seems likely that the original graves of these individuals were disturbed, possibly by construction, and their remains were interred within the new platform or construction pen.

Osteological Analysis

Burial CC-B21 consisted of small fragments of cranium and long bones. None of the elements were articulated, suggesting a secondary interment. This conclusion is supported by the low number of elements represented and the lack of teeth and small bones, such as carpals and phalanges.

Age and Sex

Sex was estimated to be probable female based on the gracile nature of the glabella and supraorbital margin of the frontal bone. The long bones are gracile, which is consistent with a female individual.

Age was estimated to be middle to older adult (35–50+) based on one cranial fragment with a section of cranial suture. The suture was partially obliterated, suggesting a mature adult.

Pathology and Trauma

Two fragments of parietal, side indeterminate, showed mixed reaction of healing and active porosity. Porosity of this type is a non-specific indicator of stress, so it may have been indicative of either a nutritional deficiency or infection. The other cranial bones and long bones did not show any bone reaction, so the insult was likely not systemic.

Conclusion

In sum, the remains of Burial CC-B21 consist of the secondary interment of one individual who died during the Late Preclassic period. Although fragmentary, the few diagnostic elements suggest the individual was a possible female of middle to older adulthood. The secondary deposit was not marked by any formal grave architecture and dated to the Late Preclassic or Early Classic period based on ceramics found within the fill.

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The 2016 Gallon Jug Drone Survey Revisited

Brett A. Houk, Mark Willis, and Gregory Zaro

In 2016, Mark Willis (2016) mapped approximately 14 km^2 of primarily pastureland surrounding the headquarters of Gallon Jug Ranch using a fixed wing Unmanned Aerial Vehicle, colloquially known as a drone (Figure 5.1). As Willis (2016:138) noted, several prehistoric mounds are visible in the data, but the results paled in comparison to work he conducted in the Belize River Valley at the site of Saturday Creek, where the drone survey discovered numerous structures in cleared agricultural fields (see Harrison-Buck et al. 2016). Willis' (2016) initial report, however, presented only preliminary findings, and this chapter includes a detailed analysis of the 2016 drone imagery around Gallon Jug and discusses the implications for our findings as they relate to ancient Maya settlement in this portion of the Belize Estates Archaeological Survey Team (BEAST) permit area.

SETTING

The area mapped by Willis (2016) lies immediately south of the Maya center of Gallon Jug, named after the ranch. The Gallon Jug ruins are still covered in forest and comprise one irregularly shaped plaza with four large structures and at least three plain stelae (Kilgore et al., this volume). Oriented east-west, Gallon Jug's plaza is approximately 200 meters north of the cleared pasture, meaning that the settlement features discussed below are all within 2 km of the plaza.

As described by Yaeger (1991), Gallon Jug Ranch cleared the pastures in the 1980s first by bulldozing the vegetation and then pushing the debris into piles. This initial clearing likely involved chaining, whereby two bulldozers drag a ship's anchor between them to pull down large trees. Crews then burned the piles of brush and plowed the cleared area several times to kill any remaining vegetation. The initial bulldozing disturbs the surface, but, as the chaining pulls down trees, the trees' roots rip up subsurface deposits, as well. Plowing also disturbs the subsurface and confuses stratigraphy but does not displace cultural material very far horizontally from its original location (Yaeger 1991). However, Yaeger (1991:91) reports that Gallon Jug Ranch used a road grader to scrape and flatten parts of the fields to prepare them for planting, and this activity displaced cultural material and features horizontally—additionally, this would have destroyed any small house mounds in the scraped areas.

PREVIOUS INVESTIGATIONS

The Rio Bravo Archaeological Project, directed by Thomas Guderjan, investigated the central plaza of Gallon Jug and conducted a pedestrian survey of a portion of the cleared fields south of the site core in 1990 (Guderjan et al. 1991). Kilgore et al. (this volume) summarize the site core investigations, so we will focus on the results of Jason Yaeger's (1991) settlement

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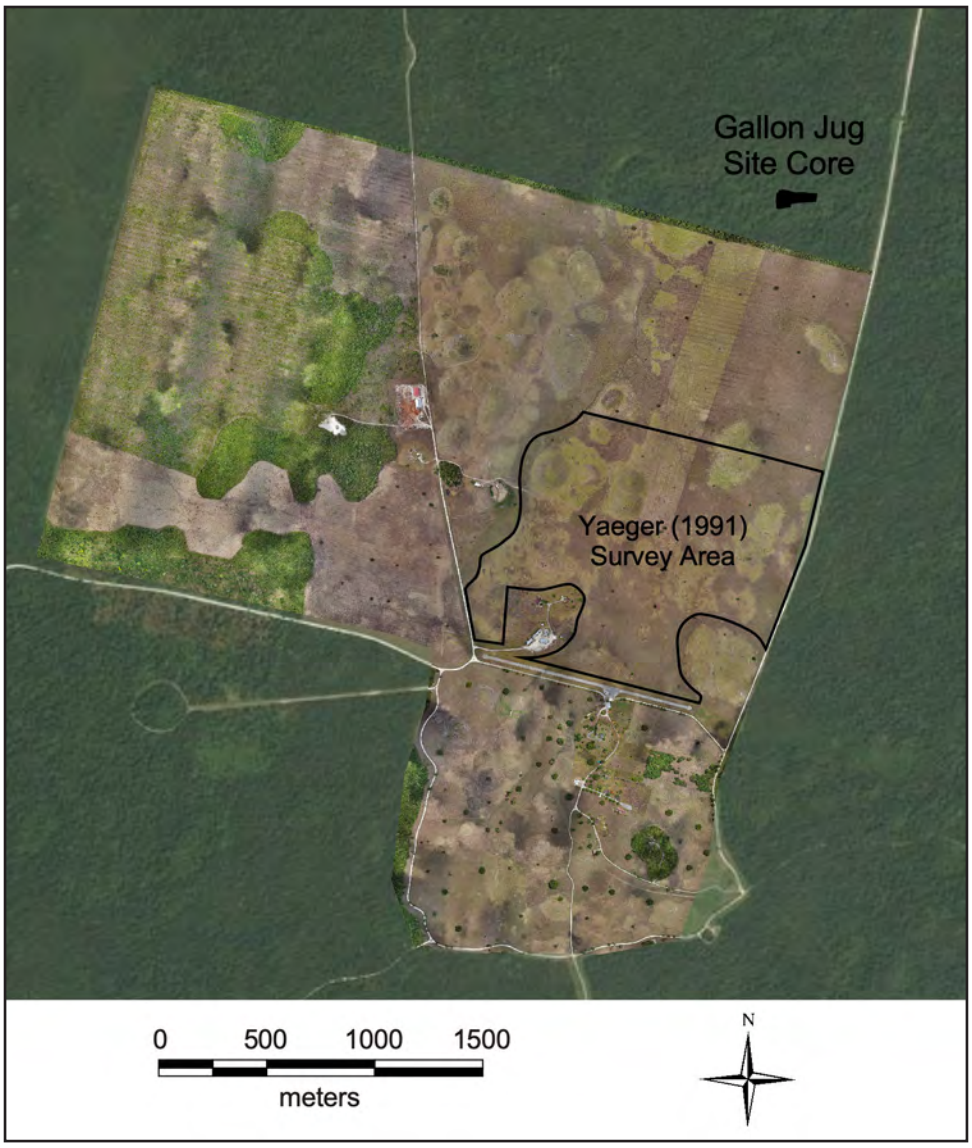

Figure 5.1. Imagery collected by Willis (2016) during the original drone survey with the Gallon Jug site core and Yaeger (1991) pedestrian survey area added.

survey. We were able to take Yaeger's (1991:Figure 59) transit map of his survey area and overlay it onto the orthophoto of Willis' drone survey to compare the two survey areas (see Figure 5.1). Using our orthophoto, we re-calculated the size of Yaeger's survey area and remeasured distances he reported. According to our calculations, Yaeger's (1991) team surveyed approximately 325 acres (1.32 km^2) of cleared fields north of the airstrip and west of the Blue Creek road. Because Gallon Jug Ranch had already planted crops in the northern part of the cleared area, his survey area terminated approximately 900 m south of the forested area that bounds the fields to the north (see Figure 5.1).

Yaeger's (1991) survey teams recorded and mapped 245 archaeological features, including 111 artifact scatters, 97 large floors (greater than 25 m^2), and 35 floors, spanning the Middle Preclassic through Late Classic periods

(Yaeger 1991:Table 4). Yaeger (1991:91) noted that features occurred on ridges and hilltops and that the low-lying areas contained little in the way of archaeological material. Yaeger (1991), however, did not survey the two hills in the southwest and southeast corners of his survey area because dense secondary growth obscured their summits. Interestingly, Yaeger did not report any visible mounds, even for the low hills upon which he was able to walk in the northern half of his survey area.

In 2013, Mark Willis, Brett A. Houk, and Kelsey Herndon tested the feasibility of using a quad-copter drone to map the Gallon Jug pastures. Over the course of approximately 1 hour, Willis flew six missions with a DJI Phantom, modified with a first-person view video camera (Sandrock and Willis 2014). He successfully created a topographic map of approximately 180 acres (0.73 km^2) of cleared pasture east of the Gallon Jug saw mill and identified five possible prehistoric structures on two adjacent hills. David Sandrock subsequently visited the hilltops and verified that the structures in the drone map were in fact ancient Maya mounds (Sandrock and Willis 2014:91).

METHODS

In 2016, Willis (2016) used a fixed-wing Skywalker UAV fitted with a 20.3 Mb-resolution Samsung NX2000 camera to map the pastures around Gallon Jug. In the portion of the survey area free of tall vegetation, Willis (2016:138) created a high-resolution digital elevation model using 4,336 individual photographs taken during multiple missions. Processed using Structure from Motion software, the resulting DEM had a ground resolution of 20 cm. Although Gallon Jug had mechanically cleared and subsequently plowed the survey area in the past to farm corn and sugar cane, the fields comprised cattle pastures in 2016 with grasses as high as 20 cm in many areas.

For this study, Willis created an overall digital elevation model map and then divided the Gallon Jug survey area into 500-x-500-m georeferenced blocks (Figure 5.2). Each DEM block slightly overlapped with adjacent blocks for consistent coverage. The base map includes 23 complete blocks and 31 partial blocks. Of those, however, this study excluded four complete and seven incomplete blocks from analysis because of dense vegetation. Although we visually inspected the blocks south of the Gallon Jug airstrip, modern alterations to the landscape have impacted these extensively with numerous structures and facilities related to the ranch. Therefore, we focused our study on the cleared area north of the airstrip (visible in Blocks 38–40, which accounts for approximately 5 km^2.

Willis created Red Relief Image Maps (RRIM) of each block north of the airstrip by loading the DEMs into ArcMap 10.6 and running custom tool, "LDR_Filter_Lieti", on each. Tibor Lieskovsky of the Slovak University of Technology in Bratislava created the "LDR_Filter_Lieti" tool. RRIM are generated based on factors such as slope angle, angular distance between surface relief, and horizontal distance from elevational data in each cell of the DEM. This results in a combination of red slope and Ridge Valley Index (RVI) that visually brings out subtle topographic features (Chiba et al. 2008). This visualization technique has become popular recently in Maya archaeological studies, especially those using airborne LiDAR systems (Cantu et al. 2018).

Based on our familiarity with the survey area, we can easily identify modern features in the imagery. For example, in Block 38, we identified modern rock piles covered in secondary vegetation—these result from hand clearing fields prior to plowing (see Yaeger 1991)—modern cow trails, which spiral around and up several hills in the survey area, a barbed-wire fence, the airstrip, and what we

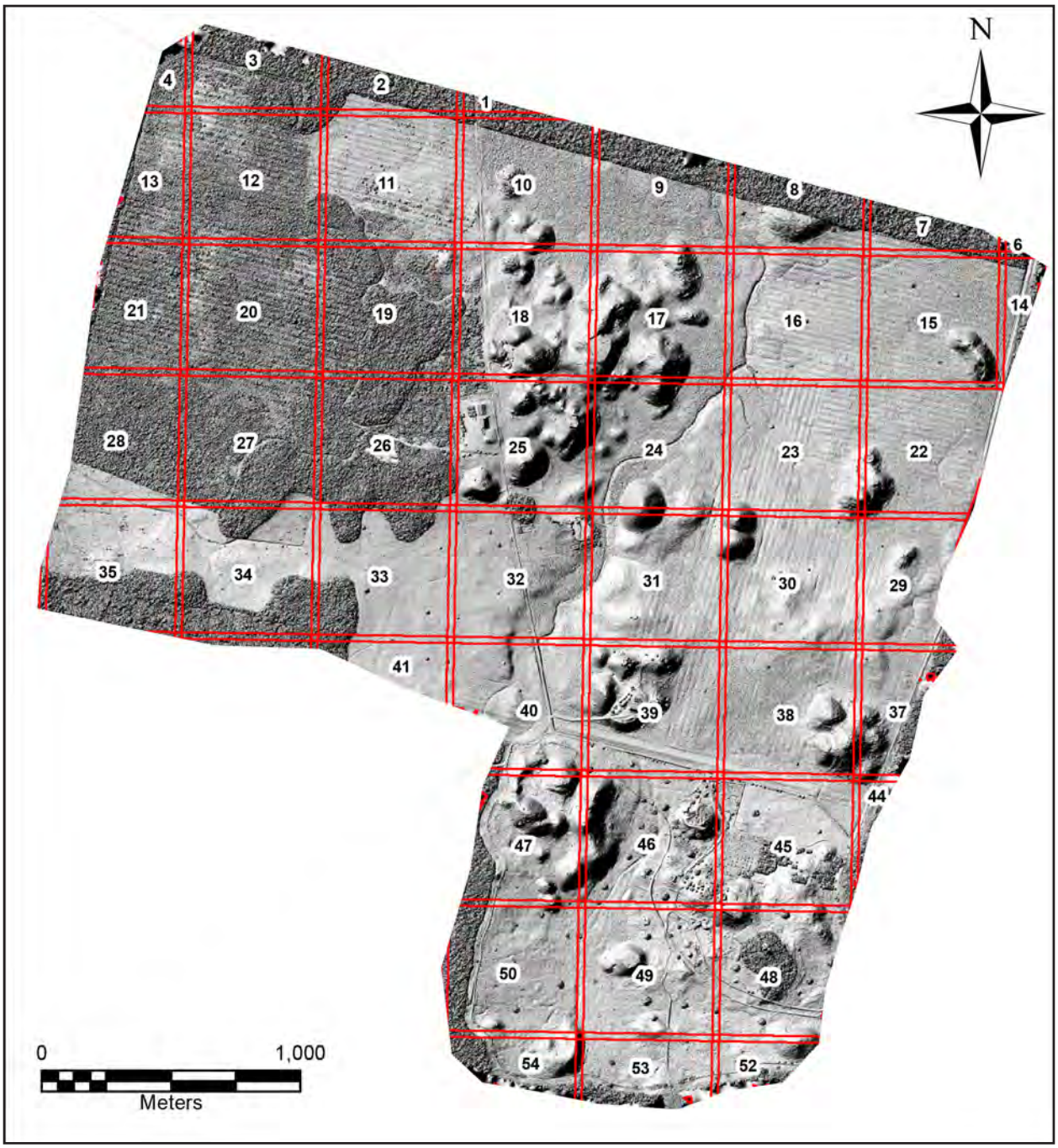

Figure 5.2. DEM of the survey area divided into 500-x-500-m blocks.

think are cows (Figure 5.3). The "cows" show up as bright red oblong objects measuring 2.3 m in length clustered in groups or alone, with no consistent orientation.

Houk visually inspected each block to identify possible prehistoric mounds. He then drew each possible mound in Canvas as a rectified (or prismatic) structure, following standard mapping conventions for Maya sites (see Hutson 2012). Zaro then performed an independent inspection of the imagery and identified one additional possible mound and possible agricultural terracing.

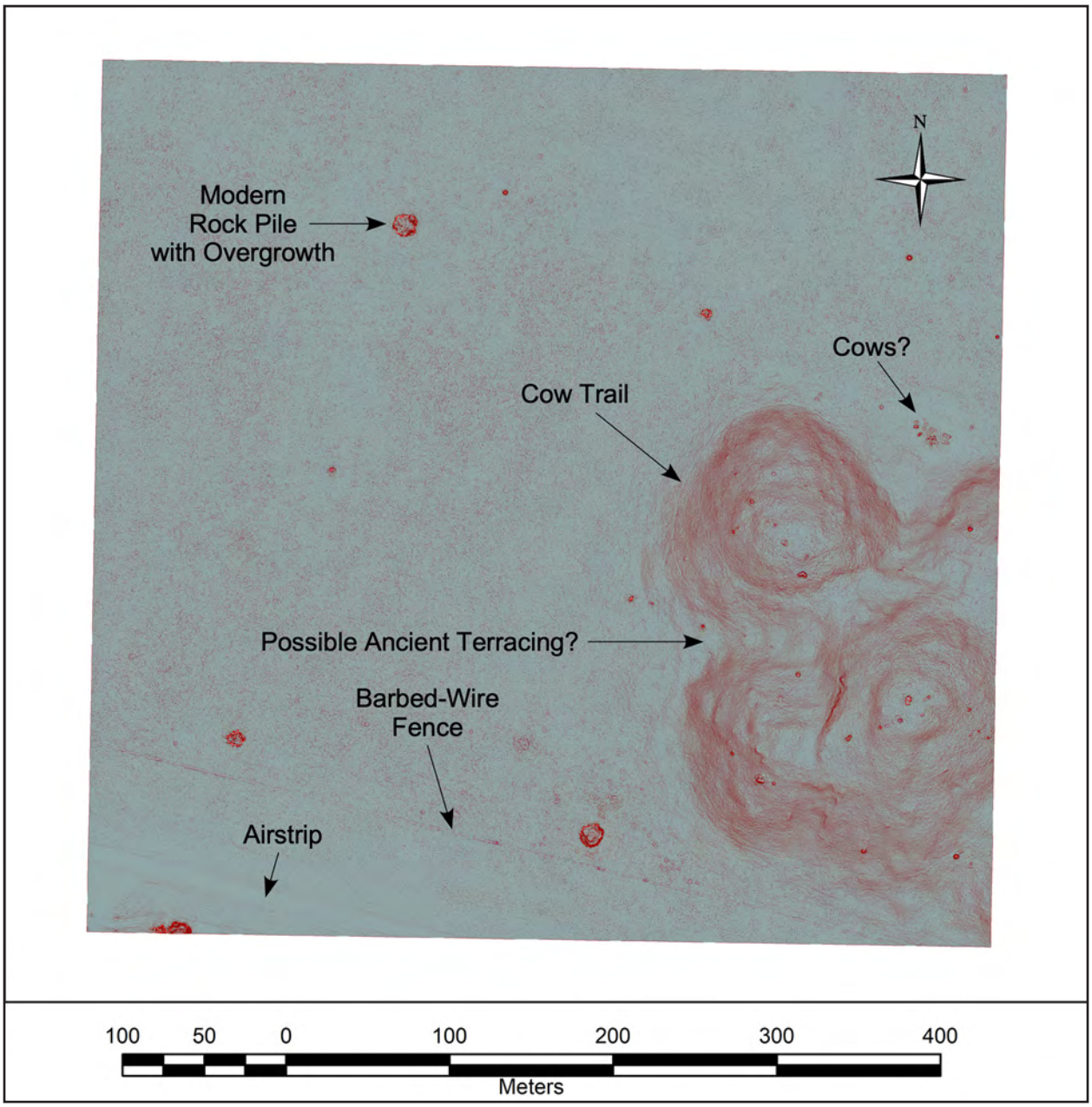

Figure 5.3. RRIM of Block 38 with observable features noted.

RESULTS OF IMAGERY ANALYSIS

Houk and Zaro identified 12 possible structures in four blocks (Table 5.1). These included the five structures previously reported and verified by Sandrock and Willis (2014). Our review of the RRIM maps identify only one possible structure off of hilltops. We also noted possible ancient terraces, but these require field verification.

Block 17

One of three contiguous blocks with a structure or possible structures, Block 17 contains a C-shaped courtyard supporting three structures and two isolated mounds (Figure 5.4). The courtyard, which is open to the east, and one isolated structure occupy the same oblong hill in the northeastern corner of the block. The second isolated structure crowns the summit

Table 5.1. Summary of Prehistoric Features Identified in RRIM Blocks

Block	Structures	Field Verified
17	5 structures (C-shaped courtyard with 3 structures and 2 isolated mounds)	Yes
22	2 structures on small platform	No
24	1 isolated mound	No
25	4 structures (one courtyard with three structures and one isolated structure)	Yes
38	Possible agricultural terraces	No

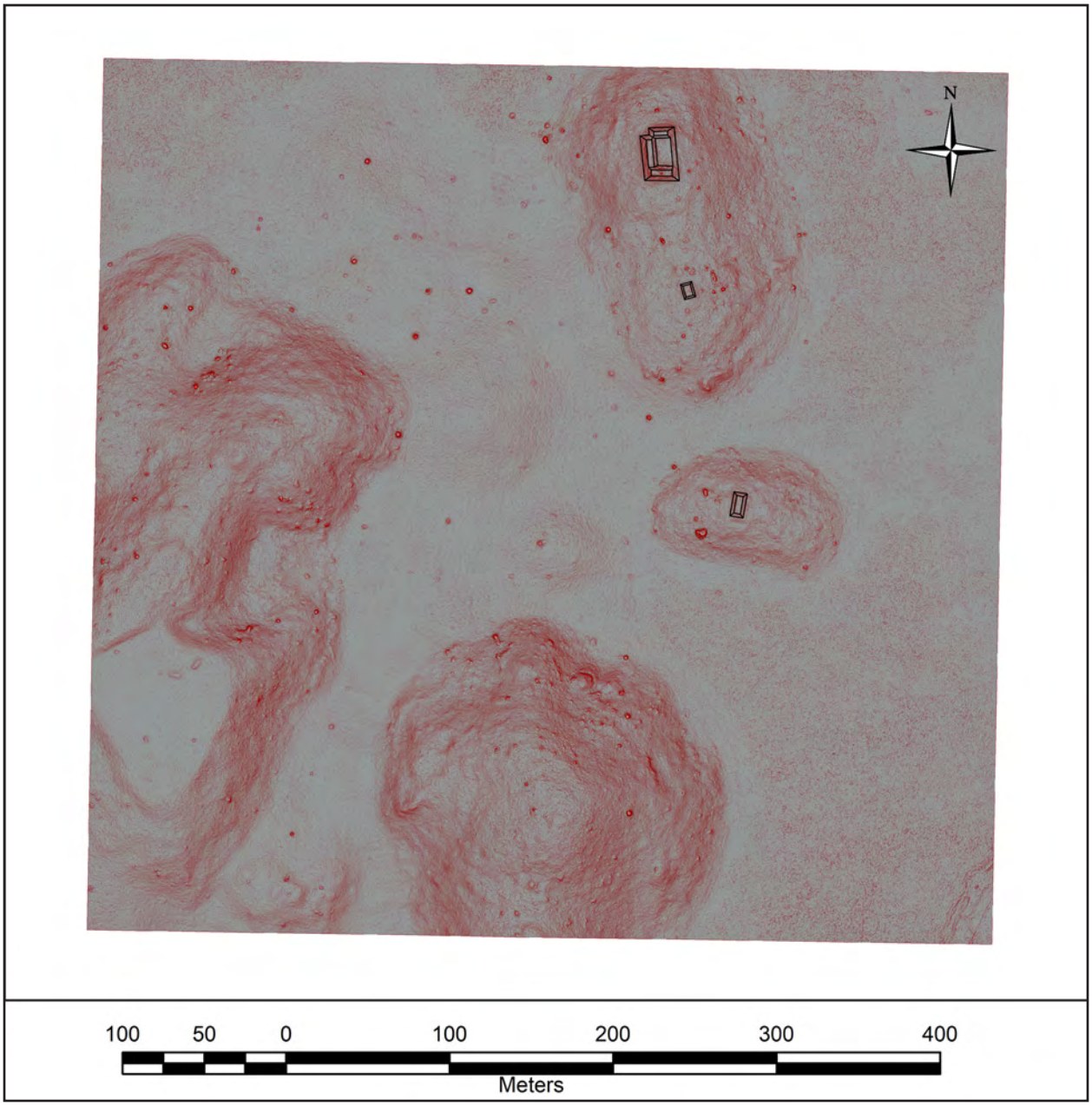

Figure 5.4. RRIM of Block 17 with field-verified structures indicated in black.

of a smaller hill to the south. In February 2017, all three authors visited and mapped the courtyard group and isolated mounds in Block 17, verifying their accuracy.

An irregularly shaped hill in the western half of the block looks artificially leveled, and we suspect Gallon Jug Ranch leveled this hill in the 1980s. Alan Jeal (personal communication, 2018) reported that the ranch bulldozed the summit of flat-topped hill in Block 49 (see Figure 5.2) as part of a never-completed construction project; both hills look similar.

Block 22

Block 22, which borders the Blue Creek road, has a small platform supporting two mounds, which form an L-shape (Figure 5.5). This small group is visible from the nearby road,

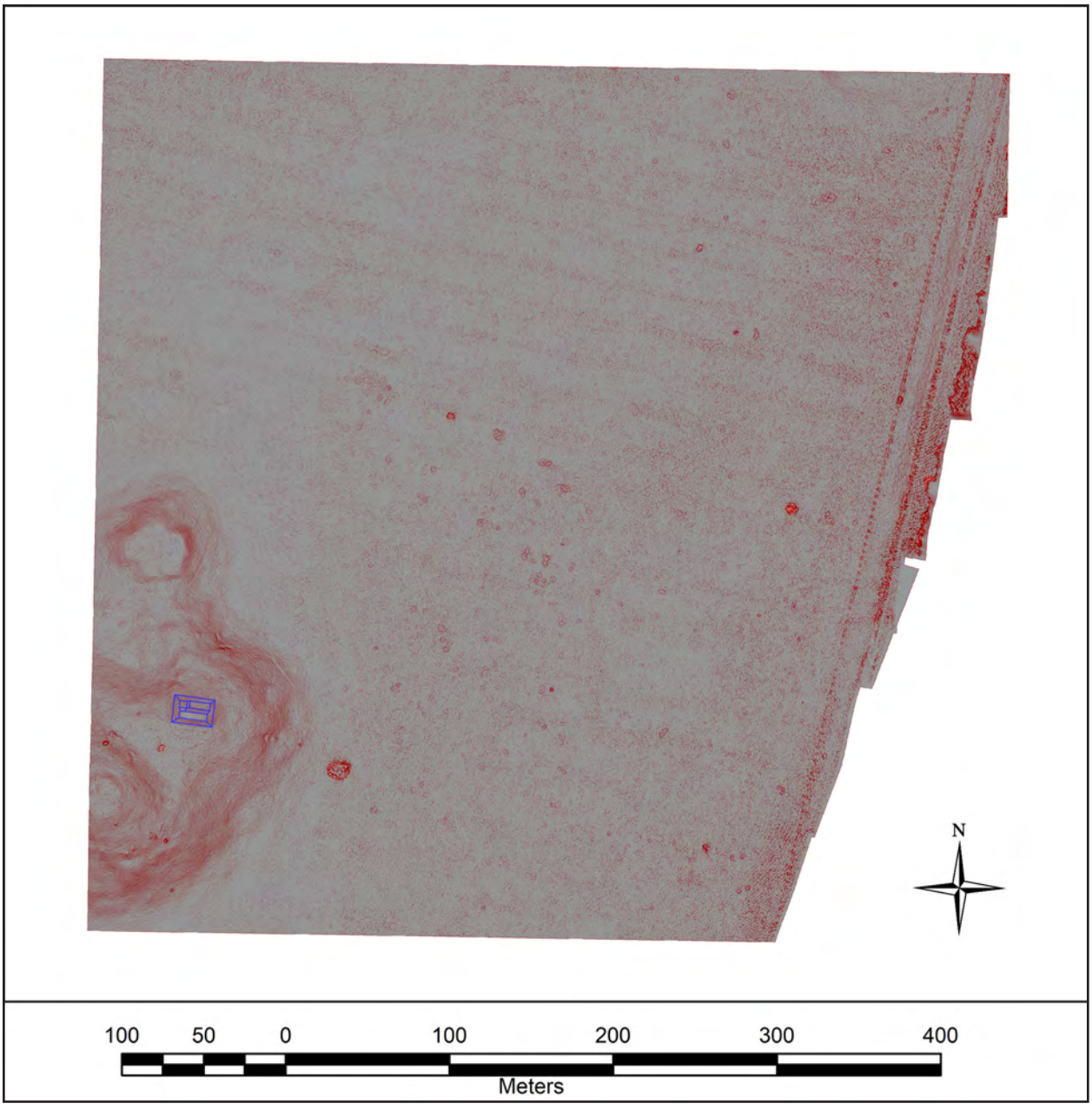

Figure 5.5. RRIM of Block 22 with possible structures indicated in blue.

but survey crews have not ground truthed the structures.

Block 24

Block 24, which is immediately south of Block 17 and east of Block 25, has one possible isolated mound in its northwest corner (Figure 5.6). The mound, which is oriented east-west, measures approximately 10 by 5 m. It sits on the foot of an irregularly shaped hill that extends into Block 17. It is the only possible structure we identified that does not occupy the summit of a hill.

Block 25

In Block 25, which is west of Block 24, a courtyard occupies the summit of a large hill in the eastern part of the block, and an isolated

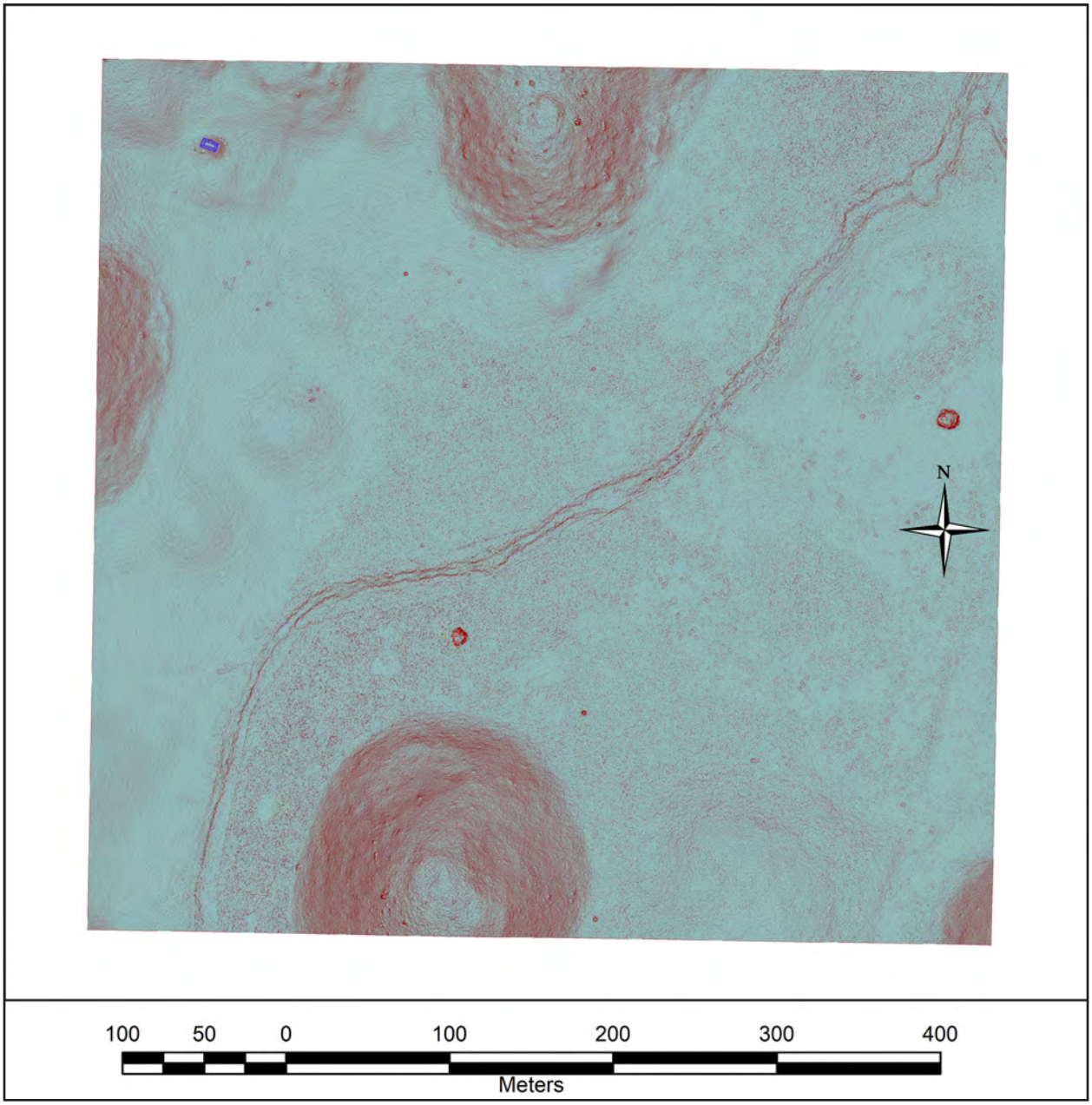

Figure 5.6. RRIM of Block 24 with possible structure indicated in blue.

structure sits on the top of a conical hill in the center of the block (Figure 5.7). Sandrock and Willis (2014) first reported these following initial drone mapping in 2013. The courtyard measures approximately 35 m by 30 m and supports an L-shaped mound on the south and two smaller mounds on the north and northeast margins of the courtyard. The isolated structure may be a small temple-pyramid, which appears to face south.

Block 38

Block 38, described above in the methods section, is one of the blocks contained in Yaeger's (1991) pedestrian survey area. As described above, we identified possible artificial

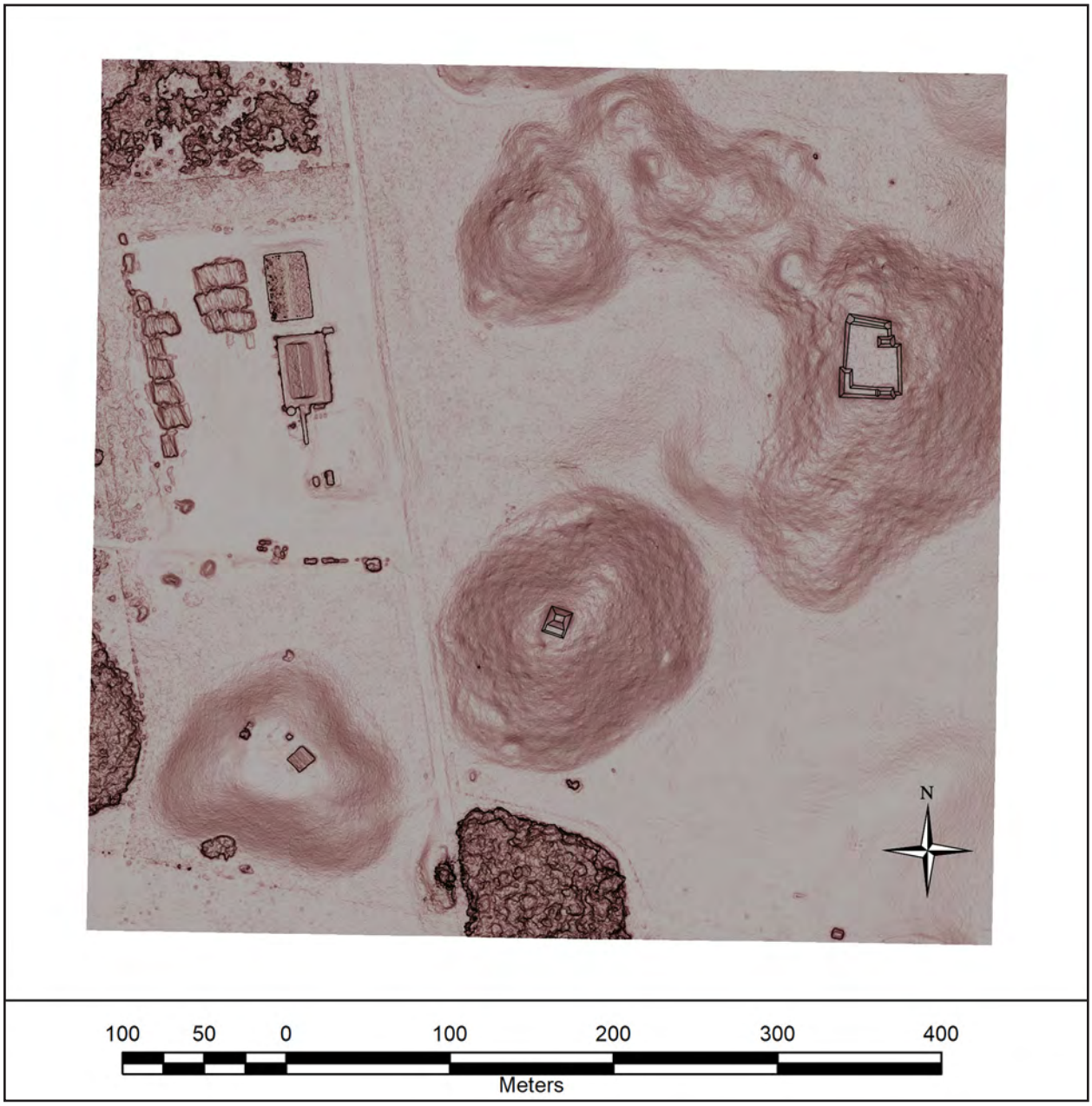

Figure 5.7. RRIM of Block 25 with field-verified structures indicated in black. The rectilinear features west of the road are all modern.

terracing along the western side of a hill in the southeastern corner of the block (see Figure 5.3). This stair-stepped feature, however, could be the natural topography of the hill.

DISCUSSION

Canuto and colleagues (2018) recently published LiDAR-derived structure density information for multiple project areas in Guatemala. Their study classified density according to the following five ranges of structures per km^2: urban core (>300), urban (150–300), peri-urban (60–149), rural (10–59), and vacant (<10). Comparing our drone survey results to their much larger data set reveals that the density of visible prehistoric structures in the surveyed area is surprisingly low. Taking the mapped number of structures that we identified in the imagery north of the airstrip (n=12) and dividing that by the survey area (4.95 km^2) results in a density of 2.42 structures per km^2, which falls in the vacant density category (<10 structures/km^2) defined by Canuto and colleagues (2018) based on LiDAR data from Guatemala (Table 5.2).

This density is particularly surprising given the number of structures mapped immediately outside of the cleared pastures around the Gallon Jug site core. The map Guderjan and colleagues (1991:Figure 40) produced of the Gallon Jug site core—while not showing formal survey boundaries—identified eight courtyard groups and a handful of isolated structures within the forested area surrounding the site core (Figure 5.8). We can roughly calculate the area containing those groups and structures to be approximately 500 m east-west by 270 m north-south, or 135,000 m^2 (0.135 km^2). Dividing the total number of structures (n=46) around the site core in that area—including the plaza and its structures—yields a density of 340.74 structures per km^2 (see Table 5.2), which falls within the "urban core density defined by Canuto et al. (218).

Other structure density estimates for the permit area come from David Sandrock's (2017) pedestrian survey of American Seismic (AS) lines in 2013 and 2014, mapping around the site core of Chan Chich (Houk et al. 1996), and Hubert Robichaux's extensive survey of settlement around Punta de Cacao (Robichaux et al. 2015). In all cases, the structure density derived for the drone survey area is far below that of the other surveyed areas (see Table 5.2). All of the other survey areas have structure densities falling within peri-urban or urban levels, making the vacant level of density in drone survey even more surprising. A number of factors could account for the low density: 1) the grass covering the project area may have obscured low mounds in the DEM data,

Table 5.2. Structure Densities Based on Surveys in BEAST Permit Area

Survey	Source	Density (Str./km^2)	Category
AS1	Sandrock (2017:Table 6.1)	162.09	Urban
AS3	Sandrock (2017:Table 6.1)	139.88	Peri-Urban
AS6	Sandrock (2017:Table 6.1)	86.51	Peri-Urban
AS7	Sandrock (2017:Table 6.1)	174.24	Urban
AS8	Sandrock (2017:Table 6.1)	181.37	Urban
Avg. AS Lines	Sandrock (2017:Table 6.1)	129.53	Peri-Urban
Chan Chich Core (1.56 km^2)	Houk et al. (1996:21)	162.18	Urban
Gallon Jug Core (0.135 km^2)	This study	340.74	Urban Core
Gallon Jug Drone (4.95 km^2)	This study	2.42	Vacant
Punta de Cacao (3.9 km^2)	Robichaux et al. (2015:55)	142.31	Peri-Urban

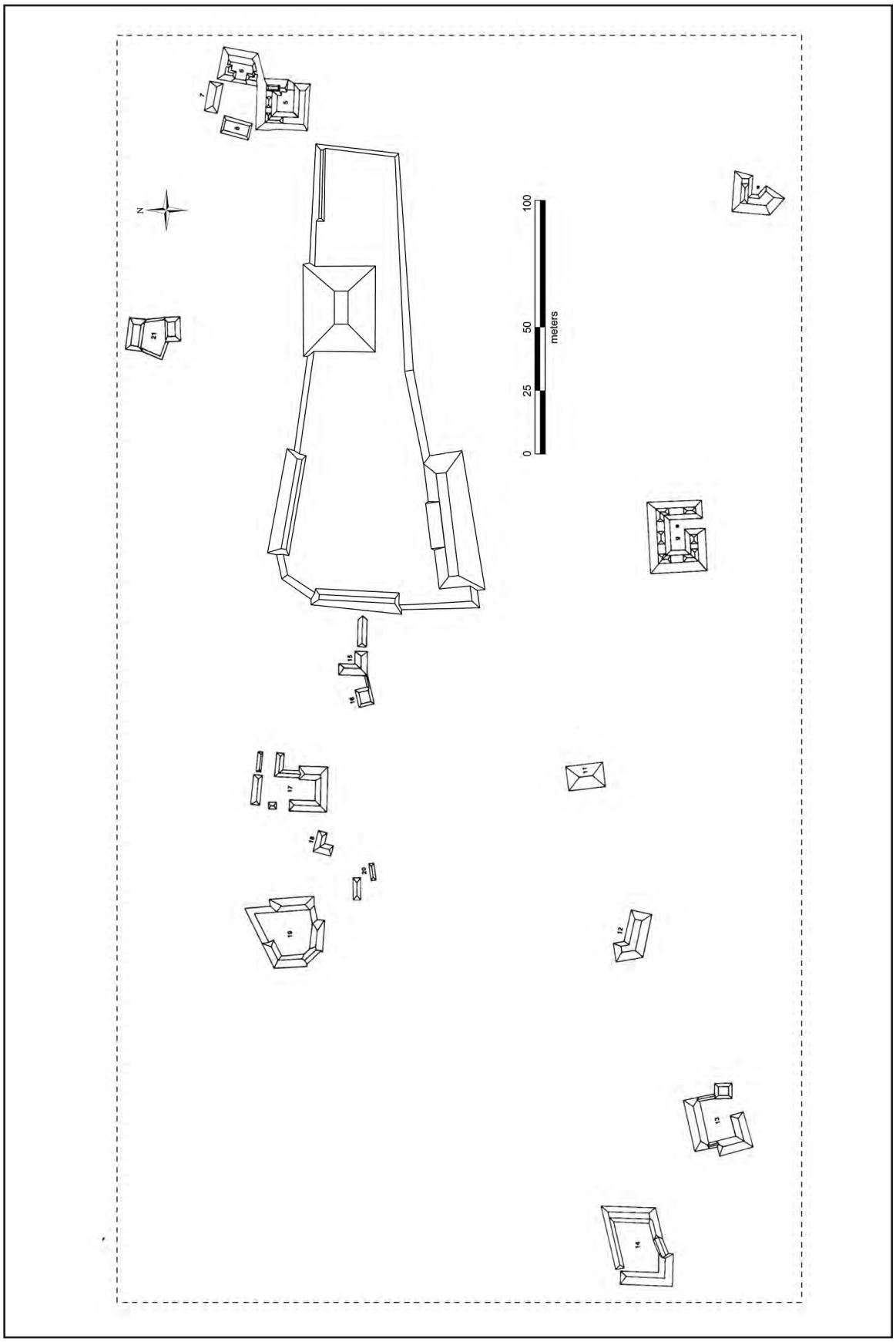

Figure 5.8. Map of Gallon Jug site core based on Guderjan et al. (1991:Figure 40) showing area used to calculate structure density.

2) Gallon Jug Ranch's aggressive vegetation clearing in the 1980s and early 1990s may have obliterated smaller mounds entirely, 3) the Maya may have avoided constructing houses in the low areas between the hills, or 4) some combination of factors is at play. We suspect the latter factor is the most likely explanation. Similar drone survey around the site of Saturday Creek discovered numerous mounds, but in that case the surveyed area had very recently been plowed and ground visibility was excellent (Harrison-Buck et al. 2015). The high grasses in the Gallon Jug survey likely obscured some cultural features in the DEM data. Second, Yaeger (1991:90–91) witnessed some of the clearing activity at Gallon Jug during his 1990 pedestrian survey and his description of it suggests many smaller mounds would have been completely destroyed. It is also evident that, since its initial clearing, agricultural modifications to the flatter segments of the survey area have been significant. Deep furrows, visible in the DEM, cross much of the cleared pastures suggesting intensive landscape alteration. Each furrow and ridge cover a width of 25 m. Although this level of agricultural modification has high potential to destroy smaller mounds, Yaeger (1991) concluded, following his original survey, that low-lying areas had little evidence of occupation based on artifacts and a lack of exposed floors. Based on his survey map, however, it is evident that Yaeger (1991) only considered the flattest portions of his survey area to be low-lying as even areas with low relief contained surface artifacts and/or evidence of marl floors in the plowed areas. Therefore, we conclude that agriculture impacts likely destroyed most if not all of the small mounds in our survey area, particularly in the areas marked by deep furrows and ridges, but that some small mounds may be obscured by vegetation, particularly on low hills, and are not visible in our DEM or RRIMs.

A final consideration is sampling bias, which we acknowledge and suspect is affecting our results. For example, if the cleared area available for survey had extended 200 m farther north, then our sample would have included the additional 46 structures associated with the Gallon Jug site core. Slide the survey area east or west and the density calculation could similarly be affected. Ultimately, additional survey is needed to increase the overall picture of settlement density in the permit area.

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CCAP Archaeology Activity Book

Gertrude Kilgore and Claire Novotny

Public outreach and community education have been part of archaeological practice since the inception of the discipline. In Belize, disseminating the results of archaeological research in an accessible way is a mandate of the Institute of Archaeology. Recent efforts from around the country provide examples for community outreach and archaeology education, including the Uch'benka K'in Ajaw Association (UKAA) in Santa Cruz village (Amy Thompson, personal communication, 2019), Toledo, the Fajina Archaeology Outreach in Succotz, Cayo (Fajina Archaeology Outreach 2016), and the Crooked Tree Museum in Crooked Tree, Belize (Eleanor Harrison-Buck, personal communication, 2018), to name just a few organizations. The Chan Chich Archaeological Project is proud to add our efforts to this growing list. Gertrude Kilgore and Claire Novotny made a coloring and activity book geared towards a primary school audience, which outlined the major goals of archaeology and included details about daily life at Chan Chich. During the 2018 season project members visited the Casey Community School in Gallon Jug to distribute (Figure 6.1) and discuss the coloring book and show artifacts, as described by Houk (this volume). Though in its infancy, the Chan Chich Outreach Project laid the foundation for future collaboration. Figures 6.2 through 6.18 present the *Archaeology Activity Book* as an example of public outreach and community engagement.

Figure 6.1. CCAP staff and Casey Community School students at work on the coloring books.

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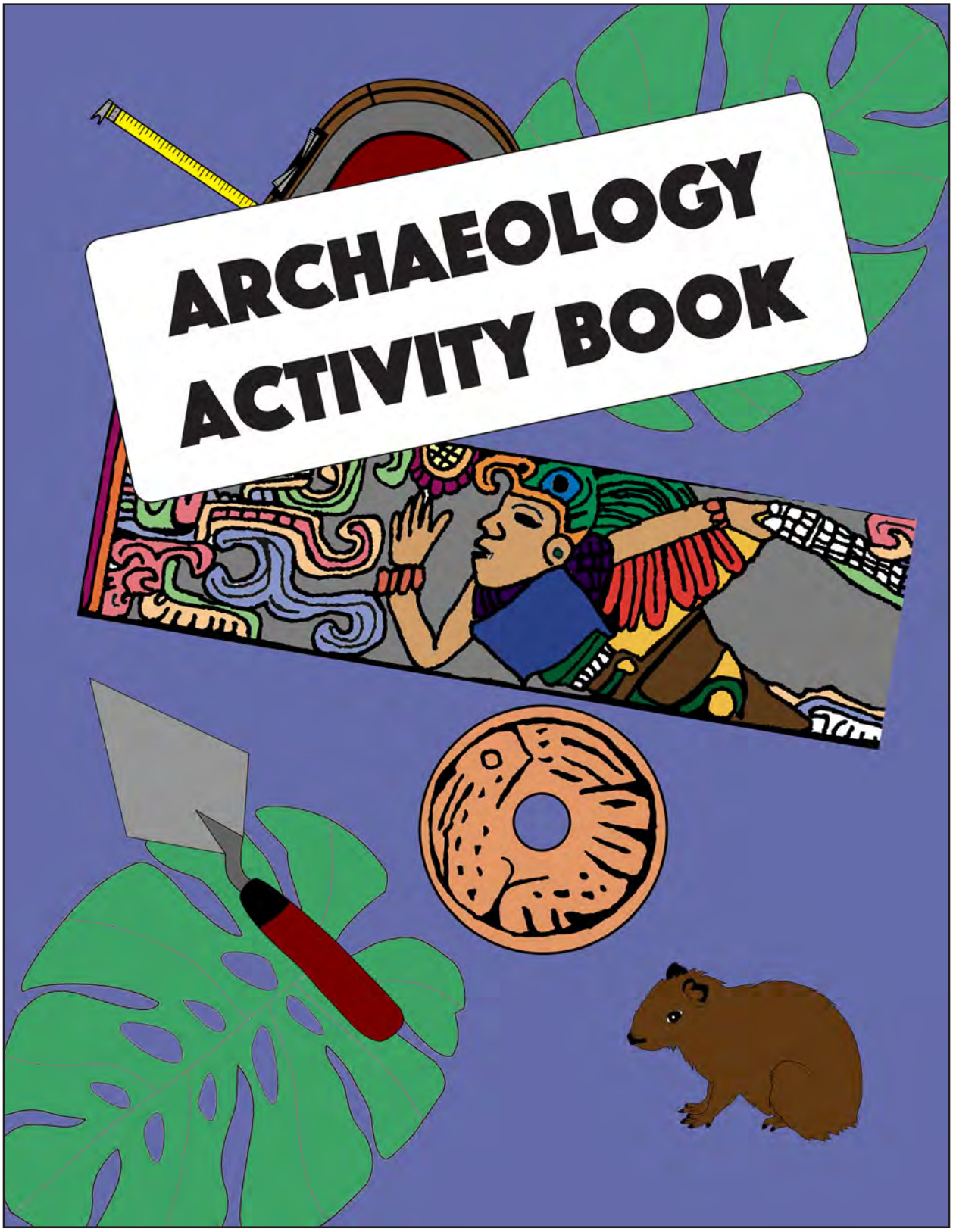


Figure 6.2. Front cover of the CCAP *Archaeology Activity Book*.

Written by Gertrude Kilgore and Dr. Claire Novotny
Illustrated by Gertrude Kilgore
Published by the Chan Chich Archaeological Project and Belize Estates Archaeological Survey Team

We would like to thank the following organizations for their support in the development and creation of this coloring book:

Belize National Institute for Culture and History (NICH)
Belize Institute of Archaeology
Alphawood Foundation Chicago
Chan Chich Archaeological Project (CCAP)
Belize Estates Archaeological Survey Team (BEAST)
Chan Chich Lodge
Gallon Jug Ranch
Yalbac Ranch
Laguna Seca Ranch

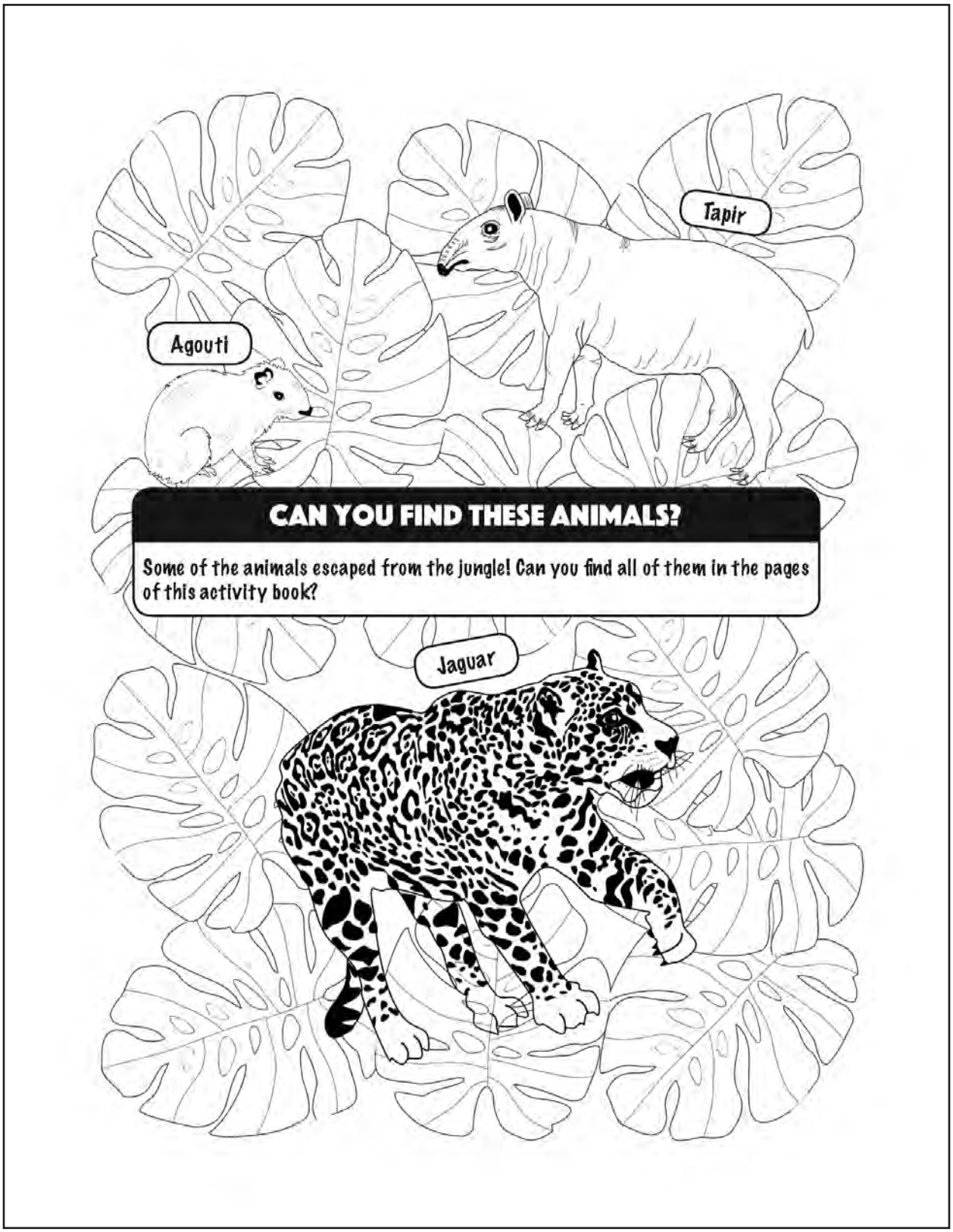
All artifact drawings were adapted from scientific illustrations created by members of the Chan Chich Archaeological Project and Belize Estates Archaeological Survey Team.

Map of Belize on page three was adapted from the Maya Area Cultural Heritage Initiative (MACHI) coloring book, "I am Maya!"

Belize Estates Archaeological Survey Team
BEAST
Gallon Jug • Belize • Laguna Seca

Chan Chich Archaeological Project
CCAP
Chan Chich, Belize - Central America

Figure 6.3. Page 1 of the CCAP *Archaeology Activity Book*.



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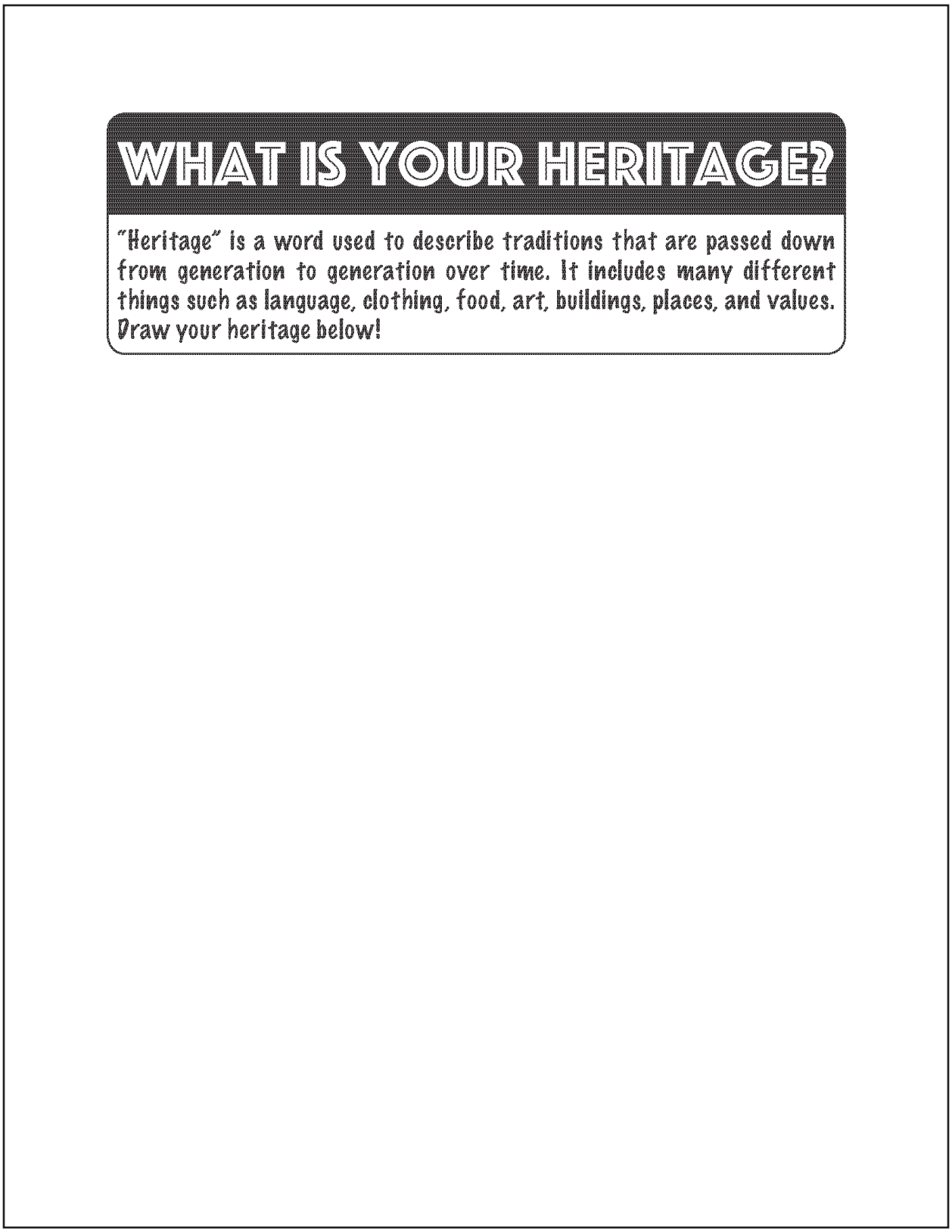

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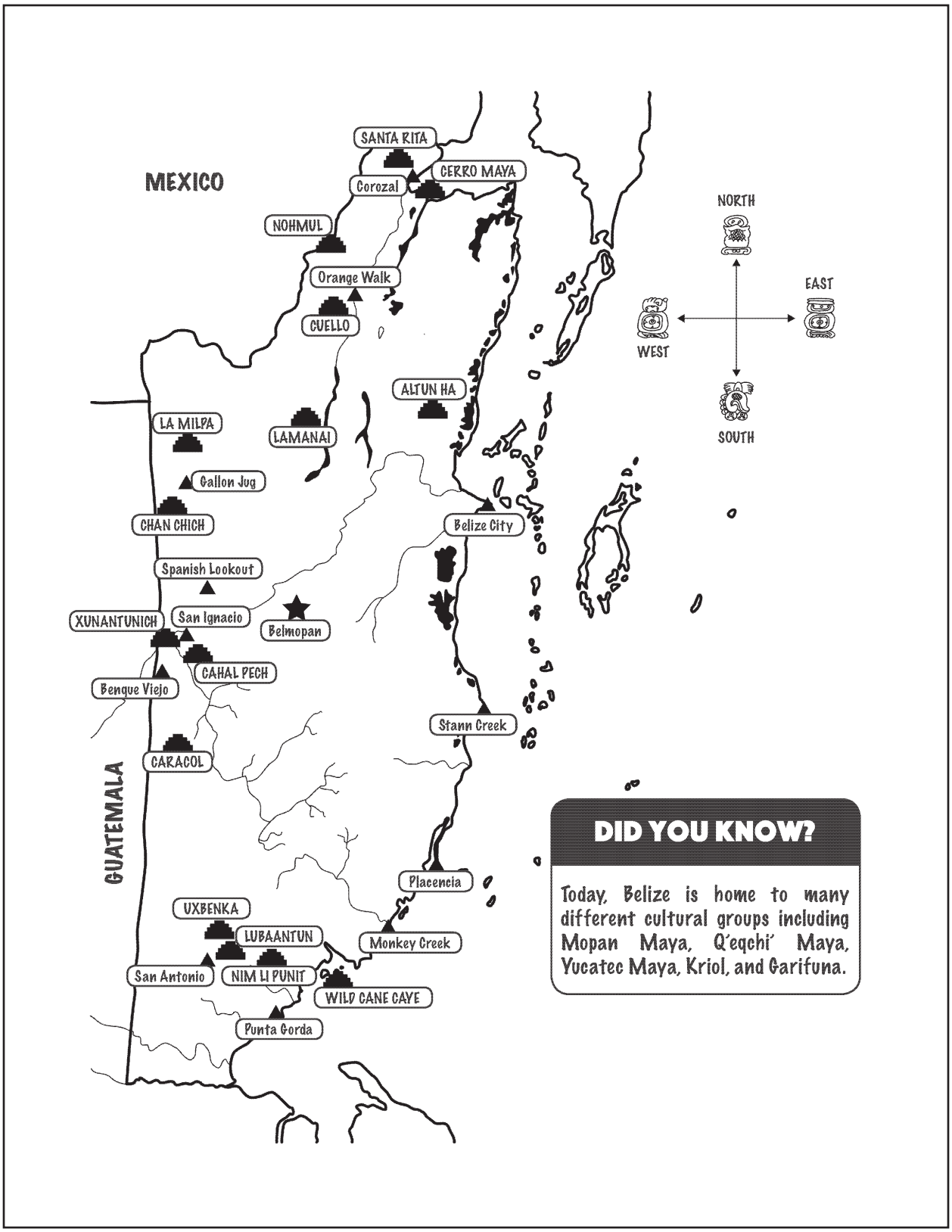

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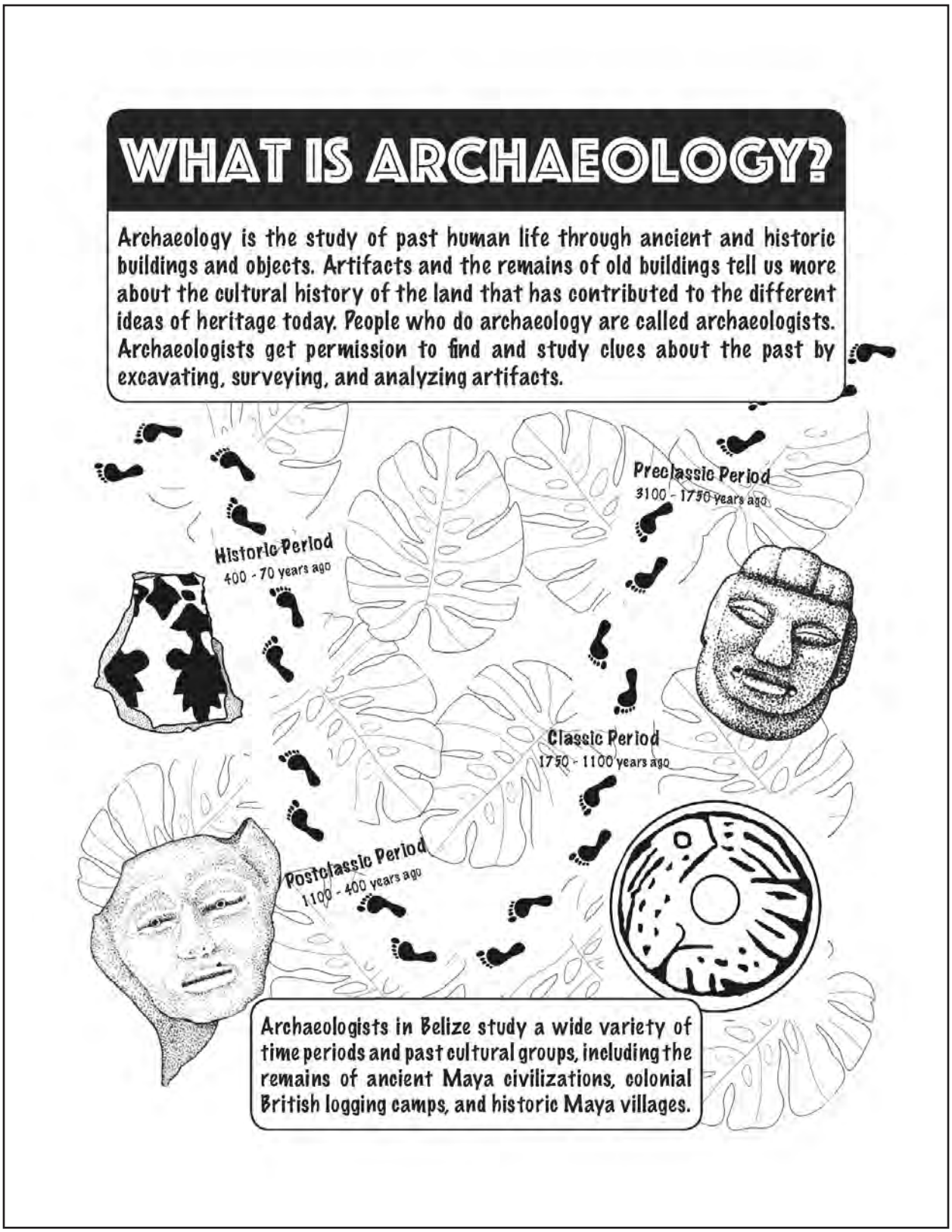

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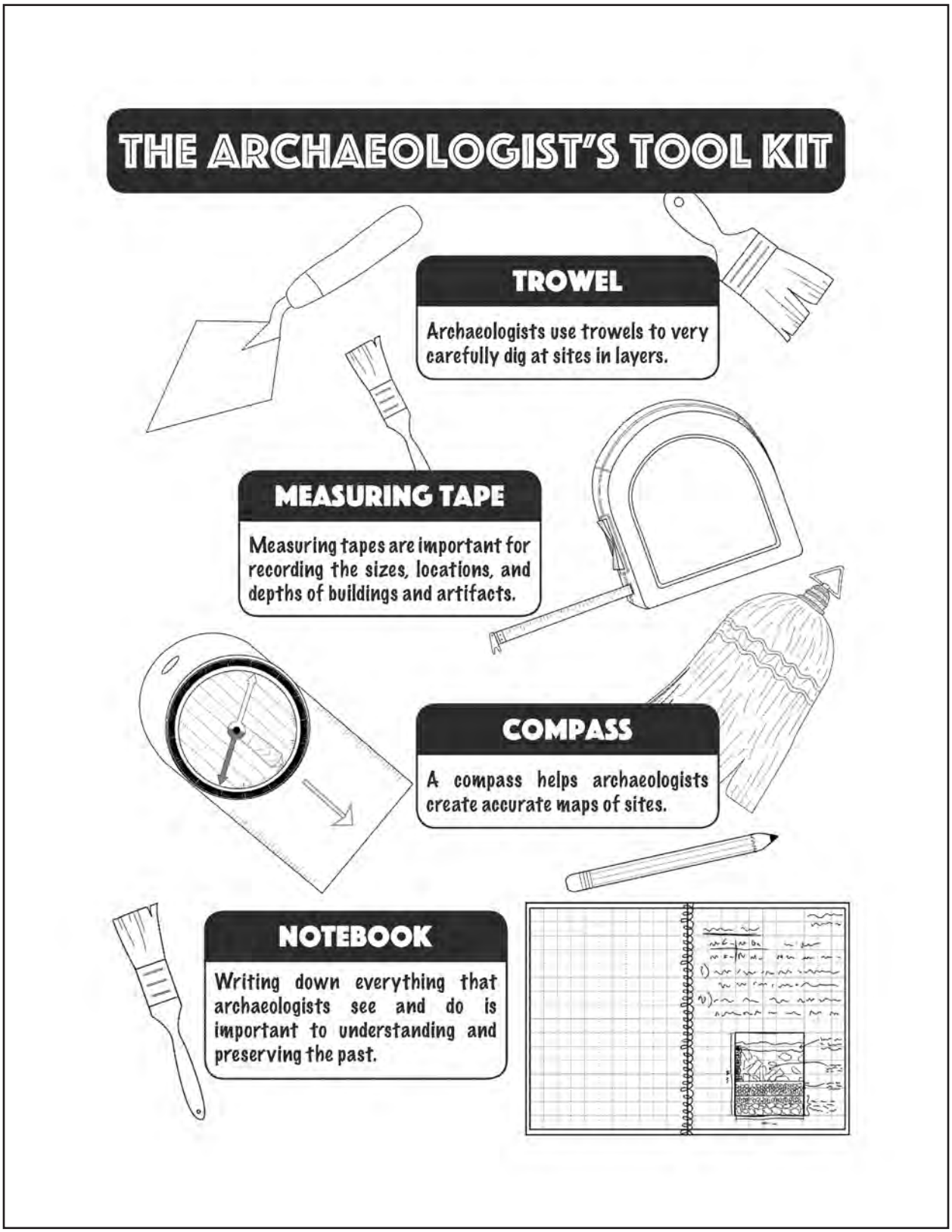
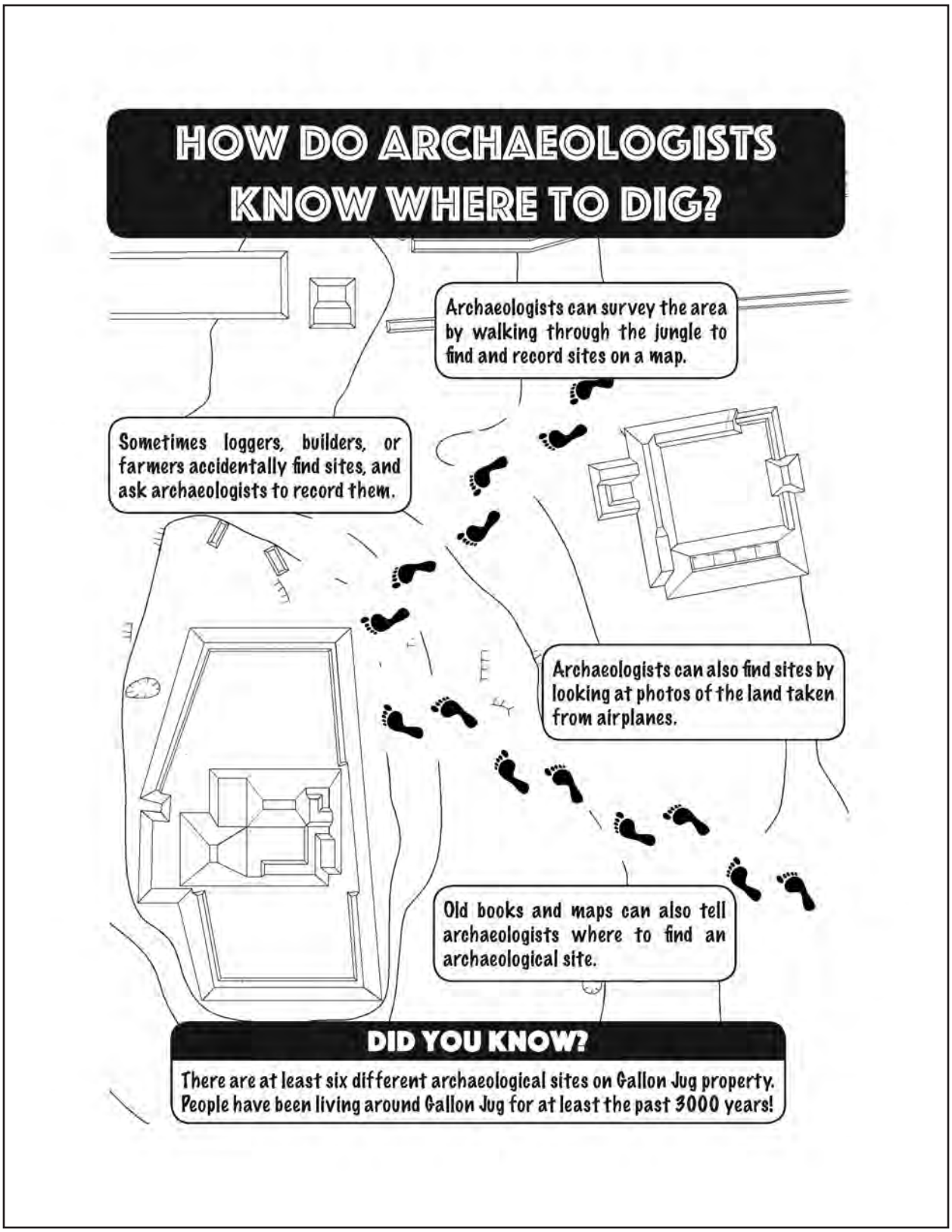


Figure 6.8. Page 6 of the CCAP *Archaeology Activity Book*.



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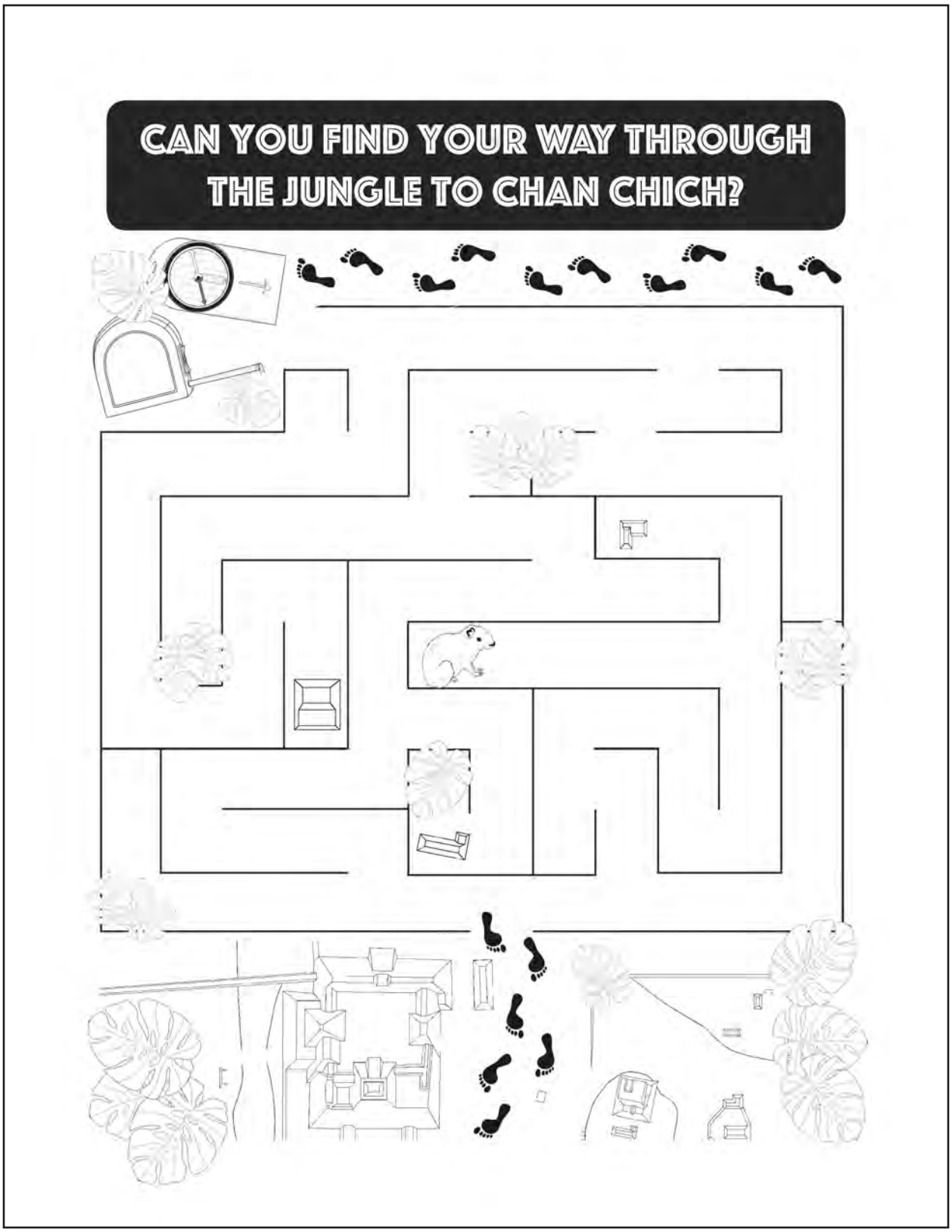

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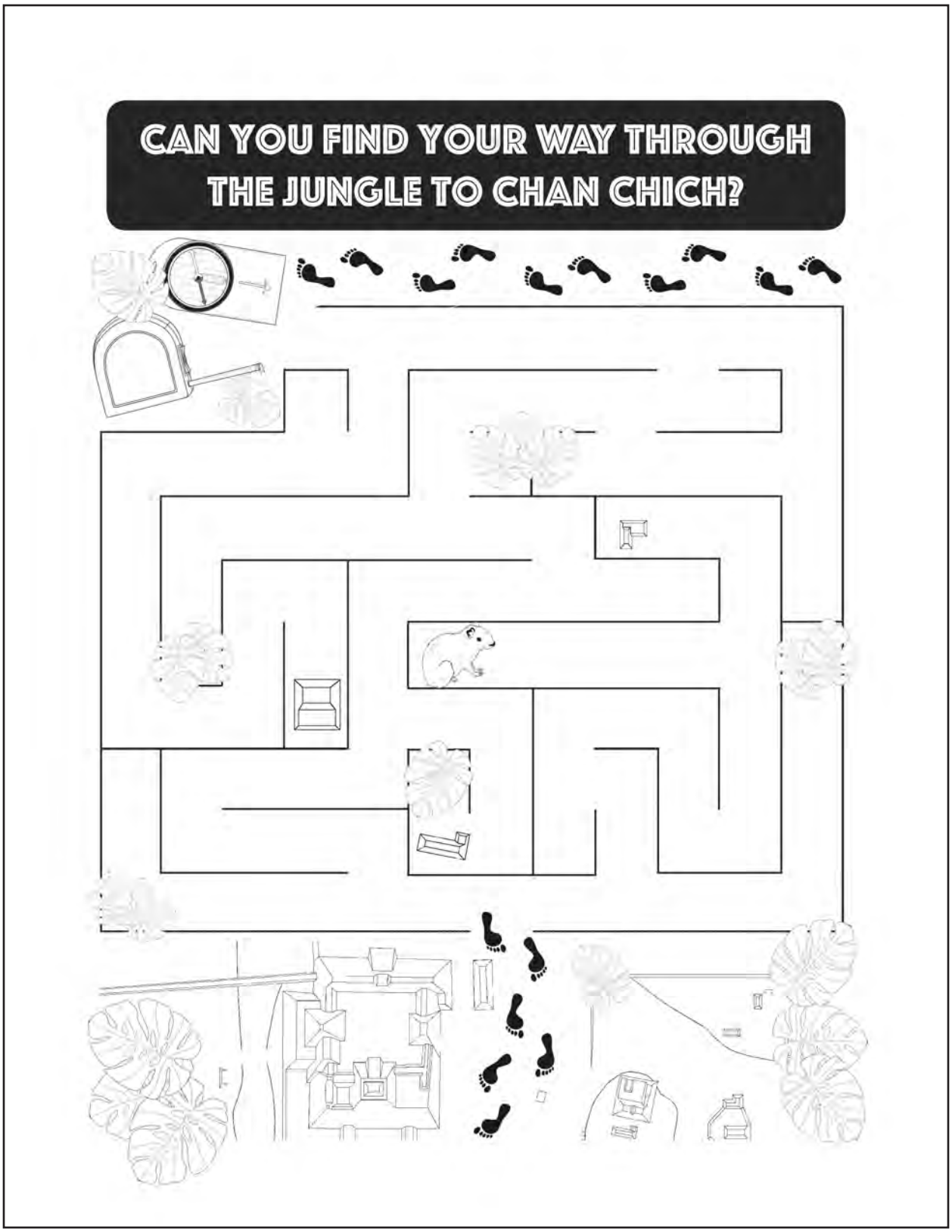

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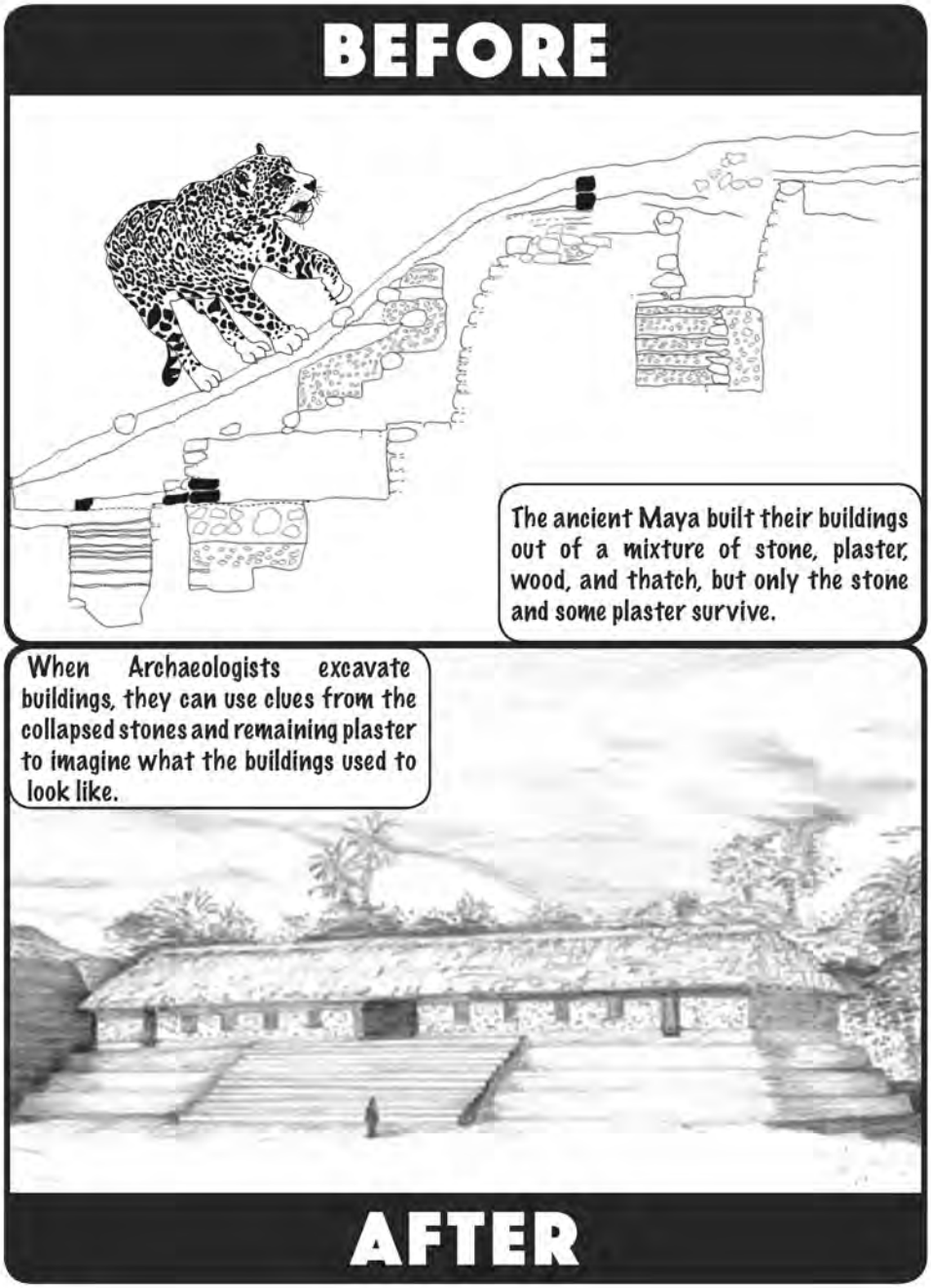

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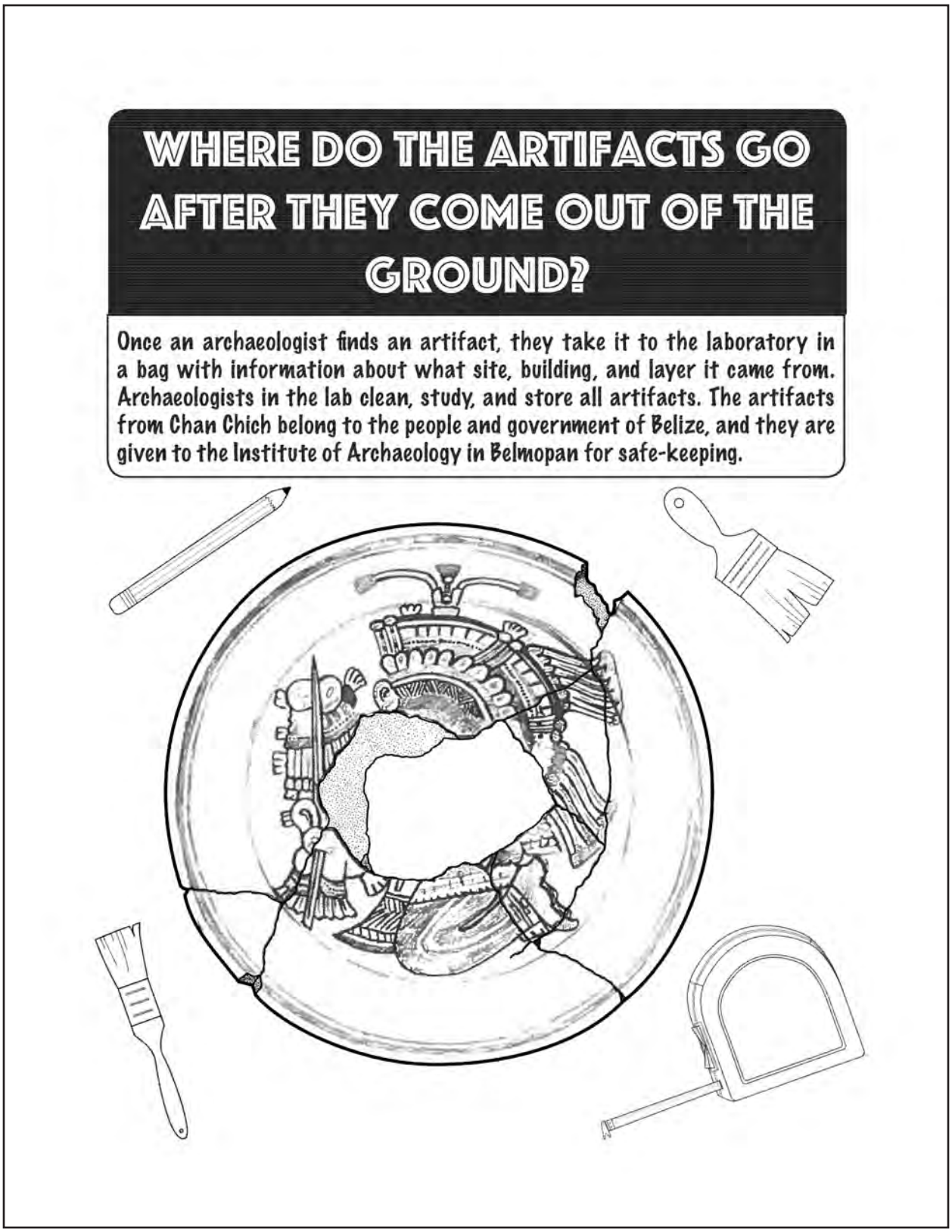

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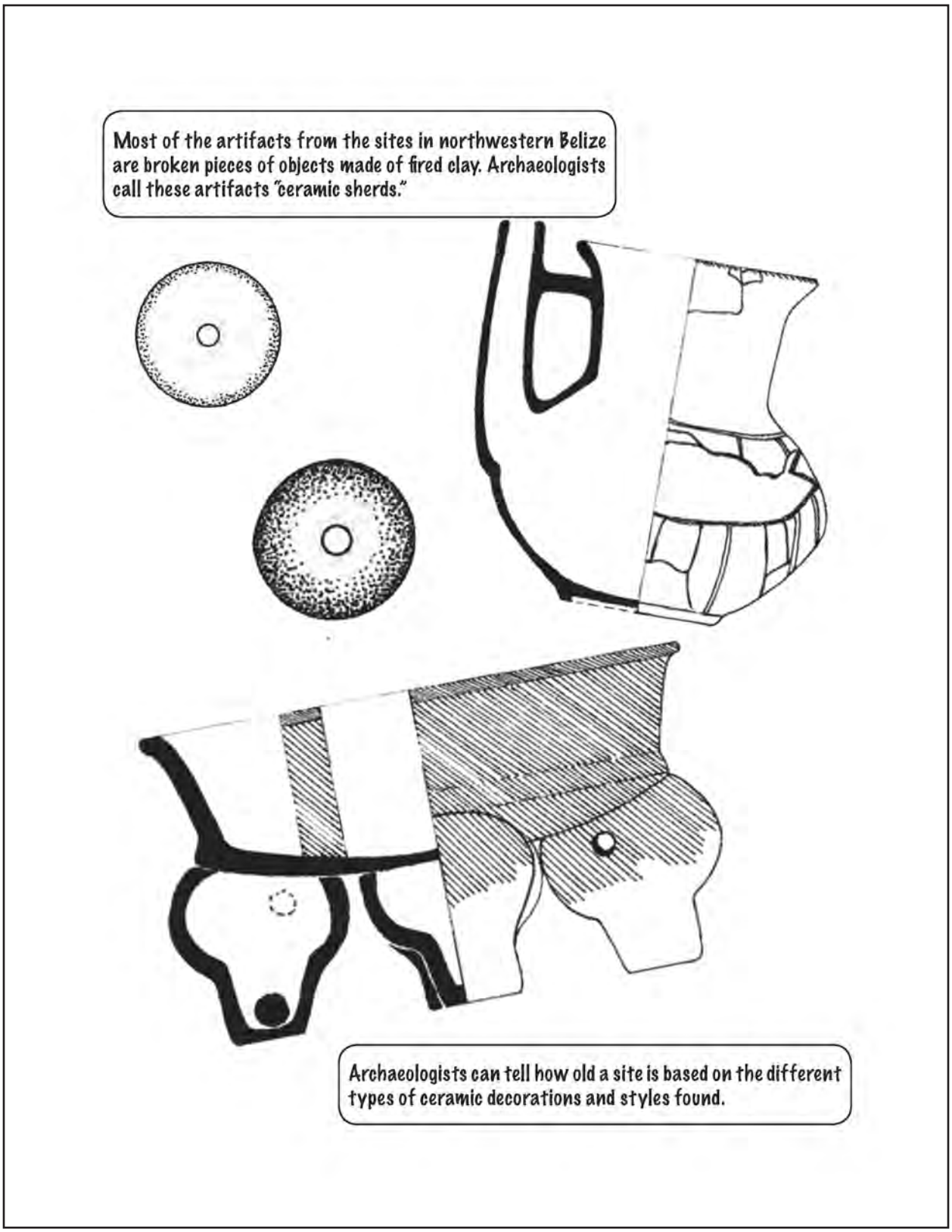

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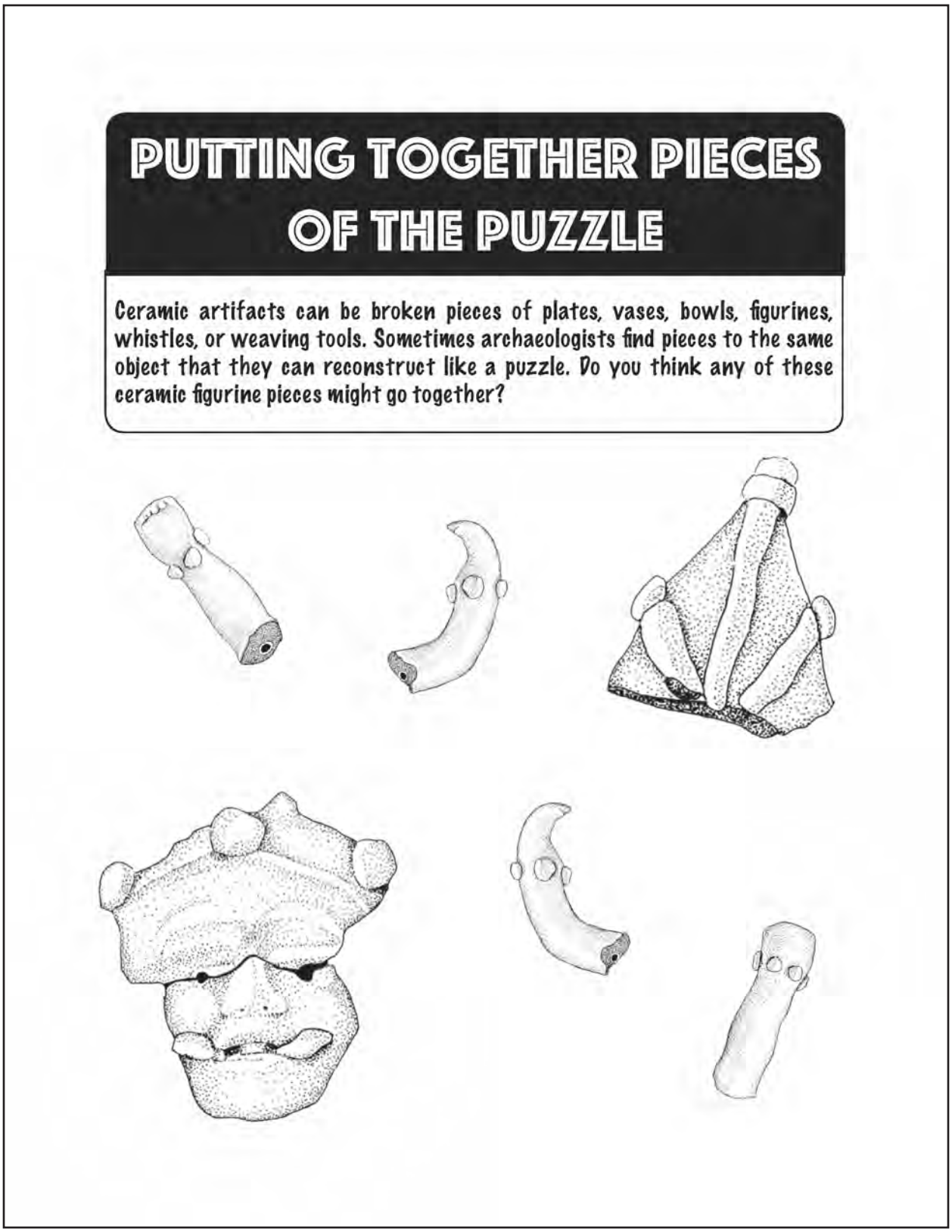

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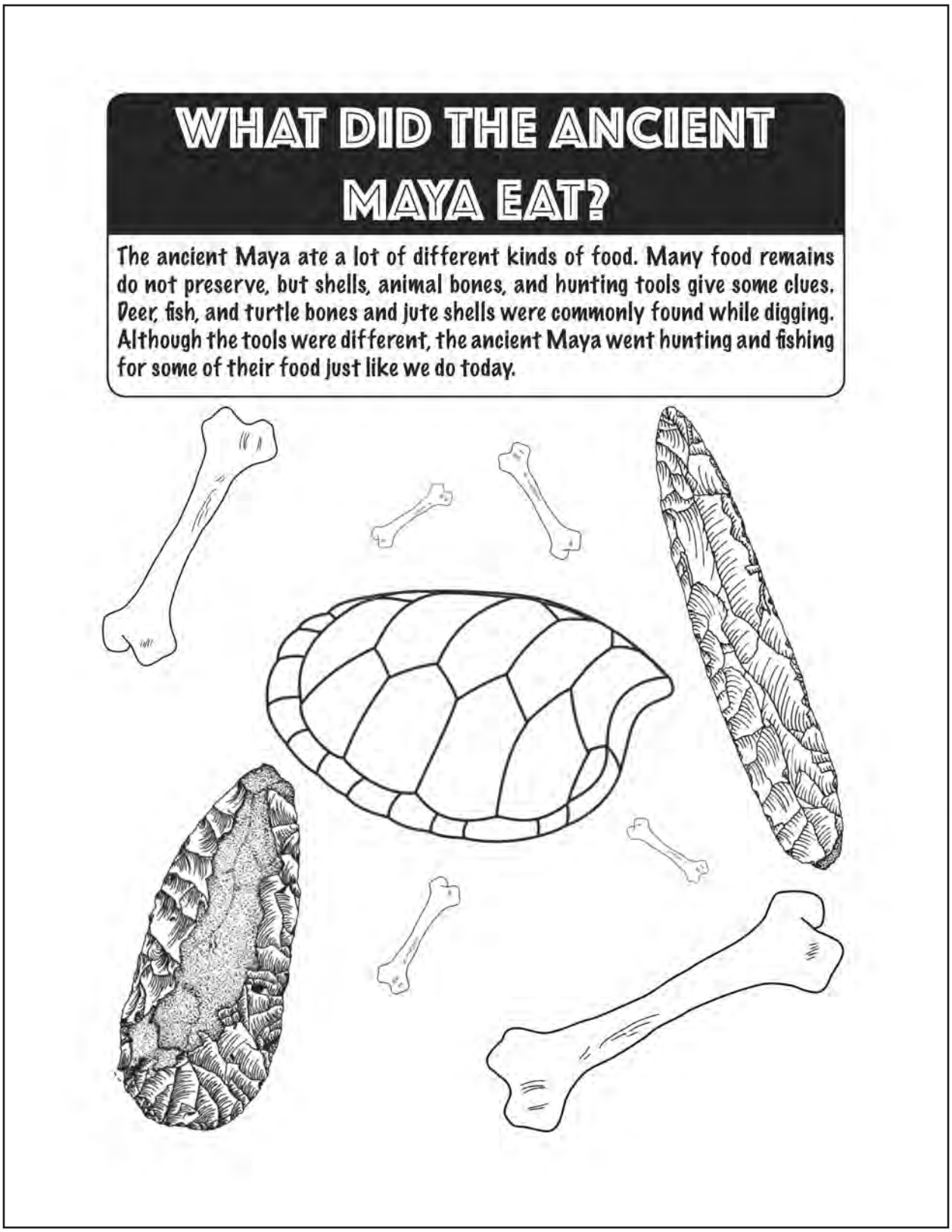

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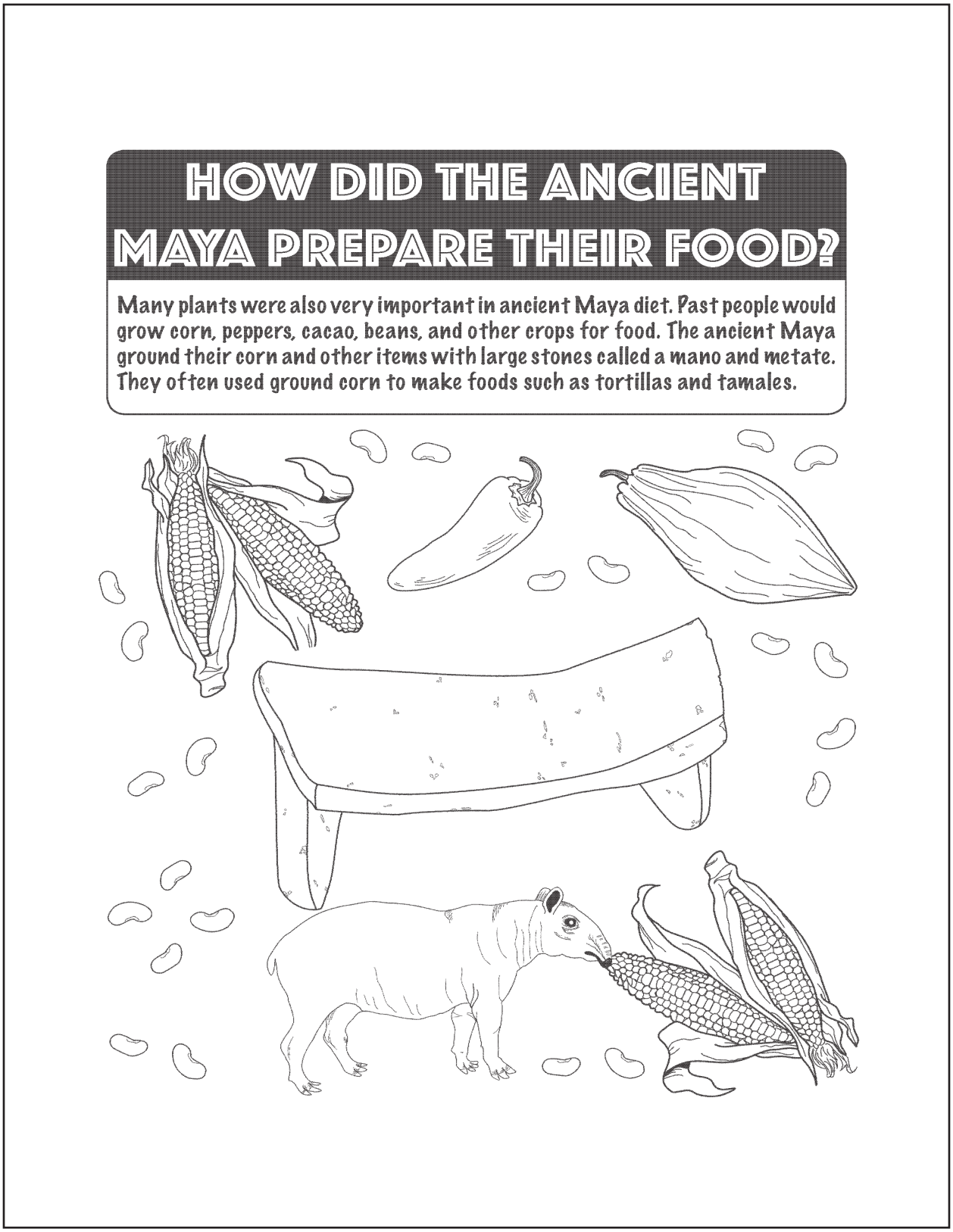

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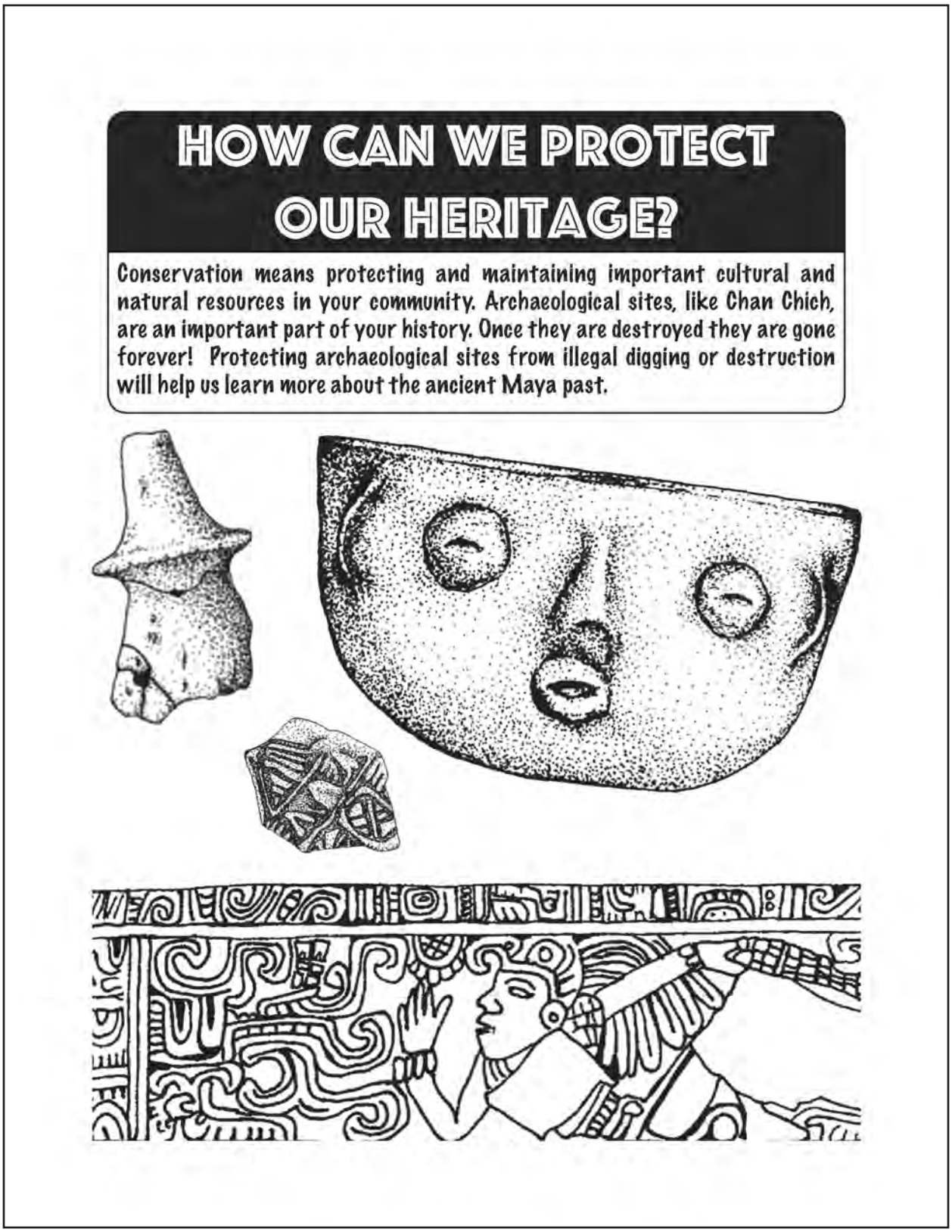

Figure 6.18. Page 16 of the CCAP *Archaeology Activity Book*.

The Chan Chich Archaeological Project: 1996 to 2018 Project Lists

Compiled by Brett A. Houk

This chapter includes lists of sites, operations, tombs, burials, caches, stone monuments, and radiocarbon dates most recorded by the Chan Chich Archaeological Project (CCAP) since its inception in 1996 and the Belize Estates Archaeological Survey Team (BEAST) since 2013. It is meant to serve as a reference document for future seasons and is updated each year.

SITES

Table 7.1 lists Maya sites on and near the Gallon Jug (GJ), Laguna Seca (LS), and the adjacent Yalbac (Y) properties with Belize Estate (BE) designations. As noted by Sandrock (2013) and Sandrock and Willis (2014), BEAST assigned BE numbers to previously named sites and to newly discovered sites with four or more structures, the tallest of which must be at least

Table 7.1. Recorded BE Sites (UTM Zone 16N)

BE #	Site Name	Property	Original Source	UTM N	UTM E
1	Chan Chich	GJ	Guderjan (1991)	19 40 412	2 75 875
2	Kaxil Uinic (E'kenha)	LS	Guderjan et al. (1991)	19 40 538	2 73 381
3	Punta de Cacao	LS	Guderjan et al. (1991)	19 46 100	2 86 728
4	Gallon Jug	GJ	Guderjan et al. (1991)	19 45 700	2 83 688
5	Laguna Verde	GJ	Guderjan et al. (1991)	~19 47 250	~2 80 500
6	Laguna Seca	GJ/LS	Guderjan et al. (1991)	~19 50 850	~2 84 000
7	Qualm Hill (ruin)	LS	Guderjan et al. (1991)	~19 57 300	~2 87 500
8	Wamil	Y?	Guderjan et al. (1991)	~19 39 900	~2 94 900
9	Sierra de Agua	Y/LS?	Guderjan et al. (1991)	~19 40 600	~2 99 500
10	Gongora Ruin	LS	Guderjan et al. (1991)	19 54 400	2 93 459
11	Ix Naab Witz	LS	Sandrock (2013)	19 55 187	2 85 854
12	La Luchita	LS	Sandrock (2013)	19 50 011	2 77 178
13	Montaña Chamaco	LS	Sandrock (2013)	19 51 187	2 75 043
14	Sylvester Camp	GJ	Sandrock (2013)	19 45 510	2 78 128
15	Qualm Hill camp	LS	Sandrock and Willis (2014)	19 57 213	2 85 282
16	Kaxil Uinic village	Y/LS	Thompson (1963)	19 40 073	2 73 487
17	Sak Mut	Y	Houk et al. (2017)	19 34 386	2 72 740
18	Tikin Ha (formerly Xma Ha Ak'al)	LS	Houk et al. (2017)	19 58 096	2 96 807

Houk, Brett A. (compiler)
2019 The Chan Chich Archaeological Project: 1996 to 2018 Project Lists. In *The 2018 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 135–168. Papers of the Chan Chich Archaeological Project, Number 13. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

4 m high including structure and substructure or basal platform, that are not within 1 km of another recorded site BE site.

In addition to prehistoric sites, a number of historic sites are present in and near the BEAST survey area. Table 7.2 includes a list of those visited by the CCAP or BEAST or reported by other researchers. Significant historic sites are also assigned BE numbers.

Table 7.2. Known and Reported Historic Sites

Name	Location	Description	Source(s)
Kaxil Uinic village BE-16	Approximately 500 m south of BE-2 primarily on Yalbac Ranch, although the northern limits of the village are on Laguna Seca Ranch.	In 2012, the CCAP re-located the remains of the historic Maya village and *chicle* camp known as Kaxil Uinic and its associated *aguada*. The village was probably settled in the 1880s, and was closed in 1931 by the Belize Estate Co. BEAST mapped and excavated the site in 2015, recording seven three-stone hearths and multiple artifact scatters, which included turn of the century glass bottles and cast iron pots. BEAST returned to the site in 2016 and mapped additional surface finds, hearths, and mounds. The 2016 work included archival research in Jamaica and England.	Bonorden (2016); Bonorden and Houk (2015, 2016); Bonorden and Kilgore (2015, 2016); Booher et al. (2016); Houk (2012); Houk and Bonorden (2015); Houk et al. (2015); Thompson (1963)
Qualm Hill camp BE-15	Immediately west of Cedar Crossing on the west bank of the Río Bravo.	A 215-x-90-m scatter of historic artifacts that likely represents the location of Qualm Hill (also known as Quam or Quam Hill), which was "the seasonal headquarters of the British Honduras Company during the mid 1800s" (Cackler et al. 2007:124). Qualm Hill is historically important as the site of a "Chichina" Maya raid led by Marcus Canul in 1865 (Bristowe and Wright 1888:27–28), yet artifacts recovered from the 2015 survey and excavation generally post-date the raid. The site, which primarily consists of surface artifact deposits, has been disturbed in recent years by individuals scavenging the historic logging equipment and modern loggers camping in the middle of the historic camp.	Bonorden (2016); Bonorden and Houk (2016); Bonorden and Smith (2015); Bristowe and Wright (1888:27–28); Houk et al. (2015); Cackler et al. (2007:124)
El Infierno logging camp	Reportedly 1 km east of Guatemala border, northwest of Gallon Jug	This site is mentioned in reference to the location of the Maya site of El Infierno, which is described as "behind" the logging camp; no other details provided.	Guderjan et al. (1991:61)
Unnamed	Approximately 75 m southwest of BE-13, 50 m west of a swamp	BEAST located a possible abandoned *chiclero* camp, as evidenced by a small collection of bottles, in 2013.	Sandrock (2013)

CHAN CHICH CONTROL POINTS

Table 7.3 lists the UTM coordinates for important mapping control points at Chan Chich. Most of the points described are marked with metal surveyor spikes or large nails. Elevations are given for the top of the spike or nail. All points are OPUS corrected. Although the project shot several new control points in 2014, they are not included in this list because the total data station apparently was not properly calibrated. Willis and colleagues (this volume) established two new control points in 2017. The elevations for these points have not yet been matched to previous control point elevations.

Table 7.3. Chan Chich Control Point UTM Coordinates

Point	Description	Northing	Easting	Elev (m)
Main Site Datum (2012)	Spike in asphalt near pavement's edge between bar and Structure A-1	1940412.85	275875.56	118.72
Structure A-1 Central Datum	Spike in central landing, summit of Structure A-1	1940390.29	275877.30	129.49
Structure A-1 East Datum	Eastern summit of mound	1940385.65	275895.98	131.76
Structure A-1 West Datum	Western summit of mound	1940395.39	275847.77	131.27
Structurea A-4 Datum	Western summit of mound	1940535.23	275863.09	126.02
Structure A-5 Central Datum	N1010 E1030 in local A-5 grid	1940519.90	275904.50	123.01
Structure A-5 West Datum	Western summit of mound	1940523.61	275891.81	122.95
Structure A-8 Datum	Summit of mound	1940494.17	275964.40	126.30
Structure A-9 Datum	Summit of mound	1940434.43	275958.13	126.41
Upper Plaza West Datum	East of Structure A-21	1940358.03	275857.15	125.99
Upper Plaza Southeast Datum	In southeast corner of plaza	1940337.89	275891.17	126.11
2017: Structure A-1	In central landing area	1940390.49	275877.58	131.00
2017: Structure A-5	Summit of structure	1940519.81	275907.97	124.33

OPERATIONS

To date, the CCAP has conducted excavations at Chan Chich and Kaxil Uinic ruins, and BEAST has made surface collections of isolated finds and at Qualm Hill camp and conducted excavations there and at Kaxil Uinic village. Operations numbers are assigned sequentially by site, preceded by a site abbreviation. Thus, the first operation at Chan Chich is designated Op CC-01. Table 7.4 lists the operations that have been assigned through the 2017 season.

Table 7.4. List of Operations Opened by CCAP and BEAST

Op	Season	Definitions	Subops	Source(s)
CC-01	1997	Excavations on the northern stairs of Structure A-1	A–C	Houk (1998)
CC-02	1997	Excavations at the Upper Plaza	A–J	Robichaux (1998)
CC-02	1998	Excavations at the Upper Plaza, including landing of Structure A-1	K–W	Robichaux et al. (2000)

Table 7.4. List of Operations Opened by CCAP and BEAST (continued)

Op	Season	Definitions	Subops	Source(s)
CC-02	1999	Excavations at the Upper Plaza including summits of Structures A-1 and A-13	X–AK	Robichaux (2000)
CC-03	1997	Excavations at the ball court	A–E	Ford (1998)
CC-04	1997	Test pits in Group C	A–C	Meadows (1988)
CC-04	1998	Test pit in Plaza C-2	D	Ford and Rush (2000)
CC-05	1998	Excavations at Courtyard C-1	A–L	Ford and Rush (2000)
CC-06	1998	Excavations at Group H	A–F	Houk and Zaro (2015); Meadows and Hartnett (2000)
CC-07	1999	Excavations at Structure C-6	A–E	Harrison (2000)
CC-08	1999	Excavations at Structure A-11	A–B	Houk (2000)
CC-09	2001	Excavations at Plaza C-2	A–M	Unpublished field notes
CC-10	2012	Excavations at the Upper Plaza	A–F	Kelley (2014); Kelley et al. (2012)
CC-10	2013	Excavations at the Upper Plaza	G–T (plus Ix)	Kelley (2014); Kelley et al. (2013)
CC-11	2013	Excavations at Structure A-5	A–R (plus Fx)	Herndon et al. (2013)
CC-12	2014	Excavations at the Upper Plaza, Chan Chich Dynastic Architecture Project	A–T (plus Ax)	Herndon et al. (2014, 2015)
CC-13	2014	Excavations at the Back Plaza	A–N (plus ST, seven shovel tests)	Herndon et al. (2015); Vazquez (2014); Vazquez et al. (2014)
CC-14	2014, 2015	Excavations associated with processional architecture including the Eastern and Western Causeways, Courtyard D-1, Structure D-48, Structure C-17, and Structure C-18A, and Structure D-36	A–AW (plus Ex, ARx, AMx, and SF)	Booher (2016a); Booher et al. (2015); Booher and Houk (2016); Booher and Nettleton (2014); Houk et al. (2015)
CC-15	2016–2018	Excavations at the Upper Plaza, Chan Chich Dynastic Architecture Project. The 2016 through 2018 seasons focused on chronology building and the northern part of the plaza.	A–Z, AA, BB, CC, DD, EE, FF, GG, HH, II, JJ, and KK (plus Bx, Kx, and Px)	Booher et al. (2016); Gallareta Cervera et al. (this volume, 2017); Houk (2016)
CC-16	2016	Excavations at Norman's Temple complex.	A–X (plus Dx)	Booher (2016b); Booher et al. (2016)
CC-17	2017	Excavations at Courtyard D-4	A–U (plus Ix, Ox, and ST)	Kilgore (2018); Kilgore et al. (2017)
CC-18	2017, 2018	Excavations at Structure A-6/ North Plaza lithic workshops and debitage deposit	A–H	Degnan (2018); Degnan and Houk (this volume); Degnan et al. (2017)
GJ-01	2018	Excavations in the plaza at Gallon Jug in 2018	A-U	Houk (this volume); Kilgore, unpublished field notes

Table 7.4. List of Operations Opened by CCAP and BEAST (continued)

Op	Season	Definitions	Subops	Source(s)
KU-01	2012	All excavations at Kaxil Uinic in 2012	A–H	Harris (2013); Harris and Sisneros (2012); Houk (2012); Houk et al. (2012, 2013)
KUV-01	2015, 2016	All excavations at Kaxil Uinic village in 2015 and 2016.	A–AD (plus Rx and SF)	Bonorden (2016); Bonorden and Houk (2016); Bonorden and Kilgore (2015, 2016); Booher et al. (2016); Houk (2012); Houk and Bonorden (2015); Houk et al. (2015)
QHC-01	2014	Surface collections made by BEAST at Qualm Hill Camp	SF	Phillips and Sandrock (2014); Sandrock and Willis (2014)
QHC-02	2015	All excavations at Qualm Hill camp made by BEAST in 2015	A–S and SF	Bonorden (2016); Bonorden and Houk (2016); Bonorden and Smith (2015); Houk et al. (2015)
SF-01	2014	Surface collections made by BEAST that were not associated with a site	SF1–SF3	FileMaker Pro database

SPECIAL DEPOSITS

Over the course of eight seasons of research, the CCAP has excavated one cache, one tomb, one crypt, and 18 burials. Table 7.5 lists the burials thus far recorded, Figure 7.1 includes plots of the radiocarbon ages for burials with AMS dates, and Table 7.6 lists the tombs and crypts documented at the site, including a looted tomb first recorded by Guderjan (1991). Table 7.7 includes the single cache entry in the list of special deposits.

Table 7.5. List of Burials

Burial #	Season	Provenience	Context	Source(s)
CC-B1	1997	CC-4-A-3	Primary burial in Late Preclassic fill, Courtyard C-1	Meadows (1998)
CC-B2	1997	CC-2-J-6	Tomb 2, Terminal Preclassic burial in Upper Plaza	Houk et al. (2010)
CC-B3 (4, 6)	1998	CC-5-C-3 and -H-2	Secondary scatter of human bone associated with surface deposit of artifacts on steps of Structure C-2; Terminal Classic (?). Burials CC-B3, -B4, and -B6 combined by Frank and Julie Saul into Burial CC-B3.	Ford and Rush (2000)
CC-B5	1998	CC-6-C-9	Late Classic (?) primary burial beneath Courtyard H-3	Meadows and Hartnett (2000)
CC-B7	1998	CC-4-D	Secondary scatter of human bone associated with surface deposit of artifacts on steps to Structure C-6; Terminal Classic (?)	Ford and Rush (2000)
CC-B8	1999	CC-7-B	Primary Terminal Classic burial beneath bench in Structure C-6	Harrison (2000)

Table 7.5. List of Burials (continued)

Burial #	Season	Provenience	Context	Source(s)
CC-B9	2001	CC-9-G-7	Primary burial of a child in Structure C-12 patio; Late Classic (?)	Unpublished field notes
CC-B10	2012–2013	CC-10-A-8 (extends into CC-10-G)	Primary (?) subfloor, simple cist, burial, poorly preserved; early Late Preclassic. Interment consisted of a single, adult individual, likely of a young age at death. The presence of 19 unmodified dog teeth suggests that an animal was placed in the grave with the human individual. Oldest burial yet excavated at Chan Chich.	Kelley (2014); Kelley et al. (2013); Novotny et al. (2017)
CC-B11	2014	CC-12-D-9	Primary burial of an adult in a small crypt in Structure A-1. The burial is associated with the penultimate construction phase and was encountered beneath the central landing on the structure. The small crypt contained four complete vessels. Likely associated with Cache CC-C1.	Herndon et al. (2014); Novotny et al. (2015)
CC-B12	2014	CC-14-F-3	Primary, simple found in dry-laid fill within a bench, very close to the surface. Burial contained a single shallow Achote Black bowl with nubin feet and post-firing graffiti—incised quadripartite designs—on two exterior sides and in the middle of the vessel's interior.	Booher (2016); Booher and Nettleton (2014); Novotny et al. (2015)
CC-B13	2014	CC-12-H-13	Primary burial of robust adult in a small crypt associated with the penultimate phase of Structure A-18 in the Upper Plaza. No grave goods.	Herndon et al. (2014); Novotny et al. (2015)
CC-B14	2015	CC-14-J-04	Primary burial of adult female buried in a seated position within a bench in Structure D-1. She was interred with a piece of anlter, a small shell bead, a *jute* shell, and a mold-made ceramic spindle whorl.	Booher (2016); Booher et al. (2015); Mitchell and Booher (2015); Novotny et al. (2015)
CC-B15	2016	CC-16-L-02	Late Classic; primary interment of a single, young adult, male individual interred in a simple cist within a bench. The individual was placed in a tightly flexed position with head to the east. Grave goods included a small, modified shell, a shell labret, two obsidian blades, and a complete Cameron Incised bowl.	Booher (2016b); Novotny et al. (2016)

Table 7.5. List of Burials (continued)

Burial #	Season	Provenience	Context	Source(s)
CC-B16	2016, 2017	CC-15-G-11, -13, and -14	Discovered in 2016, but only partially excavated, Burial CCB-16 was located in Crypt 1 in the Upper Plaza. The burial dates to the Early Classic period. Excavations on the crypt were completed in 2017. Burial CC-B16A, excavated in 2016, consisted of bones of the left foot, an articulated right leg, and an articulated right wrist and hand (Novotny et al. 2016). Burial CC-B16B was excavated in 2017 and was the primary interment of a single adult male in an extended and prone position with hands on the pelvis and the right leg crossed over the left. Burials CC-B16C and CC-B16D were clusters of human bone likely associated with Burial CC-B16A. The best explanation is that an individual was buried in crypt, perhaps in a flexed position given the position of the right leg (CC-B16A), and disturbed by the interment of CC-B16B before decomposition was complete. The primary individual was buried with a bib-helmet head pendant, which may indicate he was a member of the ruling family.	Gallareta Cervera et al. (2017); Houk (2016); Novotny et al. (2016, 2017)
CC-B17	2017	CC-15-N-4	Burial CC-B17 is a Late Preclassic burial of a young to middle age adult found shallowly buried beneath the plaza surface of the Upper Plaza. The individual was placed in an extended position with the head oriented to the north. A complete Society Hall Impressed bowl was intentionally placed over the skull.	Gallareta Cervera et al. (2017); Novotny et al. (2017)
CC-B18	2017	CC-17-C-9	Late Classic Burial CC-B18 was found within the southeast corner of a bench in Structure D-41, in Couryard D-4. Burial CC-B18 consisted of two individuals. Individual CC-B18A was in a flexed position in the western part of the burial area, oriented east-west. No cranium was found with this individual. The second skeleton, Individual CC-B18B was also in a flexed position in the northeastern corner of the burial, oriented east-west.	Kilgore (2018); Kilgore et al. (2017); Novotny et al. (2017)

Table 7.5. List of Burials (continued)

Burial #	Season	Provenience	Context	Source(s)
CC-B19	2018	CC-15-V-07	The remains of two adults were recovered from Early Classic construction fill in the northeast corner of the Upper Plaza, one young in age and one possibly a male. The bones were in a secondary context, and it is not clear how they came to be commingled. The color and root etchings on the bone surface are similar but could be due to their common deposition in the primary context from which they were recovered. Ceramics from the context suggest these individuals were deposited in the Early Classic period, and a single radiocarbon date suggests one of the individuals died near the end of the Late Preclassic period or the beginning of the Early Classic period.	Gallareta Cervera et al. (this volume); Novotny et al. (this volume)
CC-B20	2018	CC-15-V-16	Burial CC-B20 was the primary interment of an older individual, possibly a female, in a stone-lined crypt (Crypt 2) with capstones. The crypt was constructed on an earlier floor within a platform in the northeast corner of the Upper Plaza. The burial did not include grave goods. The skeletal elements were extremely well preserved, particularly the skull, but it is not immediately clear why the bones were so well preserved in this context. The lack of soil surrounding the bones, which is acidic and remains damp in the tropical climate of Belize, may have contributed to their good preservation. There were several pathologies identified, but none that were acute or unexpected for an individual of advanced age. The interment dates to the Early Classic period.	Gallareta Cervera et al. (this volume); Novotny et al. (this volume)
CC-B21	2018	CC-15-EE-06	Burial CC-B21 consists of the secondary interment of one individual who died during the Late Preclassic period. Although fragmentary, the few diagnostic elements suggest the individual was a possible female of middle to older adulthood. The secondary deposit was not marked by any formal grave architecture and dated to the Late Preclassic or Early Classic period based on ceramics found within the fill.	Gallareta Cervera et al. (this volume); Novotny et al. (this volume)

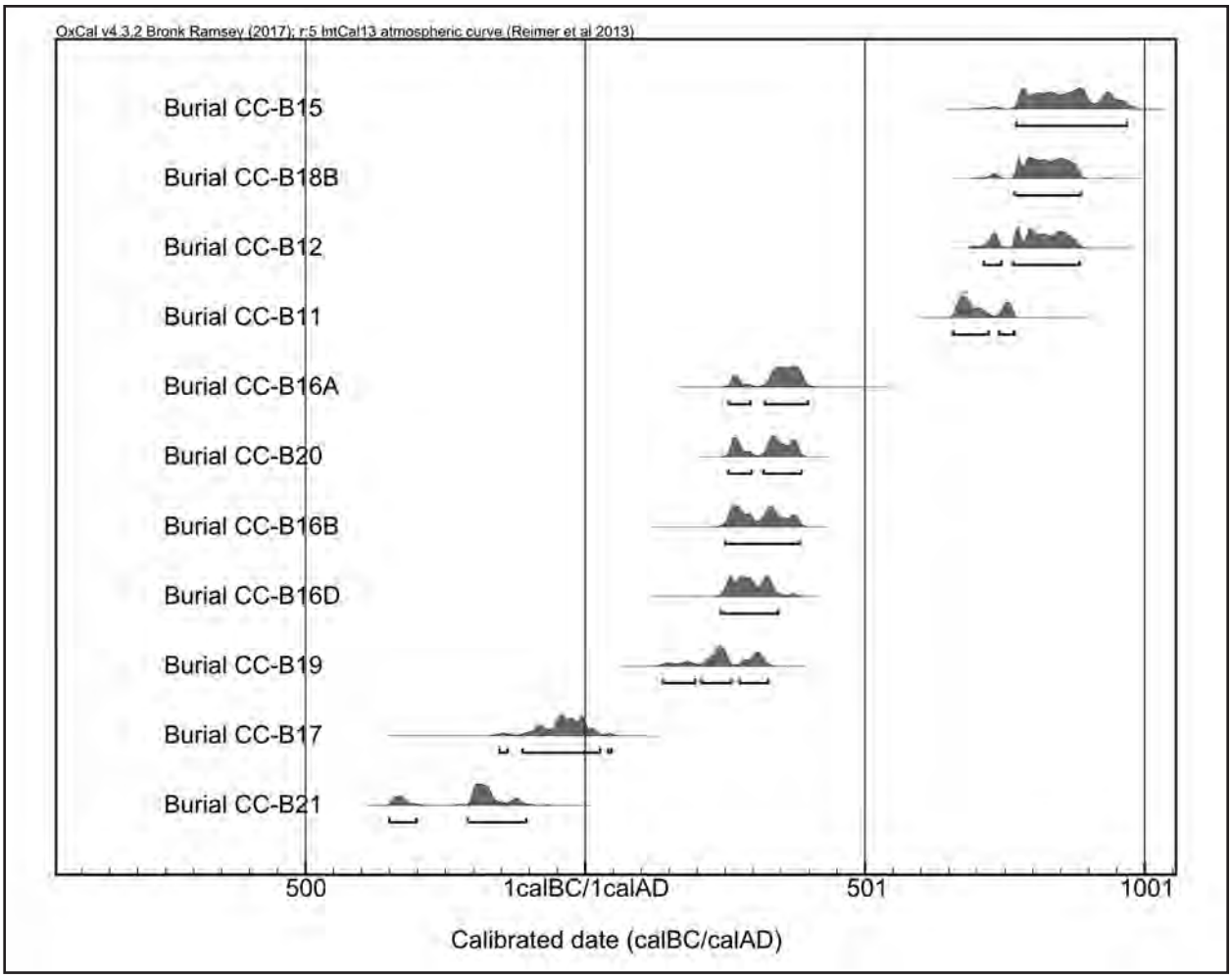

Figure 7.1. Plots of radiocarbon dates from burials with dated samples.

Table 7.6. List of Crypts and Tombs

#	Season	Provenience	Location	Source(s)
Tomb 1	--	Structure C-31	Looted tomb referred to as the King's Tomb; Late Classic (?)	Guderjan (1991)
Tomb 2	1997–1999	Upper Plaza, CC-2-J-6	Tomb 2, Terminal Preclassic tomb in Upper Plaza	Houk et al. (2010); Robichaux (1998, 2000); Robichaux et al. (2000)
Crypt 1	2016, 2017	Upper Plaza, Subop CC-15-G	Early Classic crypt in northern part of Upper Plaza	Gallareta Cervera et al. (2017); Houk (2016)
Crypt 2	2018	Upper Plaza, Subop CC-15-V	Early Classic crypt built on Middle Preclassic floor in the northeastern corner of the Upper Plaza.	Gallareta Cervera et al. (this volume); Houk (this volume: Figure 1.3); Novotny et al. (this volume)

Table 7.7. List of Caches

Cache #	Season	Provenience	Context	Source(s)
CC-C1	2014	CC-12-D-8	Structure A-1, penultimate phase. This cache contained 17 obsidian blades, found loose but grouped together in fill, resting on one of the capstones of Burial CC-B11.	Herndon et al. (2014)

STONE MONUMENTS

Table 7.8 lists the stone monuments recorded within the CCAP and BEAST permit area. To date, no monuments with legible texts or dates have been found in the area. The only monument with evidence of carving is Stela 1 at Kaxil Uinic (see Harris and Sisneros 2012; Thompson 1939).

Table 7.8. Recorded Stone Monuments in CCAP/BEAST Permit Area

BE #	Site	Monument	Location	Description	Source(s)
1	Chan Chich	Stela 1	Main Plaza, base of Structure A-2	Uncarved and burned stela	Guderjan (1991:43)
2	Kaxil Uinic	Stela 1	Main plaza, base of Structure 3	Broken in two pieces, heavily eroded stela with evidence of carving, illegible; 1.95 m tall, 80 cm wide, 55 cm thick	Guderjan et al. (1991); Harris and Sisneros (2012:52); Thompson (1939)
		Altar 1	Main plaza, base of Structure 3	Round, limestone altar (ca. 130 cm diameter; 30 cm thick), uncarved	Guderjan et al. (1991); Harris and Sisneros (2012:56–56); Thompson (1939)
3	Punta de Cacao	Stela 1	Plaza A, near base of Structure A-5	Uncarved stela	Robichaux (2004:200)
		Possible stela or altar	Plaza A, in front of Structure A-5	Large, uncarved block of stone, 82 x 82 x 40 cm, broken into two parts.	Hartnett (2005)
4	Gallon Jug	Stela 1	Northern part of the plaza in front of Structure 4	Upright, small uncarved stela with a hole in it. Dimensions not reported.	Kilgore, unpublished 2018 field notes
		Stela 2	Southwestern corner of the plaza between Structures 2 and 3.	Uncarved, broken, and laying flat stela. Dimensions not reported.	Kilgore, unpublished 2018 field notes
		Stela 3	Eastern end of the plaza, west of the southwest corner of Structure 1.	Uncarved stela discovered by Houk “floating” above the plaza in the roots of a fallen tree. Stela is 1.41 x 0.68 x 0.25 m.	Houk, unpublished 2018 field notes

Table 7.8. Recorded Stone Monuments in CCAP/BEAST Permit Area (continued)

BE #	Site	Monument	Location	Description	Source(s)
4	Gallon Jug (cont)	Stela 4?	Eastern end of the plaza, west of the of Structure 1.	Group of limestone fragments near centerline of Structure 1 which may be a broken, uncarved stela.	Houk, unpublished 2018 field notes
		Altar 1?	Approximate center of the plaza.	Small, broken, uncarved altar. Dimensions not reported.	Kilgore, unpublished 2018 field notes
7	Qualm Hill	Stela 1	Northeastern corner of Plaza A	Uncarved stela, laying flat; 1.8 m long, 0.6 m wide, and 0.4 m thick	Cackler et al. (2007:121)
		Altar 1	Plaza B	Broken in half, plain altar measuring 1.5 m in diameter and 1 m thick	Cackler et al. (2007:123)
10	Gongora Ruin	Stela 1	In plaza in front of Structure 1	Small, uncarved stela. Note that BEAST was unable to re-locate this monument in 2014.	Guderjan et al. (1991:81); Sandrock and Willis (2014)
11	Ix Naab Witz	Stela 1	Upper plaza near southwestern corner of Structure 6	Small, uncarved stela, 1.05 m tall, 40–60 cm wide, 35 cm thick	Sandrock (2013)
18	Tikin Ha	Stela 1	Northwest corner of mapped plaza	The stela measures 1.15 m tall, by 0.7 m wide, and 0.27 m thick. Uncarved or possible chain sawed by looters	Houk et al. (this volume)
		Stela 2?	Courtyard north of mapped plaza	Uncarved, 0.90 m long, 0.67 m wide, and 0.32 m thick. May be an altar.	Houk et al. (this volume)

RADIOCARBON DATES

Table 7.9 presents the results of radiocarbon samples run by the project from 2012 to 2015. Table 7.10 presents the calibrated age ranges and isotope data for those same samples. Table 7.11 presents the results of samples from the 2016 and 2018 seasons. Table 7.12 includes the calibrated ages of the radiocarbon samples from the 2016 to 2018 seasons, and Table 7.13 presents the isotope data for 2018 samples from human bone.

Table 7.9. Radiocarbon Samples from the 2012 to 2015 Seasons

Area	Context	Sample #s	Comments	PSU #	UCIAMS #	Modern Fraction	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±
Upper Plaza	Lot CC-10-C-7	CC-10-S12	Charred material. This sample came from a midden in the northern part of the Upper Plaza. This midden is above floor Lot CC-10-C-8.	6390	154684	0.7273	0.0013	-272.7167	1.3023	2560	15
Upper Plaza	Lot CC-10-C-8	CC-10-S16	Charred material. This sample comes from subfloor fill associated with the oldest floor in the northern part of the Upper Plaza.	6386	151874	0.7271	0.0019	-272.9396	1.9490	2560	25
Upper Plaza	Lot CC-10-C-4	CC-10-S03	Charred material. This sample is from the second plaster floor above the midden in the northern part of the Upper Plaza.	6385	151873	0.7561	0.0020	-243.8584	2.0222	2245	25
Upper Plaza	Lot CC-10-H-4	CC-10-S28	Charred material.This sample is associated with dense artifact deposit within northern platform buried in Upper Plaza.	6397	154691	0.7631	0.0013	-236.8672	1.3000	2170	15
Upper Plaza	Lot CC-12-O-8	CC-12-S16	Charred material.This sample comes from the lowest (fifth) identified layer of the 20-cm thick compact dirt surface that covers most of the southern part of the Upper Plaza.	6393	154687	0.7669	0.0013	-233.0904	1.2797	2130	15
Upper Plaza	Lot CC-12-O-4	CC-12-S14	Charred material. This sample comes from the second identified layer of the 20-cm thick compact dirt surface that covers most of the southern part of the Upper Plaza.	6392	154686	0.7941	0.0015	-205.9289	1.4563	1850	15
Upper Plaza	Lot CC-12-D-6	CC-12-S08	Charred material. This sample is from the plaster cap that patched the floor above Burial CC-B11.	6396	154690	0.8289	0.0016	-171.1195	1.5594	1510	20

Table 7.9. Radiocarbon Samples from the 2012 to 2015 Seasons (continued)

Area	Context	Sample #s	Comments	PSU #	UCIAMS #	Modern Fraction	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±
Upper Plaza	Lot CC-12-D-7	CC-12-S13	Charred material. This sample comes from a charcoal rich layer of fill covering Burial CC-B11.	6394	154688	0.8292	0.0014	-170.7725	1.4281	1505	15
Upper Plaza	Lot CC-12-C-4	CC-12-S03	Charred material. This sample is from the subfloor fill of the final floor in a room on Structure A-18.	6391	154685	0.8489	0.0013	-151.0105	1.3403	1315	15
Upper Plaza	Lot CC-12-D-9	CC-12-S17	Charred material. This sample comes from Burial CC-B11 in the penultimate phase of Structure A-1.	6387	151875	0.8494	0.0023	-150.5843	2.2638	1310	25
Upper Plaza	Lot CC-12-A-4	CC-12-S05	Charred material. This sample is from the final phase of construction in a room in Structure A-1 (from the floor).	6395	154689	0.8512	0.0014	-148.8458	1.4124	1295	15
Back Plaza	Lot CC-13-M-3	CC-13-S14	Charred material. This sample comes from a probable cooking feature in Structure A-23. Will help date terminal occupation.	6388	151876	0.8554	0.0023	-144.6185	2.2870	1255	25
Str. D-1	Lot CC-14-F-3	CC-14-S04	Bone. This sample is human bone from Burial CC-B12 in Structure D-1.	6418	154712	0.8589	0.0017	-141.0115	1.6736	1220	20

Table 7.10. Calibrated Age Ranges and Isotope Data for Radiocarbon Samples from 2012 to 2015 Seasons

Sample #	$\delta^{13}C$ (‰ VPDB)	$\delta^{15}N$ (‰ Atm N2)	%C	%N	C:N	From	To	%
CC-10-S12						799 BC	766 BC	95.4
CC-10-S16						805 BC	569 BC	95.4
CC-10-S03						390 BC	280 BC	95.4
CC-10-S28						355 BC	171 BC	95.4
CC-12-S16						204 BC	96 BC	95.4
CC-12-S14						AD 91	AD 231	95.4
CC-12-S08						AD 435	AD 608	95.4
CC-12-S13						AD 540	AD 602	95.4
CC-12-S03						AD 659	AD 764	95.4
CC-12-S17						AD 658	AD 768	95.4
CC-12-S05						AD 667	AD 768	95.4
CC-13-S14						AD 673	AD 863	95.4
CC-14-S04	-10.49	8.83	52.73	18.60	3.31	AD 713	AD 885	95.4

Table 7.11. Charcoal Samples Processed from the 2016 and 2018 Seasons by Lot

PSU AMS#	Sample # CC-	Lot CC-	Material	fraction Modern	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±
1278	15-S016	15-A-08		0.7354	0.0020	-264.6	2.0	2470	25
3029	15-S119/120	15-A-27	multiple charcoal	0.7102	0.0015	-289.8	1.5	2750	20
5222	15-S197	15-AA-05	single charcoal	0.8578	0.0015	-142.2	1.5	1230	15
1277	15-S005	15-B-03		0.8535	0.0019	-146.5	1.9	1275	20
1280	15-S022	15-B-04		0.7340	0.0018	-266.0	1.8	2485	20
1282	15-S045	15-B-07		0.7384	0.0018	-261.6	1.8	2435	25
1327	15-S029	15-B-08		0.7238	0.0037	-276.2	3.7	2595	45
1283	15-S050	15-B-10		0.7335	0.0020	-266.5	2.0	2490	25
1285	15-S054	15-B-11		0.7308	0.0024	-269.2	2.4	2520	30
1284	15-S051	15-B-15		0.7215	0.0022	-278.5	2.2	2620	25
1276	15-S004	15-C-04		0.7960	0.0018	-204.0	1.8	1835	20
1279	15-S019	15-C-05		0.7951	0.0018	-204.9	1.8	1840	20
1325	15-S007	15-C-07		0.7545	0.0033	-245.5	3.3	2265	40
1326	15-S023	15-C-08		0.7516	0.0026	-248.4	2.6	2295	30
1281	15-S034	15-C-10		0.7300	0.0018	-270.0	1.8	2530	20
1328	15-S039	15-C-11		0.7351	0.0027	-264.9	2.7	2470	30
5457	15-S221	15-EE-04	XAD amino acids	0.7634	0.0014	-236.6	1.4	2170	15
5454	15-S216	15-EE-06	XAD amino acids	0.7654	0.0016	-234.6	1.6	2145	20
5266	15-S201	15-EE-07	single charcoal	0.8146	0.0016	-185.4	1.6	1645	20
5225	15-S203	15-FF-11	multiple charcoal	0.7352	0.0026	-264.8	2.6	2470	30
1286	15-S059	15-G-04		0.7897	0.0022	-210.3	2.2	1895	25
2724	15-S065	15-G-13	multiple charcoal	0.7940	0.0014	-206.0	1.4	1855	15
2725	15-S063	15-G-14	multiple charcoal	0.8055	0.0014	-194.5	1.4	1735	15
2726	15-S067	15-G-14	multiple charcoal	0.8007	0.0017	-199.3	1.7	1785	20
2727	15-S070	15-G-14	multiple charcoal	0.8078	0.0014	-192.2	1.4	1715	15
2728	15-S071	15-G-14	single charcoal	0.8013	0.0015	-198.7	1.5	1780	15
2729	15-S073	15-G-14	multiple charcoal	0.7350	0.0014	-265.0	1.4	2475	15
2976	15-S141	15-G-14	XAD amino acids	0.8066	0.0017	-193.4	1.7	1725	20
5455	15-S217	15-G-14	XAD amino acids	0.8053	0.0014	-194.7	1.4	1740	15
5456	15-S219	15-G-14	XAD amino acids	0.8095	0.0016	-190.5	1.6	1700	20
2730	15-S138	15-G-19	multiple charcoal	0.8035	0.0015	-196.5	1.5	1760	15
2731	15-S137	15-G-21	multiple charcoal	0.7288	0.0014	-271.2	1.4	2540	20
2750	15-S079	15-I-09	multiple charcoal	0.7627	0.0014	-237.3	1.4	2175	15
5226	15-S206	15-JJ-06	single charcoal	0.7446	0.0014	-255.4	1.4	2370	20
5223	15-S198	15-KK-06	single charcoal	0.7389	0.0015	-261.1	1.5	2430	20
2732	15-S130	15-L-16	multiple charcoal	0.7617	0.0014	-238.3	1.4	2185	15
2733	15-S126	15-L-17	single charcoal	0.7702	0.0015	-229.8	1.5	2100	20
2734	15-S075	15-M-12	single charcoal	0.8081	0.0014	-191.9	1.4	1710	15
3030	15-S083/085	15-M-17	multiple charcoal	0.7406	0.0014	-259.4	1.4	2415	20

Table 7.11. Charcoal Samples Processed from the 2016 and 2017 Seasons (continued)

PSU AMS#	Sample # CC-	Lot CC-	Material	fraction Modern	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±
2735	15-S086	15-M-21	single charcoal	0.7371	0.0014	-262.9	1.4	2450	20
2736	15-S087	15-M-22	single charcoal	0.7356	0.0014	-264.4	1.4	2465	20
2737	15-S088	15-M-23	single charcoal	0.7306	0.0014	-269.4	1.4	2520	15
2738	15-S127	15-M-24	single charcoal	0.7390	0.0013	-261.0	1.3	2430	15
2977	15-S143	15-N-04	XAD amino acids	0.7763	0.0020	-223.7	2.0	2035	25
5229	15-S212	15-P-09	multiple charcoal	0.7378	0.0017	-262.2	1.7	2445	20
2748	15-S092	15-Q-02	single charcoal	0.5727	0.0012	-427.3	1.2	4475	20
2749	15-S117	15-Q-09	single charcoal	0.7608	0.0014	-239.2	1.4	2195	15
5221	15-S188	15-T-04	single charcoal	0.8303	0.0014	-169.7	1.4	1495	15
5443	15-S218	15-U-07	>30kDa gelatin	0.8009	0.0018	-199.1	1.8	1785	20
5208	15-S144	15-V-09	single charcoal	0.8016	0.0018	-198.4	1.8	1775	20
5453	15-S215	15-V-15	XAD amino acids	0.8078	0.0014	-192.2	1.4	1715	15
5216	15-S175	15-V-19	single charcoal	0.7364	0.0015	-263.6	1.5	2455	20
5217	15-S177	15-V-19	multiple charcoal	0.7314	0.0014	-268.6	1.4	2510	20
5218	15-S181	15-V-20	single charcoal	0.7184	0.0014	-281.6	1.4	2655	20
5219	15-S183	15-V-21	single charcoal	0.7277	0.0014	-272.3	1.4	2555	20
5215	15-S166	15-Z-07	multiple charcoal	0.7320	0.0013	-268.0	1.3	2505	15
5227	15-S208	15-Z-08	multiple charcoal	0.7364	0.0014	-263.6	1.4	2460	20
5228	15-S209	15-Z-08	single charcoal	0.7346	0.0014	-265.4	1.4	2480	15
5209	15-S152	15-Z-09	single charcoal	0.7369	0.0013	-263.1	1.3	2450	15
5210	15-S154	15-Z-09	single charcoal	0.7367	0.0014	-263.3	1.4	2455	20
5211	15-S155	15-Z-09	single charcoal	0.7369	0.0015	-263.1	1.5	2455	20
5211	15-S155	15-Z-09	single charcoal	0.7369	0.0015	-263.1	1.5	2455	20
5211	15-S155	15-Z-09	single charcoal	0.7369	0.0015	-263.1	1.5	2455	20
5212	15-S158	15-Z-11	multiple charcoal	0.7440	0.0023	-256.0	2.3	2375	25
5213	15-S160	15-Z-11	single charcoal	0.7382	0.0016	-261.8	1.6	2440	20
5214	15-S165	15-Z-11	multiple charcoal	0.7414	0.0018	-258.6	1.8	2405	20
5444	15-S220	15-Z-12	>30kDa gelatin	0.7216	0.0018	-278.4	1.8	2620	25
5220	15-S185	15-Z-18	single charcoal	0.7281	0.0014	-271.9	1.4	2550	15
1324	16-S01	16-L-03		0.8651	0.0034	-134.9	3.4	1165	35
2975	17-S19	17-C-10	XAD amino acids	0.8607	0.0018	-139.3	1.8	1205	20
2720	17-S08	17-E-04	single charcoal	0.8607	0.0014	-139.3	1.4	1205	15
2722	17-S14	17-I-06	multiple charcoal	0.8635	0.0015	-136.5	1.5	1180	15
2721	17-S06	17-J-03	multiple charcoal	0.8536	0.0014	-146.4	1.4	1270	15
2723	17-S10	17-Q-05	single charcoal	0.8640	0.0016	-136.0	1.6	1175	15

Table 7.12. Calibrated Age Ranges for 2016 and 2018 Samples by Lot

Sample # CC-	Lot* CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S016	15-A-08	Floor construction; south of stone alignment. Possibly equivalent to Floor 5 in 15-C.	2470	25	767–482 BC	94.6	767–434 BC
15-S016	15-A-08	Floor construction; south of stone alignment. Possibly equivalent to Floor 5 in 15-C.	2470	25	442–434 BC	0.8	767–434 BC
15-S043	15-A-15	Floor 11; south of stone alignment. Deepest Floor.	2700	35	911–804 BC	95.4	911–804 BC
15-S119/120	15-A-27	Floor 6, south of Blanca	2750	20	968–964 BC	0.8	968–833 BC
15-S119/120	15-A-27	Floor 6, south of Blanca	2750	20	931–833 BC	94.6	968–833 BC
15-S197	15-AA-05	looted bench in Room 2 of Str. A-1SE	1230	15	AD 694–745	35.9	AD 694–875
15-S197	15-AA-05	looted bench in Room 2 of Str. A-1SE	1230	15	AD 764–780	16.8	AD 694–875
15-S197	15-AA-05	looted bench in Room 2 of Str. A-1SE	1230	15	AD 788–875	42.7	AD 694–875
15-S005	15-B-03	Terminal use of Structure A-1	1275	20	AD 675–770	95.4	AD 675–770
15-S022	15-B-04	Top of MPC/LPC Structure?	2485	20	766–540 BC	95.4	766–540 BC
15-S045	15-B-07	Embedded in top of floor CC-15-B-07	2435	25	749–648 BC	21.3	749–407 BC
15-S045	15-B-07	Embedded in top of floor CC-15-B-07	2435	25	667–640 BC	6.8	749–407 BC
15-S045	15-B-07	Embedded in top of floor CC-15-B-07	2435	25	589–578 BC	1.0	749–407 BC
15-S045	15-B-07	Embedded in top of floor CC-15-B-07	2435	25	564–407 BC	66.3	749–407 BC
15-S029	15-B-08	Structure Fill?	2595	45	841–736 BC	73.4	841–547 BC
15-S029	15-B-08	Structure Fill?	2595	45	689–663 BC	5.4	841–547 BC
15-S029	15-B-08	Structure Fill?	2595	45	648–547 BC	16.6	841–547 BC
15-S050	15-B-10	MPC/LPC fill in cut	2490	25	744–536 BC	95.1	744–524 BC
15-S050	15-B-10	MPC/LPC fill in cut	2490	25	525–524 BC	0.3	744–524 BC

Table 7.12. Calibrated Age Ranges for 2016 and 2018 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S054	15-B-11	MPC/LPC floor	2520	30	795–728 BC	29.3	795–542 BC
15-S054	15-B-11	MPC/LPC floor	2520	30	717–708 BC	1.0	795–542 BC
15-S054	15-B-11	MPC/LPC floor	2520	30	694–542 BC	65.1	795–542 BC
15-S051	15-B-15	MPC/LPC fill in cut (in CC-15-B-15, floor)	2620	25	826–782 BC	95.4	826–782 BC
15-S004	15-C-04	Top of compact dirt floor	1835	20	AD 128–236	95.4	AD 128–236
15-S019	15-C-05	Floor 3	1840	20	AD 125–238	95.4	AD 125–238
15-S007	15-C-07	Floor 5	2265	40	401–346 BC	38.3	401–206 BC
15-S007	15-C-07	Floor 5	2265	40	322–206 BC	57.1	401–206 BC
15-S023	15-C-08	Floor 6	2295	30	406–354 BC	75.1	406–231 BC
15-S023	15-C-08	Floor 6	2295	30	291–231 BC	20.3	406–231 BC
15-S034	15-C-10	Floor 8	2530	20	794–746 BC	42.7	794–552 BC
15-S034	15-C-10	Floor 8	2530	20	686–666 BC	13.5	794–552 BC
15-S034	15-C-10	Floor 8	2530	20	644–552 BC	39.2	794–552 BC
15-S039	15-C-11	Floor 9	2470	30	768–476 BC	92.4	768–431 BC
15-S039	15-C-11	Floor 9	2470	30	464–453 BC	1.2	768–431 BC
15-S039	15-C-11	Floor 9	2470	30	445–431 BC	1.8	768–431 BC
15-S221	15-EE-04	dates fill of platform, NE UP	2170	15	355–292 BC	58.4	355–171 BC
15-S221	15-EE-04	dates fill of platform, NE UP	2170	15	231–171 BC	37.0	355–171 BC
15-S216	15-EE-06	Burial CC-B21	2145	20	351–302 BC	20.1	351–106 BC
15-S216	15-EE-06	Burial CC-B21	2145	20	211–106 BC	75.3	351–106 BC
15-S201	15-EE-07	Lot CC-15-EE-07	1645	20	AD 342–429	94.2	AD 342–505
15-S201	15-EE-07	Lot CC-15-EE-07	1645	20	AD 497–505	1.2	AD 342–505
15-S203	15-FF-11	below Floor 3 of Crystal	2470	30	768–476 BC	92.4	768–431 BC
15-S203	15-FF-11	below Floor 3 of Crystal	2470	30	464–453 BC	1.2	768–431 BC
15-S203	15-FF-11	below Floor 3 of Crystal	2470	30	445–431 BC	1.8	768–431 BC
15-S059	15-G-04	“Burning event” in crypt fill	1895	25	55 BC–AD 175	91.8	55 BC–AD 211
15-S059	15-G-04	“Burning event” in crypt fill	1895	25	AD 191–211	3.6	55 BC–AD 211
15-S065	15-G-13	Fill of capstones, north wall of crypt	1855	15	AD 87–107	6.5	AD 87–227
15-S065	15-G-13	Fill of capstones, north wall of crypt	1855	15	AD 121–227	88.9	AD 87–227

Table 7.12. Calibrated Age Ranges for 2016 and 2018 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S063	15-G-14	Burial 16/Crypt context	1735	15	AD 247–353	92.5	AD 247–379
15-S063	15-G-14	Burial 16/Crypt context	1735	15	AD 368–379	2.9	AD 247–379
15-S067	15-G-14	Burial 16/Crypt context	1785	20	AD 140–197	14.1	AD 140–328
15-S067	15-G-14	Burial 16/Crypt context	1785	20	AD 208–262	48.2	AD 140–328
15-S067	15-G-14	Burial 16/Crypt context	1785	20	AD 277–328	33.1	AD 140–328
15-S070	15-G-14	Burial 16/Crypt context	1715	15	AD 257–298	30.7	AD 257–387
15-S070	15-G-14	Burial 16/Crypt context	1715	15	AD 320–387	64.7	AD 257–387
15-S071	15-G-14	Burial 16/Crypt context	1780	15	AD 174–192	2.3	AD 174–330
15-S071	15-G-14	Burial 16/Crypt context	1780	15	AD 212–264	50.8	AD 174–330
15-S071	15-G-14	Burial 16/Crypt context	1780	15	AD 275–330	42.4	AD 174–330
15-S073	15-G-14	Burial 16/Crypt context	2475	15	762–537 BC	95.4	762–537 BC
15-S141	15-G-14	Burial CC-B16B	1725	20	AD 252–384	95.4	AD 252–384
15-S217	15-G-14	Burial CC-B16D	1740	15	AD 243–346	95.4	AD 243–346
15-S219	15-G-14	Burial CC-B16A	1700	20	AD 257–296	15.7	AD 257–399
15-S219	15-G-14	Burial CC-B16A	1700	20	AD 321–399	79.7	AD 257–399
15-S138	15-G-19	Crypt Floor	1760	15	AD 237–333	95.4	AD 237–333
15-S137	15-G-21	Fill of Crypt Floor	2540	20	796–748 BC	60.5	796–556 BC
15-S137	15-G-21	Fill of Crypt Floor	2540	20	685–667 BC	10.4	796–556 BC
15-S137	15-G-21	Fill of Crypt Floor	2540	20	641–587 BC	19.6	796–556 BC
15-S137	15-G-21	Fill of Crypt Floor	2540	20	581–556 BC	4.9	796–556 BC
15-S079	15-I-09	Floor 3 of Blanca	2175	15	355–291 BC	63.0	355–175 BC
15-S079	15-I-09	Floor 3 of Blanca	2175	15	232–175 BC	32.4	355–175 BC
15-S206	15-JJ-06	Blanca steps	2370	20	508–499 BC	2.3	508–395 BC
15-S206	15-JJ-06	Blanca steps	2370	20	492–395 BC	93.1	508–395 BC
15-S198	15-KK-06	inside Blanca steps	2430	20	735–689 BC	15.5	735–408 BC
15-S198	15-KK-06	inside Blanca steps	2430	20	663–648 BC	3.8	735–408 BC
15-S198	15-KK-06	inside Blanca steps	2430	20	546–408 BC	76.2	735–408 BC

Table 7.12. Calibrated Age Ranges for 2016 and 2018 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S130	15-L-16	Top of stone feature (outside)	2185	15	358–281 BC	65.4	358–185 BC
15-S130	15-L-16	Top of stone feature (outside)	2185	15	258–245 BC	2.3	358–185 BC
15-S130	15-L-16	Top of stone feature (outside)	2185	15	236–185 BC	27.8	358–185 BC
15-S126	15-L-17	Inside of stone features	2100	20	182–52 BC	95.4	182–52 BC
15-S075	15-M-12	Floor 3 of East Upper Plaza Construction Sequence	1710	15	AD 257–296	23.3	AD 257–390
15-S075	15-M-12	Floor 3 of East Upper Plaza Construction Sequence	1710	15	AD 321–390	72.1	AD 257–390
15-S083/085	15-M-17	Fill of Preclassic platform floor	2415	20	728–717 BC	2.1	728–406 BC
15-S083/085	15-M-17	Fill of Preclassic platform floor	2415	20	707–694 BC	2.5	728–406 BC
15-S083/085	15-M-17	Fill of Preclassic platform floor	2415	20	542–406 BC	90.8	728–406 BC
15-S086	15-M-21	Floor 6 of East Upper Plaza Construction Sequence	2450	20	751–683 BC	31.9	751–413 BC
15-S086	15-M-21	Floor 6 of East Upper Plaza Construction Sequence	2450	20	669–637 BC	11.5	751–413 BC
15-S086	15-M-21	Floor 6 of East Upper Plaza Construction Sequence	2450	20	622–617 BC	0.6	751–413 BC
15-S086	15-M-21	Floor 6 of East Upper Plaza Construction Sequence	2450	20	591–413 BC	51.5	751–413 BC
15-S087	15-M-22	Construction Fill	2465	20	762–482 BC	94.8	762–434 BC
15-S087	15-M-22	Construction Fill	2465	20	441–434 BC	0.6	762–434 BC
15-S088	15-M-23	Surface of posthole	2520	15	787–746 BC	32.0	787–552 BC
15-S088	15-M-23	Surface of posthole	2520	15	686–666 BC	16.2	787–552 BC
15-S088	15-M-23	Surface of posthole	2520	15	644–552 BC	47.2	787–552 BC

Table 7.12. Calibrated Age Ranges for 2016 and 2018 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S127	15-M-24	Inside of Post hole	2430	15	730–692 BC	12.1	730–411 BC
15-S127	15-M-24	Inside of Post hole	2430	15	659–652 BC	1.7	730–411 BC
15-S127	15-M-24	Inside of Post hole	2430	15	544–411 BC	81.6	730–411 BC
15-S143	15-N-04	Burial CC-B17	2035	25	154–140 BC	1.9	154 BC–AD 27
15-S143	15-N-04	Burial CC-B17	2035	25	113 BC–AD 27	92.7	154 BC–AD 27
15-S143	15-N-04	Burial CC-B17	2035	25	AD 42–47	0.8	154 BC–AD 27
15-S212	15-P-09	below Floor 3 of Blanca	2445	20	750–648 BC	28.6	750–411 BC
15-S212	15-P-09	below Floor 3 of Blanca	2445	20	668–639 BC	9.4	750–411 BC
15-S212	15-P-09	below Floor 3 of Blanca	2445	20	590–577 BC	1.6	750–411 BC
15-S212	15-P-09	below Floor 3 of Blanca	2445	20	568–411 BC	55.8	750–411 BC
15-S092	15-Q-02	Fill of Floor 1 of SE Upper Plaza Construction Sequence	4475	20	3335–3211 BC	60.8	3335–3033 BC
15-S092	15-Q-02	Fill of Floor 1 of SE Upper Plaza Construction Sequence	4475	20	3193–3151 BC	13.5	3335–3033 BC
15-S092	15-Q-02	Fill of Floor 1 of SE Upper Plaza Construction Sequence	4475	20	3138–3088 BC	18.0	3335–3033 BC
15-S092	15-Q-02	Fill of Floor 1 of SE Upper Plaza Construction Sequence	4475	20	3057–3033 BC	3.0	3335–3033 BC
15-S117	15-Q-09	Fill of dismantled Floor 4 of SE Upper Plaza	2195	15	358–278 BC	61.0	358–199 BC
15-S117	15-Q-09	Fill of dismantled Floor 4 of SE Upper Plaza	2195	15	259–199 BC	34.4	358–199 BC
15-S188	15-T-04	dates fill in bench, Room 1, Str. A-1SE	1495	15	AD 544–605	95.4	AD 544–605
15-S218	15-U-07	Burial CC-B19	1785	20	AD 140–197	14.1	AD 140–328
15-S218	15-U-07	Burial CC-B19	1785	20	AD 208–262	48.2	AD 140–328
15-S218	15-U-07	Burial CC-B19	1785	20	AD 277–328	33.1	AD 140–328

Table 7.12. Calibrated Age Ranges for 2016 and 2018 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S144	15-V-09	floor above Burial CC-B20	1775	20	AD 170–194	2.9	AD 170–336
15-S144	15-V-09	floor above Burial CC-B20	1775	20	AD 211–336	92.5	AD 170–336
15-S215	15-V-15	Burial CC-B20	1715	15	AD 257–298	30.7	AD 257–387
15-S215	15-V-15	Burial CC-B20	1715	15	AD 320–387	64.7	AD 257–387
15-S175	15-V-19	Lot CC-15-V-19	2455	20	752–682 BC	34.2	752–416 BC
15-S175	15-V-19	Lot CC-15-V-19	2455	20	670–613 BC	16.4	752–416 BC
15-S175	15-V-19	Lot CC-15-V-19	2455	20	593–428 BC	44.1	752–416 BC
15-S175	15-V-19	Lot CC-15-V-19	2455	20	422–416 BC	0.8	752–416 BC
15-S177	15-V-19	Lot CC-15-V-19	2510	20	784–732 BC	23.3	784–544 BC
15-S177	15-V-19	Lot CC-15-V-19	2510	20	691–661 BC	15.8	784–544 BC
15-S177	15-V-19	Lot CC-15-V-19	2510	20	650–544 BC	56.3	784–544 BC
15-S181	15-V-20	surface under Burial CC-B20	2655	20	837–797 BC	95.4	837–797 BC
15-S183	15-V-21	surface under Burial CC-B20	2555	20	801–751 BC	85.0	801–590 BC
15-S183	15-V-21	surface under Burial CC-B20	2555	20	684–667 BC	4.5	801–590 BC
15-S183	15-V-21	surface under Burial CC-B20	2555	20	636–626 BC	1.0	801–590 BC
15-S183	15-V-21	surface under Burial CC-B20	2555	20	615-590 BC	5.0	801–590 BC
15-S166	15-Z-07	dates Floor 3 of NW UP	2505	15	772–737 BC	19.4	772–548 BC
15-S166	15-Z-07	dates Floor 3 of NW UP	2505	15	689–663 BC	15.9	772–548 BC
15-S166	15-Z-07	dates Floor 3 of NW UP	2505	15	647–548 BC	60.2	772–548 BC
15-S208	15-Z-08	Floor 3 of NW UP	2460	20	756–679 BC	35.3	756–430 BC
15-S208	15-Z-08	Floor 3 of NW UP	2460	20	671–606 BC	20.1	756–430 BC
15-S208	15-Z-08	Floor 3 of NW UP	2460	20	600–430 BC	40.0	756–430 BC
15-S209	15-Z-08	Floor 3 of NW UP	2480	15	761–540 BC	95.4	761–540 BC
15-S152	15-Z-09	Floor 4 of NW UP	2450	15	749–684 BC	36.8	749–415 BC
15-S152	15-Z-09	Floor 4 of NW UP	2450	15	667–641 BC	11.7	749–415 BC
15-S152	15-Z-09	Floor 4 of NW UP	2450	15	588–579 BC	1.1	749–415 BC
15-S152	15-Z-09	Floor 4 of NW UP	2450	15	561–415 BC	45.8	749–415 BC

Table 7.12. Calibrated Age Ranges for 2016 and 2018 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S154	15-Z-09	Floor 4 of NW UP	2455	20	752–682 BC	34.2	752–416 BC
15-S154	15-Z-09	Floor 4 of NW UP	2455	20	670–613 BC	16.4	752–416 BC
15-S154	15-Z-09	Floor 4 of NW UP	2455	20	593–428 BC	44.1	752–416 BC
15-S154	15-Z-09	Floor 4 of NW UP	2455	20	422–416 BC	0.8	752–416 BC
15-S155	15-Z-09	Floor 4 of NW UP	2455	20	752–682 BC	34.2	752–416 BC
15-S155	15-Z-09	Floor 4 of NW UP	2455	20	670–613 BC	16.4	752–416 BC
15-S155	15-Z-09	Floor 4 of NW UP	2455	20	593–428 BC	44.1	752–416 BC
15-S155	15-Z-09	Floor 4 of NW UP	2455	20	422–416 BC	0.8	752–416 BC
15-S158	15-Z-11	dates Floor 6 of NW UP	2375	25	534–529 BC	1.0	534–394 BC
15-S158	15-Z-11	dates Floor 6 of NW UP	2375	25	519–394 BC	94.4	534–394 BC
15-S160	15-Z-11	dates Floor 6 of NW UP	2440	20	748–685 BC	24.6	748–409 BC
15-S160	15-Z-11	dates Floor 6 of NW UP	2440	20	666–642 BC	7.4	748–409 BC
15-S160	15-Z-11	dates Floor 6 of NW UP	2440	20	586–581 BC	0.5	748–409 BC
15-S160	15-Z-11	dates Floor 6 of NW UP	2440	20	556–409 BC	62.9	748–409 BC
15-S165	15-Z-11	dates Floor 6 of NW UP	2405	20	703–696 BC	0.8	703–402 BC
15-S165	15-Z-11	dates Floor 6 of NW UP	2405	20	541–402 BC	94.6	703–402 BC
15-S220	15-Z-12	dates Floor 6 of NW UP	2620	25	826–782 BC	95.4	826–782 BC
15-S185	15-Z-18	bedrock of NW UP sequence	2550	15	798–756 BC	91.1	798–596 BC
15-S185	15-Z-18	bedrock of NW UP sequence	2550	15	680–671 BC	2.5	798–596 BC
15-S185	15-Z-18	bedrock of NW UP sequence	2550	15	605–596 BC	1.8	798–596 BC
16-S01	16-L-03	Burial CC-B15	1165	35	AD 771–970	0.954	AD 771–970
17-S19	17-C-10	Burial CC-B18B, tibia	1205	20	AD 769–886	0.954	AD 769–886
17-S08	17-E-04	dense artifact concentration in the southwestern corner between Structures D-42 and D-43.	1205	15	AD 771–883	95.4	AD 771–883

Table 7.12. Calibrated Age Ranges for 2016 and 2018 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
17-S14	17-I-06	floor (at S04-019) in northern room of Structure D-42.	1180	15	AD 775–890	95.4	AD 775–890
17-S06	17-J-03	plaster of the c-shaped bench Structure D-42.	1270	15	AD 681–770	95.4	AD 681–770
17-S10	17-Q-05	very dense artifact concentration on the courtyard surface in the northwestern corner.	1175	15	AD 775–893	95.4	AD 775–893

Table 7.13. Isotope Data for Radiocarbon Samples from Burials, 2017 and 2018 Seasons

PSU AMS#	Sample # CC-	Lot CC-	Burial CC-	Material	Fraction Modern	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	%C	%N	C:N
5456	15-S219	15-G-14	B16A	XAD amino acids	0.8095	0.0016	-190.5	1.6	1700	20	-10.4	9.3	30.3	10.8	3.27
2976	15-S141	15-G-14	B16B	XAD amino acids	0.8066	0.0017	-193.4	1.7	1725	20	-11.1	8.2	16.0	5.8	3.22
5455	15-S217	15-G-14	B16D	XAD amino acids	0.8053	0.0014	-194.7	1.4	1740	15	-10.8	9.2	28.7	10.3	3.26
2977	15-S143	15-N-04	B17	XAD amino acids	0.7763	0.0020	-223.7	2.0	2035	25	-11.4	10.0	8.7	3.0	3.42
2975	17-S19	17-C-10	B18B	XAD amino acids	0.8607	0.0018	-139.3	1.8	1205	20	-12.7	9.4	14.0	5.0	3.29
5443	15-S218	15-U-07	B19	>30kDa gelatin	0.8009	0.0018	-199.1	1.8	1785	20	-8.9	9.8	45.7	16.1	3.31
5453	15-S215	15-V-15	B20	XAD amino acids	0.8078	0.0014	-192.2	1.4	1715	15	-11.7	8.6	28.4	10.2	3.25
5454	15-S216	15-EE-06	B21	XAD amino acids	0.7654	0.0016	-234.6	1.6	2145	20	-10.6	10.1	22.8	7.9	3.35

STUDENT RESEARCH

Much of the research conducted by CCAP and BEAST supports graduate student thesis projects. Beginning with the 2012 season, seven graduate students and one undergraduate have collected thesis data through CCAP or BEAST research (Table 7.14).

Table 7.14. List of Theses Resulting from CCAP and BEAST Research

Harris, Matthew C.
2013 A Short Walk from Paradise: Initial Excavations at Kaxil Uinic. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Kelley, Krystle
2014 Establishing the Acropolis: Two Seasons of Investigations in the Upper Plaza of Chan Chich, Belize. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Vazquez, Edgar
2015 In Service of the King: The Form, Function, and Chronology of Courtyard A-3 at Chan Chich, Belize. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Booher, Ashley M.
2016 Assessing the Form and Function of the *Sacbeob* and Associated Structures at Chan Chich, Belize. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Bonorden, Alyssa Brooke
2016 Comparing Colonial Experiences in Northwestern Belize: Archaeological Evidence from Qualm Hill Camp and Kaxil Uinic Village. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Sandrock, David
2017 BEAST Mode: Two Seasons of Archaeological Survey on the Gallon Jug-Laguna Seca Property in Northwestern Belize. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Degnan, Bridgette
2018 An Evaluation of Ancient Maya Urban and Suburban Lithic Production at Late Classic Chan Chich, Belize. Unpublished honors thesis, University of Virginia, Charlottesville.

Kilgore, Gertrude B.
2018 Maya Household Identity and Domestic Activity Areas at Courtyard D-4, Chan Chich, Belize. Unpublished master's thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

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Bonorden, Alyssa Brooke
2016 Comparing Colonial Experiences in Northwestern Belize: Archaeological Evidence from Qualm Hill Camp and Kaxil Uinic Village. Unpublished master's thesis, Department of Anthropology, Texas Tech University, Lubbock.

Bonorden, Brooke, and Brett A. Houk
2015 Navigating the Cultural Landscape of 19th-Century Belize: An Archaeological Examination of Kaxil Uinic Village. Paper presented at the 6th Annual South-Central Conference on Mesoamerica, The University of Texas at San Antonio.
2016 Archaeological Investigations at Kaxil Uinic and Qualm Hill, Two Colonial Period Sites in Northwestern Belize. *Research Reports in Belizean Archaeology* 13:337–347.

Bonorden, Brooke, and Gertrude Kilgore
2015 Results of the 2015 Excavations at Kaxil Uinic Village. In *The 2015 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 105–144. Papers of the Chan Chich Archaeological Project, Number 10. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.
2016 Results of the 2015 Excavations at Kaxil Uinic Village. In *The 2016 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 81–134. Papers of the Chan Chich Archaeological Project, Number 11. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Bonorden, Brooke, and Briana N. Smith
2015 Results of the 2015 Excavations at Qualm Hill Camp. In *The 2015 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 67–104. Papers of the Chan Chich Archaeological Project, Number 10. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

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