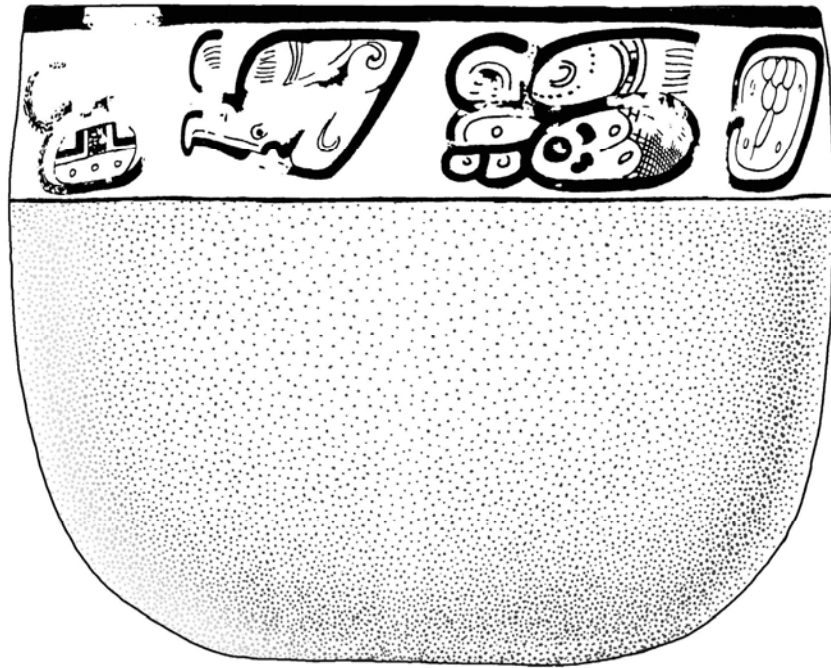


***The Belize Valley Archaeological  
Reconnaissance Project:  
A Report of the 2004 Field Season***



EDITED BY CHRISTOPHE G.B. HELMKE AND JAIME J. AWE

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**2005**

**Cover:** Black-on-orange bowl, Structure 209, Baking Pot.  
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# ***The Belize Valley Archaeological Reconnaissance Project***

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# **EXCAVATIONS OF STRUCTURES B AND G, PLAZA 2, GROUP 2, BAKING POT**

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## **INTRODUCTION**

Recent investigations conducted at the site of Baking Pot during the 2004 field season included test excavations in four of the main plazas (Swain and Hoggarth, this volume), a large multilevel structure (Str. 51) located just outside of the site core (Dixon, this volume), Strs. B and G in Group 2 (this report), and 5 test excavations throughout the periphery of the site in efforts to locate hidden mounds (Hoggarth and Swain, this volume). These investigations revealed some surprising results, including the discovery of two early Late Preclassic deposits, several burials in the main plazas, and the lack of deposits in the palace complex. This report will focus on our excavations of Strs. B and G in Plaza 2, Group 2. These excavations were conducted from June through August of 2004.

Palace groups have been excavated at most major Maya sites, and range in size from a single four-structure grouping to dozens of vaulted structures surrounding numerous connected plazas. At Baking Pot, we initially believed that the palace was a small grouping of four structures (some vaulted and some not) that surrounded a single plaza. Our clearing and subsequent remapping of the area, however, has led us to understand the palace as complex of at least three plazas with surrounding structures (Poe, this volume). Excavations in the 2004 season focused on the structures associated with the largest plaza that had been previously mapped by Bullard and Bullard (1962).

## **STRUCTURE B**

Structure B is a 15 meter tall structure located on the eastern side of the palace complex (Plaza 2) in Group 2 (Figure 1). Initially, it was believed that it might have functioned as a temple, given its conical appearance and location on the eastern side of the main palace group. Its wide platform at the summit, coupled with the topography before excavation, suggested that there were several rooms with masonry superstructure walls and likely several benches. In an effort to expose these features, a 12 by 5 meter excavation (broken into two sub units) was placed on the top of the structure (Unit 3a and 3b). In addition, a 2 x 8 meter trench was placed on the front of the structure along the central axis in efforts to discover the central staircase (Unit 2), and a 2 x 2 meter penetrating unit was placed on the plaza floor directly in front of the trench (Unit 1). Additional penetrating units were placed in the fill of Str. B in efforts to determine the construction sequence of the platform.

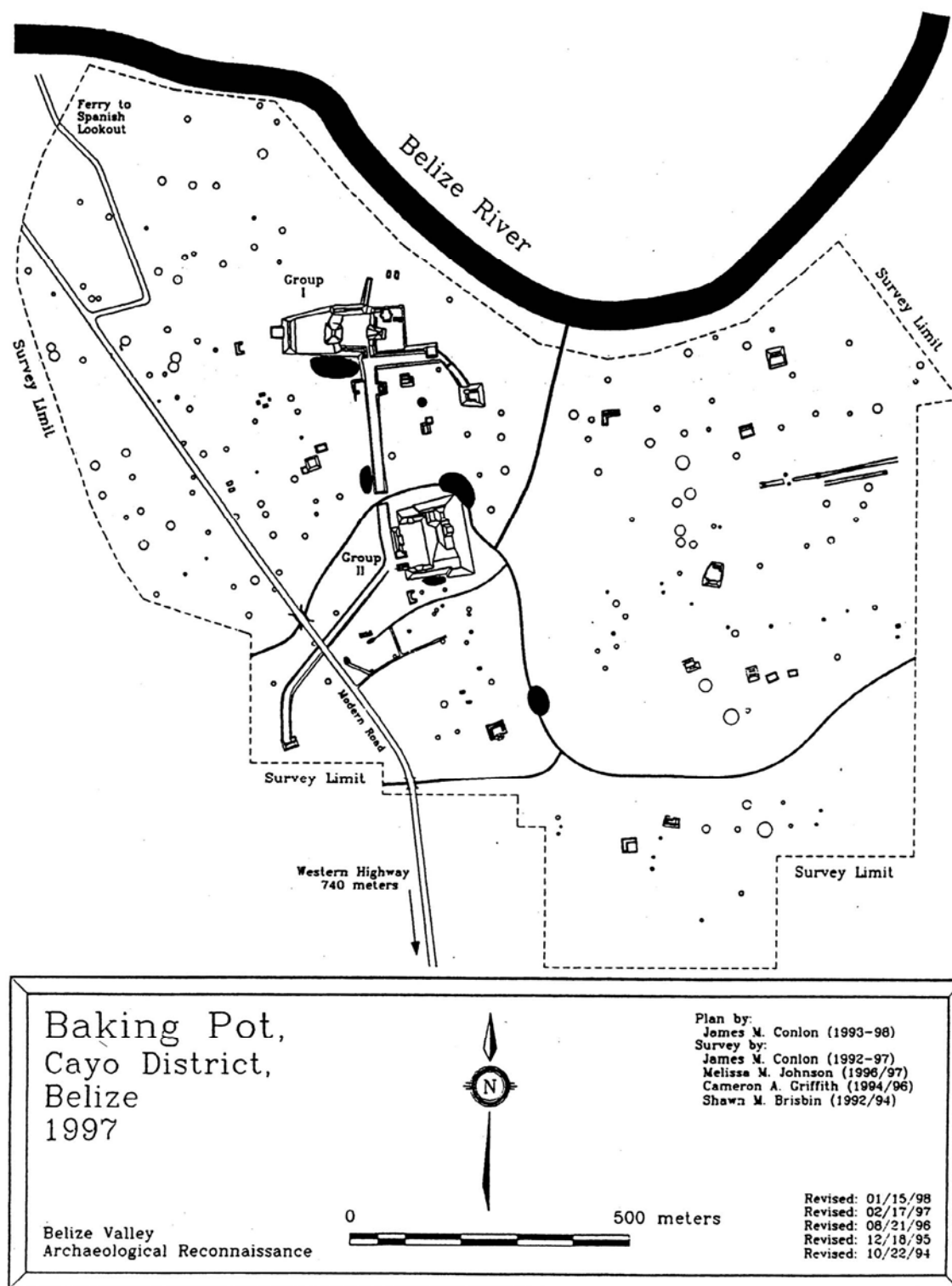


Figure 1.



## Unit 1

Unit 1, a 2 x 2 meter excavation, was placed in the center (as close as we could determine) of the plaza. We were hoping to discover a series of plaza floors that would give us a better idea of the construction sequence of this section of the site. Floors 1 through 5 (located 20-28 cm below the surface) were all extremely well preserved. The ceramics from the fill below the first four floors (Plaza 2-7<sup>th</sup>, -8<sup>th</sup>, -9<sup>th</sup>, and -10<sup>th</sup>) indicate a Late Classic 2 or Spanish Lookout date, as does the material from Level 1. These floors were simple plaster resurfacings of the original floor surface (Floor 5) that was constructed on a level of large river cobbles measuring between 15 to 25 cm in length and 10 to 17 cm in width. Within this rocky fill, we encountered Cache 1, two Mountain Pine Red dishes (Gifford 1976) stacked, upside down, lying above Floor 5. This cache, coupled with the fill ceramics from this level both point to a Late Classic 1 or Tiger Run date for the construction of Plaza 2-6<sup>th</sup>.

Directly below this cache, we encountered Floor 6 (Plaza 2-5<sup>th</sup>), a well-preserved stucco floor that abutted a two-course high limestone platform on the northern side of the unit. Unfortunately, we did not have the time to investigate the nature of the platform. However, future researchers may find its location an interesting feature to investigate. The fill under Floor 6 (Level 7) consisted primarily of Late Classic 1 or Tiger Run ceramics, including Mountain Pine Red dishes, Saturday Creek Polychrome sherds, and Zibal Unslipped jar rims (Gifford 1976).

The forth phase of construction was encountered 1.3 meters below Floor 6. This phase of construction consisted of a second platform, which was encountered on the southern edge of the unit. The single platform wall we discovered faced north (running east-west) and was constructed of 6 courses of cut limestone blocks. Since this platform stood over 1.3 m high, we decided to extend our excavations south an additional meter in efforts to place a small penetrating unit inside this earlier construction phase. The platform, unfortunately, was not in a good state of preservation. It seems that the Maya, before covering the structure to create the subsequent construction, ripped the majority of the good facing stones from the platform, likely using them in the walls of nearby buildings. The likelihood of this occurring is further supported by the distance of Baking Pot from the nearest limestone quarry; over one kilometer. With a limited population, it appears reasonable that cut blocks would be reused at times.

At the base of this wall a sixth plaster floor extended from the platform almost 60 cm before evidence of it being dug through in antiquity was discovered. Above this floor, and extending over the region that the floor should have been, was a thick (7-14 cm) layer of burnt material, including ceramics, organic material, and lithics. Due to time constraints, we left the area of unbroken floor intact and continued our excavations through the region where the floor had been broken. Fill from within the platform suggested a Tiger Run or Late Classic 1 date. While some earlier material was encountered, the bulk of the ceramics date to this time period.

The third phase of construction was discovered only 8 cm below Plaza 2-4<sup>th</sup>, but over 84 cm above Plaza 2-2<sup>nd</sup>. Like Plaza 2-2<sup>nd</sup>, Plaza 2-3<sup>rd</sup> consisted only of a thick layer of plaster with no associated architecture. The ceramics from the fill included Early Classic material, including Minanha Red sherds, an unslipped *tecomate*, and several Dos Hermanos ceramics (Gifford 1976).

The second phase of construction consisted of a thick plaster floor that lay 20 cm above Plaza 2-1<sup>st</sup> Middle Preclassic platform. While we have no architecture associated with this construction level, the ceramics from Level 9 indicated that the floor was constructed at the beginning of the Late Preclassic period. These ceramics include Jocote Orange-Brown, Savanna Orange, Reforma Incised, Sierra Red, and Polvero Black sherds (Gifford 1976). While the majority of the sherds found in the fill date to the Middle Preclassic, the inclusion of later material suggests a transitional point between the Middle and Late Preclassic periods.

The first phase of construction began about 3.3 meters below modern surface levels. A two-course high platform wall (roughly 28 cm high) was encountered running east-west through the unit. Above this platform was a well-preserved plaster floor that we left intact. Below the base of the platform, Level 10, we encountered a Middle Preclassic cache, consisting of partially complete ceramic vessels, individual sherds, and numerous freshwater and saltwater shells. The partially complete vessels include Reforma Incised, Savanna Orange, and Jocote Orange Brown sherds (Gifford 1976). The shells included hundreds of jute shells, bivalves, and conch shells. Almost all showed signs of being broken for eating purposes, suggesting possible feasting activities, however, the limited number of ceramics and their lack of completeness do not completely support this. Clearly, however, this was a ritual deposit of some importance, and its location below the first construction phase of the site (and it being the earliest sealed deposit at Baking Pot), certainly point to the possibility that the deposit forms the remains of ceremonial activities associated with the first construction at the site.

## Unit 2

Unit 2 was initially set up as a 2 x 8 meter trench intended to locate the central axis and staircase on Str. B. Unfortunately, preservation of the front of this tall structure was not as good as we hoped or even as good as the structures around it. This difference in preservation, in addition to the lack of massive quantities of collapsed material led investigators to believe that much of the western face of the terminal phase construction had been removed in antiquity. It is possible that the rather robust population of people living at Baking Pot during both the Early and Late Postclassic periods, both around the site core and to the northeast of the site used these stones in the construction of their own homes. Structure 209, a causeway terminus structure located only 200 m from Group 2, also had the majority of its facing stones removed in antiquity, further supporting this position.

With this in mind, it is not surprising that we found only a single row of stones from the terminal phase of construction. This line was located directly on the plaza floor:

everything located above this had been removed, with the notable exception of the superstructure on the summit of the mound. We persevered onwards, and deep within the trench discovered the penultimate phase staircase. These huge stone slabs were covered in a very thick layer of stucco that was so well preserved we could not determine where one stone began and the next ended without breaking through it. After uncovering portions of four large stairs that clearly were leading several meters below the terminal phase superstructure, we terminated the excavation for fear of undermining the stability of the mound.

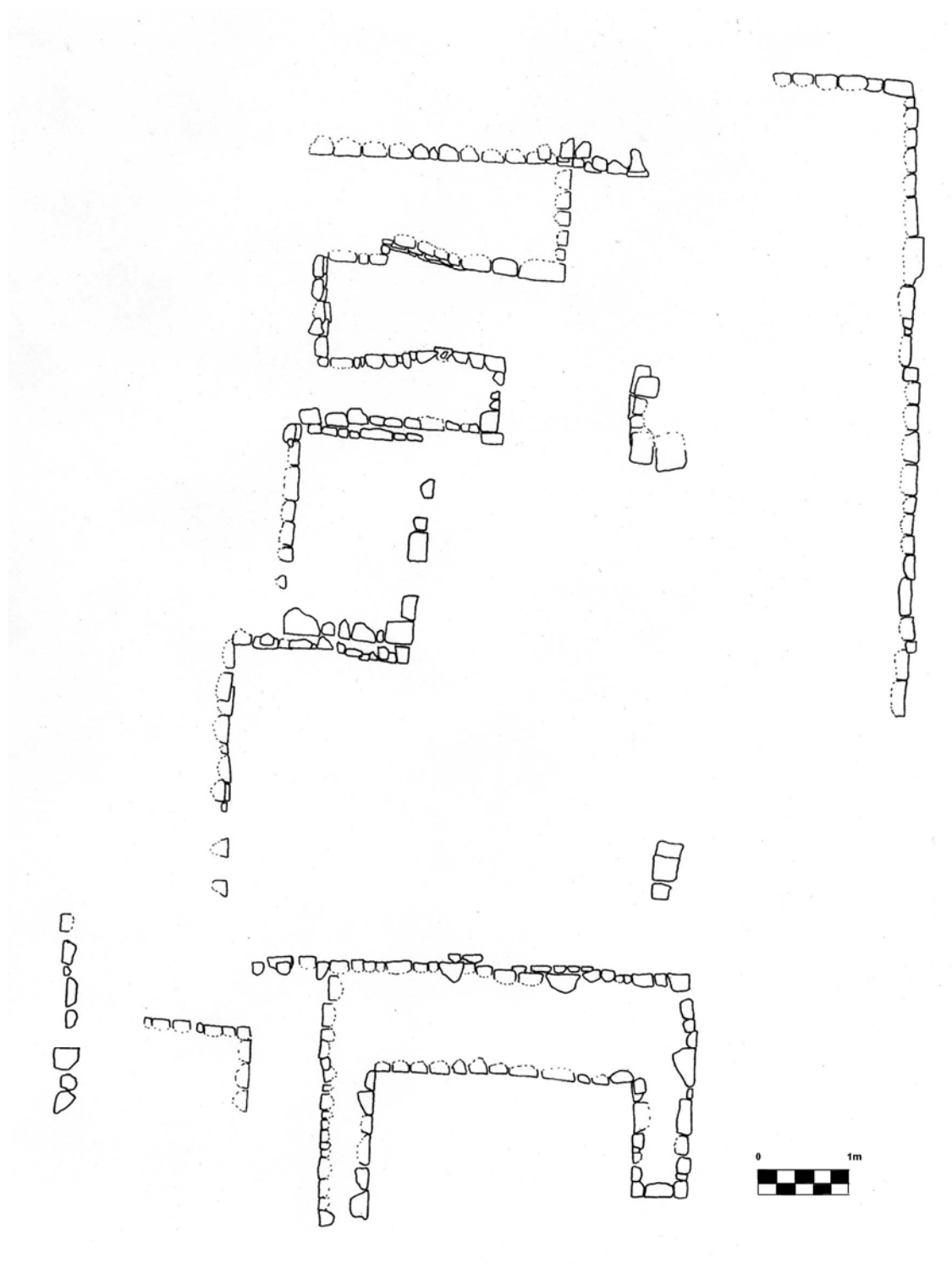
### **Unit 3**

Unit 3 was located on the summit of Str. B. This unit was divided into two sections, Unit 3a and Unit 3b. Unit 3a contained the remains of the northern side of the superstructure while Unit 3b was located on the southern half. The terminal phase architecture was surprisingly well-preserved, particularly when compared with the front of the structure. It does not appear that any of the walls were removed in antiquity, and even the platform retaining walls at the top of the structure were still standing (Figure 2).

Just above the floors and along the tops of the benches within the structure, particularly within the central room, we encountered a large number of ceramic vessels, chert debitage, and shell refuse. All of the ceramics date to the Late/Terminal Classic period, or to the Spanish Lookout phase. Many of the Cayo Unslipped sherds contained the “Pie Crust” impressions, and several Daylight Orange: Darknight Variety sherds were also uncovered (Gifford 1976), suggesting that the last occupation of these structures occurred quite late. It is difficult to determine, however, if this cluster was left by squatters or by the original occupants themselves. Some elite quality shell and jade ornaments were encountered with the ceramics, perhaps suggesting the latter. Either way the site core in Group 2 was nonetheless abandoned by the end of the Terminal Classic period.

The architectural features located at the terminal phase summit of Str. B were numerous. Two benches and three separate rooms were uncovered. The central room is the largest, measuring 415 cm wide and 581 cm long. On the southeastern edge of the room is a large bench, measuring 153 cm wide and 246 cm long. The bench abuts two spine walls; one separates the central room from the southern room, and the eastern or back wall that divides the internal space from the back terraces. The western edge of the room is open, likely once leading out to the pillaged staircase. There would have been little privacy in this room; even though it was likely covered in thatch. It is possible, however, that the front walls were constructed with wooden poles, or that this room was intended to be visible to the rest of the palace and to those in the main courtyard of Group 2. Perhaps certain ceremonies were conducted in this space, ceremonies that were more private than those that were carried out on the tops of the three main temples at the site.

The southern room did offer its occupants more privacy. However, the space was significantly more cramped than the central room. The southern room is 420 cm long by



**Figure 2.**

240 cm wide. A single bench stood in the southeastern corner of the room and measured 192 cm long by 140 cm wide. This bench took up much of the floor space. There were two entrances into this room: one from the north leading into the central area and one to the west, leading out to the front terrace of the structure.

The northern room was only accessible from the top of the structure via a hallway that began at the back of central room, led to the edge of the structure and then turned to the west and opened into the small northern space. There was also a doorway to the north, likely with steps leading down into the smaller northern palace group. Time constraints, however, limited our ability to test this hypothesis. There was no bench in this room, possibly suggesting that many of the inhabitants used this room as the entryway, which then led into the two rooms that were more commonly used for sleeping, meetings, and/or ritual ceremonies.

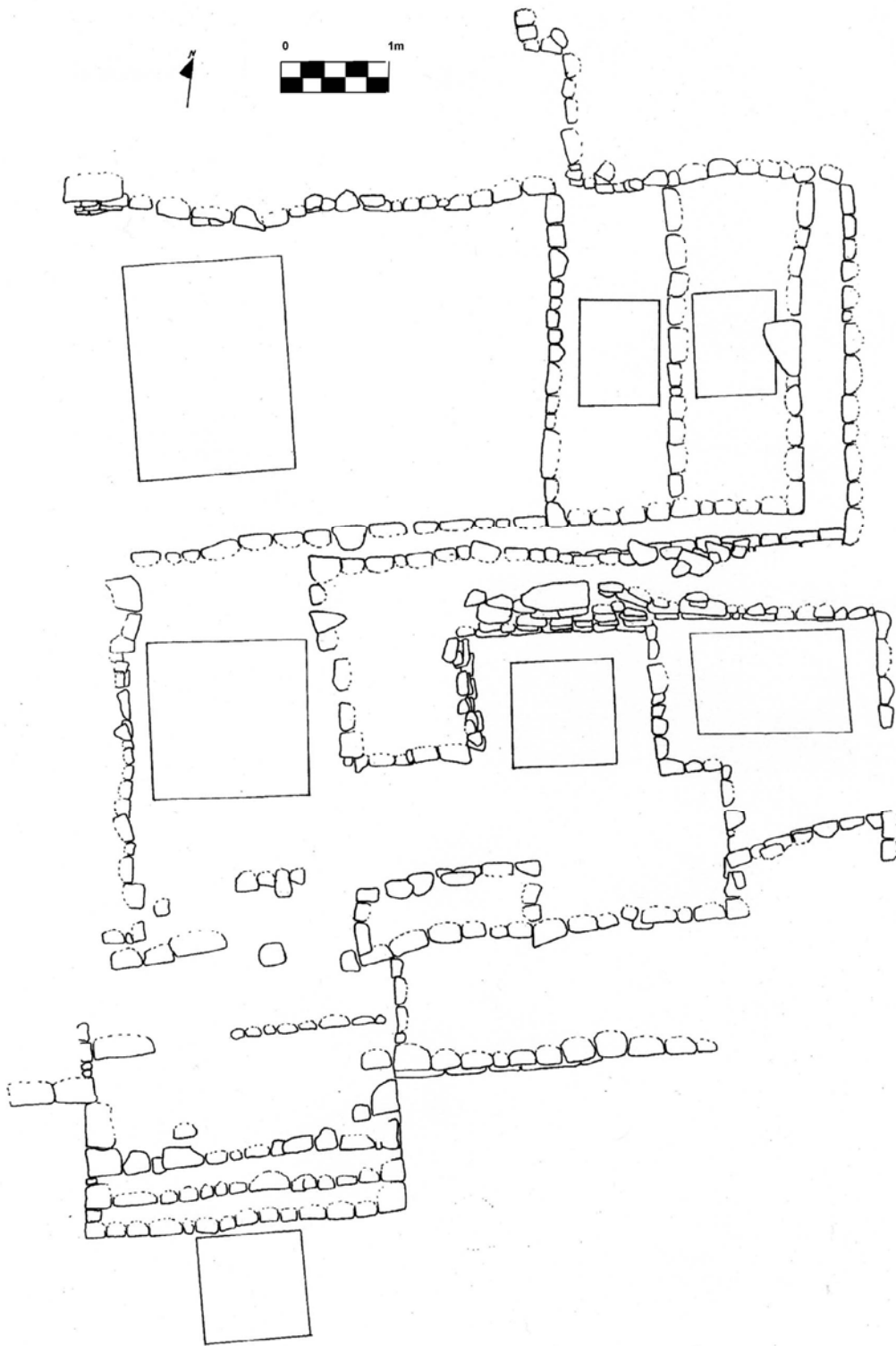
The eastern face of the structure remains unexcavated but the tops of the terraces could clearly be seen with just a cursory inspection, suggesting that a series of small terraces extend down to the base of the mound. Future excavations at the base of this structure, if time allowed investigators to get through the monumental layer of collapse would likely yield evidence of feasting and the remains of rituals performed at the top of the structure. Unfortunately, time did not permit testing during the 2004 season.

### **Test Units**

Several penetrating units were placed at the top of Str. B. Only one of these units, Unit 5 (located in the northern room) yielded ceramic artifacts. Unfortunately, the ceramics from this unit were undiagnostic. The others only contained the remains of roughly cut limestone blocks that formed construction pens directly below the terminal phase plaster floor. Unit 7 extended to a depth of 2.3 meters, however, only construction pens and plaster were uncovered. Due to the difficulty in excavating in solid stucco material, excavations were eventually halted.

### **STRUCTURE G**

The northern palace structure lining Plaza 2 in Group 2 is a 2.3 meter high residential platform that supported a two-room masonry superstructure (Figure 3). Only the eastern half of this structure was excavated, with the assumption that the western half mirrored the layout of the eastern section to some degree. Time and financial constraints made excavation of the entire platform impossible. A single 14 x 7 meter unit was placed across the eastern half of Str. B. We hoped that Unit 12 contained the remains of the superstructure as well as the topmost terrace, with Unit 19 placed adjacent to it in an effort to uncover the stairs and sections of the plaza.



**Figure 3.**

## Unit 12

Unit 12 yielded evidence of two rooms; a southern or front room that was accessible from both the central staircase and through a second doorway on the eastern side of the front platform as well as a northern or private room only accessible via the central doorway. The front room was smaller than the back, measuring 7.2 m by 2.2 m and contained a single bench on the eastern end. The back room was significantly larger and contained the remains of two benches, both located on the eastern edge of the room. The back room appears to be a single large room. Half of the room was excavated and measured 7.4 m long (but likely would be roughly double this) and 3.1 m wide.

Two features within this room were unique. The benches are unlike anything found in the Belize Valley. These “double-decker” benches were placed parallel to each other, the easternmost one 30 cm higher than the other. Perhaps there were two benches for a large family to sleep or for meetings with lots of people? Unfortunately that is something we will never know. A second and more confusing element in this room is a “drain”-like feature that encircles the benches. While it does not appear as though it would have actually functioned as a drain, (the slope actually angles down into the center of the room) there had to be some function for this long and narrow passage. Unfortunately, we have not been able to ascertain its purpose nor have similar features been documented in the region to my knowledge.

Thankfully, the penetrating units in Str G yielded more ceramic information than those placed into Str. B. The ceramics found above the first floor indicate a Terminal Classic date. These include Cayo Unslipped “pie crust” ollas, several Belize Red dishes and vases, a partially complete Montego Polychrome vase, and two Daylight Orange: Darknight variety sherds (Gifford 1976). Several penetrating units were placed within the platform and the benches. A single unit was placed at the base of the stairs. No cached material was found in any of the units, however, some ceramic material useful for dating was uncovered. Unfortunately, like our excavations in Str. B we did not have time to complete the excavation to sterile.

## Unit 19

Unit 19 revealed the front terraces and the nine steps leading up to the summit of the platform. These steps were usually two courses high and constructed with large cut limestone blocks. The platform was 2.2 m above the plaza floor, with three terraces flanking each side of the staircase. At the base of the eastern side of the first terrace we uncovered a drain that led from the plaza, through the platform, and presumably out the back of the monumental core. This drainage system was common throughout the lowlands, but it was an interesting discovery nonetheless. Below the monumental core was a stream that bisected the causeway leading from Group 1 to Group 2 (there was likely a wooden bridge of some sort connecting the two sides) that this run off would have flowed into.

## Unit 13

A single penetrating excavation extending to at least the level of the plaza was placed in the center of the back room in Str. G. This unit measured 1.5 m x 1.5 m and we hoped to find evidence of the construction sequence of the platform. While some of the levels yielded numerous datable ceramics, many of the levels were without ceramic artifacts entirely. Level 2 was a simple re-plastering over the floor covering the construction fill of Level 3 and contained no artifacts. However, a ceramic deposit (Feature #6) was found in the fill of Level 3, at least giving us an idea of the late date of construction. The ceramics found within this feature include Belize Red dish sherds, several Benque Viejo Polychrome fragments, and numerous Cayo Unslipped rim sherds with “pie crust” impressions (Gifford 1976). This last type in particular, along with material found in the collapse, suggests a Terminal Classic date for the last two construction phases. Levels 4 and 5 contained ceramics dating to the Late Classic 2 phase, while Levels 6 through 8 did not contain any ceramics at all. Ceramics from Levels 9 and 10 date to the Late Classic 1, or Tiger Run phase. Unfortunately, we did not have time to continue below Level 10 and had to terminate our excavations approximately 2 meters below the level of the terminal phase floor.

Additional penetrating units placed in the benches and in the floor of the southern room all revealed nothing. No caches or artifacts were uncovered, just lots of thick plaster and roughly cut limestone blocks, similar to the construction techniques found in Str. B.

## Artifacts

Unlike Str B, few artifacts were found in situ above the terminal floors of the platform. However, a miniature unslipped olla and a partially complete Benque Viejo Polychrome vase were found at the base of the western side of the double-decker bench (Gifford 1976). Few artifacts indicating activity areas were discovered, specifically no evidence of cooking in or around the structures or courtyard was uncovered. A few broken *manos* and *metates* were found in humus layers, and three spindle whorls were found scattered throughout the area, but this is a very sparse artifact density when compared with other households that we have excavated at the site. This may indicate the lack of domestic chores that were being completed in the palace complex. Perhaps cloth was woven and food was prepared in areas outside of the site core and brought in at appropriate times. This would be consistent with hypotheses proposed at other sites in the Maya region.

## DISCUSSION

The construction and artifacts uncovered from the palace at Baking Pot was comparable with that found at other sites in the region. The only lacking element was the corbelled arch, however when the distance to the nearest limestone quarry is taken in account, the quantity of stone construction is impressive. The lack of domestic refuse is expected, given the assumption that the elites were not cooking food nor weaving their



own clothes. Those who were taking care of this probably lived in the smaller homes in close proximity to the palace.

The dating of the first phase of construction in the plaza was also slightly earlier than expected. The late Middle Preclassic date for the first platform indicates that Baking Pot, while settled later than Cahal Pech or Blackman Eddy, did have some significant activity occurring during this early period. Of additional note, was the limited construction that occurred during the Terminal Classic period. While it is impossible to know how much of Str B was built during this late phase, at least minor modifications were still being added to the plaza and to Str. G. Many of the ceramics previously thought to have a Postclassic date, including Daylight Orange: Darknight Variety are present, however it is interesting to note that Plumbate, found in other parts of the site in early and middle Postclassic assemblages, was absent from site core.

The lack of dedicatory caches in both platforms was a surprise. At other temples and residences throughout the site there has been a consistent pattern of axial caches extending from the Late Preclassic through to the end of the Classic period. Despite the numerous axial, doorway, and bench units placed in both platforms, not a single cache was discovered. It is possible that these caches were located in earlier phases of construction (thus on different alignments), however, why there were no terminal phase caches, with the exception of the Tiger Run period deposit in the center of the plaza, is a mystery.

## **CONCLUSION**

Future research in the place groups at Baking Pot should seek to establish the sequence, orientation, and size of the newly discovered residential platforms as well as determine the sequence of construction on each of the larger platforms already tested. The site of Baking Pot is a large, wealthy, and important site within the Belize River Valley whose political importance in regional politics should not be ignored. Only through further testing of the site will we understand the true magnitude of its history.

## Acknowledgments

I would like to thank everyone who has helped make BVAR a success for the past few years. Thanks to foreman Antonio Itza who did an excellent job interpreting architecture, helping out the students and teaching the other workers. Our distinguished excavators and artists include Nazario Puc, Hubert Kelly, Bernabé Comal, Jim Puc, Hilberto Puc Sr. and Jr., Gustavo Valenzuela, and Carlos. To Ada Wood, Alice and “Viejo” Guerra, Sherilyne Jones, Lisa Awe, Dr. John Morris, and Antonio Beardall for their endless support during my time in Belize, I could never repay the kindness you all have shown me. I would also like to thank many of the scholars working in the area that have impacted my thinking and supported my work over the years: Dr. Jim Garber, Dr. Kat Brown, Dr. Lauren Sullivan, Dr. Lisa Lucero, Dr. Cynthia Robin, and Dr. Gyles Iannone. Lastly I would like to thank Dr. Jaime Awe for giving me the opportunity to learn about archaeology at the amazing site of Baking Pot.

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# TEST EXCAVATIONS OF PLAZA 2, GROUP 1, BAKING POT

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## INTRODUCTION

The Maya site of Baking Pot is located along the bank of the Belize River and is comprised of two main architectural groups connected by a causeway, or *sacbe*, which is surrounded by hundreds of smaller domestic and non-domestic structures including several ballcourts and administrative buildings (Audet and Awe 2004). Baking Pot was occupied from the Middle to Late Preclassic (c. 400 BC) until the early Postclassic Period (c. AD 1100) (Willey et al. 1965). During the 2004 field season, the Belize Valley Archaeological Reconnaissance Project (BVAR) conducted excavations in Plaza 2 of Group 1 at Baking Pot. Group 1 is one of two large architectural groups at Baking Pot. Plaza 2 is flanked on the east and west by two large temples, Structures E and B respectively, and on the north and west by two residential structures, Structures F and C. Several other plazas and large structures comprise the rest of Group 1. Two 1.5 x 1.5 m excavation units were placed in the floor of Plaza 2 in an attempt to establish the chronology of the plaza, and subsequently the group as a whole.

## RESEARCH DESIGN AND ORIENTATION

The immediate research goal for this area was to establish a chronological sequence, based mostly on ceramic artifacts, for the Plaza 2 floor sequences. This area was specifically chosen because the Maya traditionally resurface and rebuild plaza floors atop one another creating a neatly stratified series of floors separated by layers of core in which several types of artifacts are often found. This type of construction forms a cultural stratigraphy, in which the bottommost layer is the oldest and the topmost layer the newest (Gifford 1976) and is ideal for meeting our research goal.

During the previous month the BVAR Project conducted excavations in Group 2 Plaza 1 that included the excavation of two excavation units, 2.0 x 2.0 m in size, placed along the central axis of that plaza. These units yielded part of a large circular platform, several successive floor levels, and an interment consisting of two individuals that dates probably to the late Preclassic Period (300 BC-AD 300). Thus the excavations of Plaza 2 in Group 1 served as a comparison of the chronology of the plazas of each both main groups at Baking Pot.

In an attempt to mirror the excavations in Group 2 Plaza 1, two 1.5 x 1.5 m units were laid out 1-m apart from one another along the central axis of Structures E and B using GPS instrumentation. These excavation units were designed to penetrate through the plaza floor sequence, while yielding an array of artifacts, to sterile soil beneath the

earliest floor. It was assumed that both units would yield the same number of floors and bear similar types of artifacts dating to the same periods because they were only 1-m apart from one another. However, by the end of the excavation Unit 1 (the easternmost unit) exhibited four floors while within Unit 2 (the westernmost unit) five floors were distinguished. Also in the end Unit 2 was able to attain a greater depth because Unit 1 contained a burial, which took time from attaining a depth that reached to sterile soil.

## **EXCAVATION UNIT 1**

Unit 1 was divided up into 5 successive levels, each directly corresponding to the surfacing and core of a floor. The artifacts of each level were analyzed separately, assuming that each floor (and each level) was built at a different time period and thus could help to determine the chronology of the plaza as a whole. Hence, the constituents of each level (artifacts, architectural core, etc.) were deposited after the construction of the floor located below it and before the construction of the floor above it. The analysis focuses on ceramic artifacts, as they are the most abundant and most durable artifact found, as well as the most widely studied and useful for determining a chronological sequence (Gifford 1976). All ceramics were analyzed according to complex as established by James Gifford (1976), with the assistance of Jaime Awe and Carolyn Audet.

### **Level 1**

Level 1 consisted of the topsoil, which contained a few artifacts located above Floor 1. Floor 1 was barely perceptible, as most of the plaster had been eroded, being located only 5 cm below the modern ground surface. The most obvious evidence that there had been a floor located there was the presence of small stone ballast with some remains plaster located directly above it. Stones were used as core in the area where a floor was constructed and plaster was laid on top of it. Level 1 yielded several types of artifacts including lithics, ceramics, and a small obsidian blade fragment (special find #1). The four pieces of ceramic found in Level 1 were small and undiagnostic. However, as was previously stated, a burial was found in Unit 1 and thus had to be extended to the south by 104 cm to allow complete exposure to the burial. Artifacts from the Level 1 extension were much more diagnostic than those previously discovered. Three pieces of daub were found, along with eleven lithics and 24 ceramic sherds. The daub probably originates from a perishable superstructure that could have been built in the vicinity. The lithics were deemed to be undiagnostic of a specific time period. The ceramic artifacts, however, could be assigned to specific types and thus discrete temporal phases. Nine sherds were identified as Belize Red, one as part of Roaring Creek dish rim, four derived from thick jar sherds, and an additional ten undiagnostic pieces were found (in the Level 1 extension). Belize Red and Roaring Creek types are part of the Spanish Lookout Complex dating to between AD 680 and 880. Thus Level 1 of Unit 1 (and extension) may date to the same time period, putting the construction of Floor 1 around the same time as well.

## **Level 2**

Level 2 of Unit 1 began directly below Floor 1 and continued until the discovery of Floor 2, 10-cm below the surface and just 5-cm below the floor ballast of Floor 1. This level yielded several small lithics and 26 ceramic sherds, many of which were diagnostic. Thirteen of the fragments were typed as Belize Red including one rim piece, one piece was identified as Mount Maloney Black, one piece was found to be of the Garbutt Creek Red type, and one piece was determined to be Cayo Unslipped. The ten remaining fragments were undiagnostic. All of these types also date to the Spanish Lookout Complex (AD 680-880). Thus both Levels 1 and 2 of Unit 1 appear to be from about the same time period and consequently both Floors 1 and 2 appear to date to the same time period. Floor 2 was originally thought to be a thickly plastered floor about 14 cm thick with a few stones scattered throughout the plaster, however, upon further inspection, it was obvious that Floor 2 was actually two floors separated by a thin layer of ballast stones. Apparently the original floor was resurfaced shortly after its construction. Floor 2 was divided into Floors 2a and 2b with Floor 2a being the topmost and most recent. Floor 2a was about 5 cm thick and Floor 2b was about 6 cm thick. Level 2 was also extended in Unit 1 when the burial was discovered and yielded five pieces of daub, four lithics, a small obsidian fragment (special find # 4), and thirteen ceramic sherds. Upon analysis of these ceramics, 5 pieces were found to be Belize Red of the Spanish Lookout Complex, 3 pieces were thick jar sherds from the same period and 5 pieces were undiagnostic.

## **Level 3**

Level 3 in Unit 1 is located directly below the plaster Floor 2b. Almost immediately smaller fill stones were found and we expected to find another plaster floor just below it, however, no such floor was found in Unit 1 and excavation in Level 3 continued. Interestingly, about 20 cm below Floor 2b and about 11 cm below the small ballast layer just mentioned, larger fill stones were discovered. The absence of a third floor was very puzzling as the placement of the associated ballast stones seemed to indicate that a floor may have once existed there. Another factor indicating that a third floor may have been present here at one time is the discovery of Floor 3 in Unit 2 at about 40 cm below the surface, which directly corresponds to the depth between the two layers of ballast found in Unit 1. However, during the excavation of the Unit 1 extension to access the burial was it revealed that the Maya had probably cut through this section of floor to enter the burial as parts of this missing floor were found in Unit 1 extension at 38 cm below the surface.

Unit 1 and Unit 1 extension in Level 3 yielded a large amount of artifacts, probably because it was the most substantial level in Unit 1. Twenty lithics in total were found in this level, along with 5 small pieces of daub, and 95 ceramic fragments. Most of the diagnostic ceramics found in Level 3 were also indicative of the Spanish Lookout Complex: 10 fragments were Belize Red, 5 were Roaring Creek Red, and 1 Garbutt Creek Red vessel rim. Also, 1 Zibal unslipped vessel fragment was found amongst the layer of larger core stones, which date to the Tiger Run Ceramic Complex that dates to

between AD 590 and 680. Thus Level 3 appears to begin making the transition between identifiable ceramic periods. Unusually the foot of an Aguacate Orange vessel was found just below the area of small fill stones located in level three. This piece dates to the Late Preclassic period to between AD 0 and about 280 and belongs to the Floral Park ceramic complex, and seems very out of place in Level 3 because all of the other ceramics date to the Late Classic period. Thirty-eight of the ceramic fragments found in this level were undiagnostic.

#### **Level 4**

Floor 3 in Unit 1 was discovered as an intact plaster surface on the eastern half of the unit and was about 7 cm thick. It was found 66 cm below the modern ground surface and about 56 cm below Floor 2. No plaster floor was found in the western half of the unit except for a small section located in the northwest corner. The remaining un-plastered area contained a few large core stones. In the northwest corner, directly below these stones, skull fragments were found. Apparently a portion of Floor 3 had been cut during the interment of Burial 1. The skeletal remains extended to the north, requiring a northern extension to be added to Unit 1 to allow access for the excavation of Burial 1. Once the skeletal remains were removed, excavation of Unit 1 extension discontinued, however, excavation resumed in Unit 1.

Level 4 was located directly beneath Floor 3 and includes Burial 1. A large variety of artifacts were found in Level 4, however, it is almost impossible to determine whether the artifacts found in this level are directly associated with Burial 1 because evidence suggests that this burial was interred after the construction of Floor 3. Level 4, Unit 1 yielded 17 small lithic fragments as well as an array of animal remains including 6 fragments of shell (possibly clamshell) and 4 jute shells. Both are considered to be the remains of food debris. Level 4 also yielded 85 ceramic fragments.

#### **Level 5**

Level 5 in 1 was the last level excavated in Unit 1 due to time constraints brought about by the discovery of Burial 1. It is located directly below Floor 4, which was determined to be a partially eroded plaster floor located a depth of about 105 cm below the modern ground surface and about 39 cm below Floor 3. This depth also directly corresponds to the elevation of Floor 5 found in Unit 2. Burial 1, however, did not appear to be placed on Floor 4.

No subsequent Floors were found in Unit 1. Level 5, however, did contain a fair amount of artifacts: 50 lithics (including a small bifaces, special find #12), 10 small pieces of daub and 100 faunal remains (38 shell fragments, perhaps of the same type as those found in Level 4 and 62 jute shell). One hundred and two ceramic fragments were found in Level 5. The final excavated depth of Unit 1 was 167 cm below modern ground surface, or about 62 cm below the fifth and final floor discovered.

## **EXCAVATION UNIT 2**

Unit 2 was located 1 m to the west of Unit 1 and included a series of five successive floors and subsequently 6 successive levels containing artifacts of similar nature to those found in Unit 1. A cache was also found in Unit 2, but no information on it is presented here, as it was excavated by Carolyn Audet. Unit 2 could be excavated more expediently than Unit 1 as it did not contain a burial. Consequently, a more comprehensive stratigraphic series can be presented for this unit. The same methodology and research goals were used for Unit 2 as for Units 1. The analysis and the presentation of the data are also the same.

### **Level 1**

Level 1 of Unit 2 consisted mostly of topsoil until ballast stones were discovered within the first 5 cm. The ballast was intermingled with pieces of plaster identical to those found in Unit 1, and are considered to be the remnants of the same poorly preserved Floor 1. Artifacts found in Level 1 of Unit 2 included 12 small lithics and 6 ceramic fragments. Two of the ceramic fragments were determined to be of the Belize Red type, while 2 were identified as Augustine Red; both types belonging to the Spanish Lookout Complex which dates to about AD 680-880 and two other fragments were undiagnostic.

### **Level 2**

Directly below Floor 1, Level 2 yielded several types of artifacts consisting of ceramics, lithics, and daub. Thirteen lithics were found, including one with a serrated edge (special find #2) as well as six large pieces of daub, and 20 ceramic fragments. Three of these sherds were typed as Belize Red (Spanish Lookout Complex, AD 680-880) and 17 were undiagnostic. Level 2 continued until the discovery of Floor 2, about 14 cm below Floor 1 and only about 20 cm below the modern ground surface. Floor 2 was found at a greater depth in Unit 2 than in Unit 1, but looks almost identical to Floor 2 in Unit 1 in regards to the resurfacing patterns. Floor 2a was 5 cm thick and Floor 2b was 6 cm thick, again with a small layer of ballast separating the two floors.

### **Level 3**

Larger ballast stones were found directly below Floor 2b in Level 3 of Unit 2 and soon another plaster floor was found below these. Floor 3 in Unit 2 was found about 38 cm below the surface and about 11 cm below Floor 2b. Thus the artifacts found in Level 3 were few. Two small lithics, four pieces of daub, 25 ceramic fragments and 1 small shell were found. The shell is of the same type as those found in Unit 1. Of the 25 ceramic pieces, three were Dolphin Head Red, one was Mount Maloney Black, and 21 were undiagnostic. Both of the diagnostic types belong to the Spanish Lookout Complex.

#### **Level 4**

Level 4 was located directly below Floor 3 in Unit 2 and continued until a depth of about 58 cm below the modern ground surface, or about 17cm below Floor 3. Floor 4 was mostly intact and consisted of a thin layer of plaster not more than 2 cm thick. Immediately another thin layer of small ballast stones was found directly above another thin layer of plaster floor. Floor 4 in Unit 2 apparently was resurfaced as well, thus this floor is also divided into two separate floors, Floor 4a and Floor 4b. Within Level 4 several large stones were found, including a few pieces of what appeared to be burned limestone. These isolated occurrences, however suggest that the limestone was burned elsewhere and then used in this location simply for fill. Artifacts found in Level 4 included nine lithic fragments, 4 pieces of daub, and 18 ceramic sherds. Most ceramic fragments were determined to be of the Spanish Lookout Complex including ten Belize Red, two Cayo Unslipped, one Platon Punctated-incised, two Montego Polychrome, and two Dolphin Head Red. In addition, one fragment identified as Zibal Unslipped, is characteristic of the Tiger Run Ceramic Complex, which dates to c. AD 590-680, possibly denoting a transitory phase between Spanish Lookout and Tiger Run.

#### **Level 5**

Located directly below Floor 4b, Level 5 consisted of softer, lighter soil with no ballast stones represented. Floor 5 was discovered at a depth of about 100 cm below the modern ground surface and about 40 cm below Floor 4b. Floor 5 was difficult to discern as it mostly consisted of ballast stones littered with plaster chunks in some areas and was the last floor found in Unit 2. Excavation of Level 5 yielded 24 lithics, 4 faunal remains (2 shell fragments, 2 jute), and 122 ceramic fragments. The frequency of ceramic artifacts and the number of artifacts in general, increased with depth in Unit 2. Ceramics found in Level 5 included fragments from both the Barton Creek and the Jenney Creek Ceramic Complexes. The Barton Creek Ceramic Complex dates to about 300-100 BC. Barton Creek ceramics found in Level 5 consisted of 24 Sierra Red, 6 Polvero Black, 2 Lechugal Incised, and 3 Paila Unslipped. Only one type of Jenney Creek (about 600-300 BC) was found in Level 5: seven Savana Orange fragments.

#### **Level 6**

Level 6 is the final and most extensive level in Unit 2. Here sterile soil was reached. A Preclassic cache was found at a depth of more than 300 cm below surface level. The cache, Feature 1, was excavated and analyzed by Carolyn Audet. Our excavation achieved a depth of 267 cm below the modern ground surface. However, due to the volume of Level 6, a large number of artifacts were found in the light, sandy soil. Artifacts found included, 85 lithics, 16 pieces of daub, a partial granite *mano* (special find #8), a human incisor (special find #9), two faunal bone fragments, and a small obsidian fragment (special find #10), as well as over 200 faunal remains consisting of jute and other small shells. Ceramic fragments found in Level 5 numbered around 350, however, only about 100 were diagnostic.



All ceramics found in Level 6 dated to the Middle to Late Preclassic Period in the Barton Creek and Jenney Creek Ceramic Complexes: 17 Jocote Orange-brown, 51 Sierra Red, 11 Sierra Red dish sherds, 9 Polvero Black, 2 Polvero Black with cream outside, 7 Lechugal Incised, 1 Flor Cream, 3 Savana Orange, 4 Paila Unslipped, 1 undetermined spout, and 1 Chaccinic Red on Orange-brown.

## **BURIAL 1**

Burial 1 was found in Unit 1 in Level 4. This burial can be described as a simple burial, as it did not contain any large stones associated with it. In fact, no artifacts were determined to be directly interred with the individual. It was oriented with the head to the south with the skull lying almost directly on the central axis between structures B and E. The body was placed prone with the head slightly tilted to the west in a partially semi-flexed position. The legs were bent, while the arms elongated and slightly rested on the legs. The torso appears to have been compacted, as a few ribs were missing and the spine twisted in an unnatural way.

The preliminary skeletal analysis of Burial 1 was undertaken by Melissa Beske. The skull and teeth were very well preserved. The incisors and canines of the upper row each contained one round jade inlay. All of the canines, maxillary and mandibular, were filed flat. All of the teeth were also worn down to the dentin, indicating a diet of harder foods, possibly maize (Larsen, 1997). Many of the cranial sutures were fused or almost fused with some porosity on the parietals. However, this was deemed to be very unusual because the individual otherwise seemed to be of a young age. It is possible that this individual suffered from a cranial trauma that healed prior to death. Analysis of the remains of the pelvis revealed that the iliac crest was almost, but not fully fused. Between 93%-97% of individuals have an iliac crest that is fully fused by age 23 (Larsen, 1997), indicating that this individual was probably around that age at death. The sex of the individual could not be determined at the time.

The presence of a burial in Unit 1 explained that lack of Floor 3 that was found in Unit 2 and the missing portion of Floor 3 in Unit 1. Sometime after the construction of Floor 3 and before the construction of Floor 2 (Floor 2 was found intact), the Maya cut through two floors in order to inter this individual within Floor 3. This does, however, make the date of this burial difficult to determine. Ceramics found in Level 3 are of the Spanish Lookout and Tiger Run Complexes, suggesting that this level dates to the Late Classic Period sometime between AD 590 and 880. These dates also coincide with the period of greatest architectural construction at Baking Pot and especially in Group (Audet and Awe 2004).

## CONCLUSIONS

By excavating two test excavation units in the floor of Plaza 2, Group 1 and analyzing their contents, we were able to establish an effective chronological sequence for the plaza and consequently the group as a whole. Most of the ceramic evidence gathered dates to either the Late Classic Period (c. AD 590-880) or the Middle to Late Preclassic Period (c. 600-100 BC), suggesting that the construction of the floors also date to these time periods. The lack of any ceramic evidence dating to the Early Classic Period indicates that there was little to no construction on Plaza 2. The presence of daub found throughout the excavation implies that perishable superstructures were continuously present in the vicinity, as is typical of Mayan architectural practices in general (Sharer 1994). The amount and frequency of other artifacts found such as lithics or faunal debris suggest frequent use of the plaza during its occupation. The chronological sequence established by the excavation of Plaza 2, Group 1 can serve as an excellent comparison to excavations conducted throughout the site of Baking Pot, especially with the other structures in Group 1 and with plaza construction in Group 2.

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# TEST EXCAVATIONS OF PATIO H, GROUP 1, BAKING POT

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## INTRODUCTION

Baking Pot is located along the Belize River in western Belize. The site is made up of two architectural groups, which are connected by a causeway. During the 2004 field season, BVAR excavated structures in both groups, in an effort to investigate the construction phases of the site. For this investigation, excavations in Group 1, Patio H were set up to gain a better understanding of the chronology of the site.

## EXCAVATIONS

Patio H is located south of Structure E in Group 1, and adjacent to Structure H. A 1.0 x 1.0 m excavation unit (Unit 1) was placed in the center of Patio H in order to understand the construction chronology of the site. The goals of this investigation were twofold. The first goal was to get a chronology of construction for the plaza. The location in a major part of the site would be a good indicator of the state of the site throughout time. The second goal was to determine if the plaza was being used for ritual purposes. Unit 1 was placed in the center of the plaza, in order to locate any ritual deposits.

Unit 1 measured 1.5 x 1.5 m, and was oriented to magnetic north. In Level 1, a partial floor was found about 20 centimeters below the modern ground surface. The floor was poorly preserved, with only the ballast present in the southern part of the unit. Several tree roots in the unit probably contributed to the poor preservation. The majority of ceramics were Belize Red, although smaller amounts of Augustine Red, Paxcaman Red, Mount Maloney, Sierra Red, and other ceramics were found in this level as well. In Level 2, another partial floor was located at 32 cm below the surface. This floor was also highly disturbed by the tree roots in the unit, and was only present on the western side of the unit. Level 2 ceramics included Belize Red, Mount Maloney Black, Meditation Black, and Garbutt Creek Red types. The third floor was located approximately 47 cm below the modern ground surface. This floor was almost intact, except in the southeast corner, where a large tree root is present. In Level 3, Mountain Pine Red, Sierra Red, and Minanha Red ceramics were found. At approximately 15 cm below Floor 3, another floor was located. Floor 4 was not as thick as the previous two, only measuring between 1 and 2 cm in depth. It was located at 65 cm below the modern ground surface. There were few artifacts between Floors 3 and 4, though some ceramic sherds were found. There were no diagnostic ceramic sherds in Level 4, making the dating of this level difficult. In Level 5, beneath Floor 4 and on the western side of the unit, large pieces of daub were found. These may have been used as fill for Floor 4. River cobbles, jute shell,

lithics, and a small animal bone fragment were also found in the fill of Floor 4, although the fill consisted mostly of alluvial soil. In Level 5, a poorly preserved floor was located at approximately a meter below the modern ground surface. The tree roots which were present in earlier levels continued into this level and may have contributed to the poor preservation. The floor is preserved in the center of the unit, as well as in the southeast corner. Level 5 ceramics included Sierra Red with Polvero Black, Savanna Orange, Sierra Red, and Paila Unslipped. Below Floor 5, two obsidian blade fragments (Special Finds #1 and 2) were found in Level 6, at approximately 140 cm below the modern ground surface. Ceramics in Level 6 were of limited frequency and were mostly undiagnostic, though Balanza Black sherds were noted. Level 7 ceramics included Sierra Red and Polvero Black. Excavation stopped at 145 centimeters below the modern ground surface. Due to time constraints, we were not able to continue excavation in Unit 1.

## **DISCUSSION**

Although investigations at Patio H, Unit 1 were limited, we were able to obtain some data on the chronology of the locus. Further investigations are needed in order to get a complete understanding of the construction phases and chronology of Patio H. In addition to this current study, previous studies have shed some light on the chronology of Group 1 at Baking Pot. Willey et al's study analyzed ceramics from Plaza 1 of Group 1, dating between the Late Preclassic and the early Postclassic periods (Willey et al. 1965). Excavations by Aimers in Plaza 2 of Group 1 uncovered ceramics dating mostly to the Early through Late Classic periods, with some ceramics from the Late Preclassic (Aimers 1996).

## **CONCLUSION**

Although this investigation was limited, it revealed some information about the chronology of the site. Further analyses of the artefactual materials recovered and additional investigations are needed to get a more complete understanding of the use and chronology of Patio H.

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# **PRELIMINARY REPORT ON THE EXCAVATION OF STRUCTURE 51, BAKING POT**

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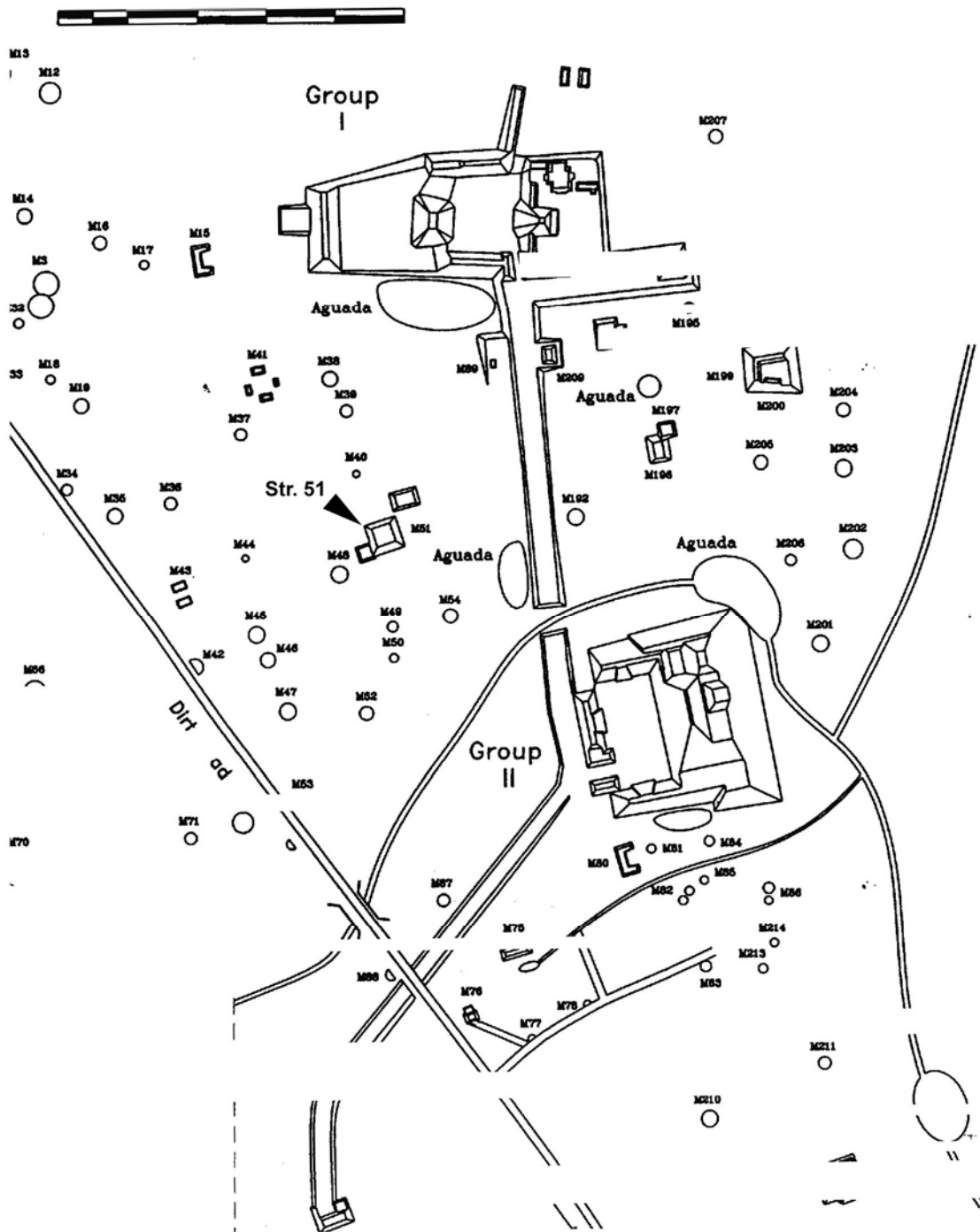
## **INTRODUCTION**

The 2004 field season at Baking Pot included the excavation of Structure 51. Structure 51 is a residential structure near the site core of Groups 1 and 2 (Figure 1). House mounds of various sizes and locations have been excavated throughout Baking Pot in order to understand the complex social life of people from various socio-economic statuses within the community (Piehl 1999). The excavation of this structure was undertaken with the original intention of establishing a chronology for the residential structure. Structure 51 was chosen because of its relatively large mound size and its location in relation to the site causeway. This initial goal was quickly reframed when Unit 1, a 1 x 1 m excavation unit intended to penetrate the structure, revealed stone architecture. Therefore, the excavation goals of Structure 51 were transformed into the confirmation of residential occupation and the investigation of terminal occupation at this location.

Structure 51 is a residential structure located west of the causeway connecting the two major site groups, Group 1 and Group 2 (Figure 1). The area is presently used by the Government of Belize's Central Farm as pasture and has undergone some clearing and plowing activity. Structure 51 is a single mound with a large central portion (height of approximately 4 m) and two smaller topographical features, one to the southwest and one to the northeast (both heights of approximately 1 to 2 m). In the 2004 field season a portion of the terminal occupation phase of Structure 51 was excavated on top of the center of the mound. Excavation units were also opened on the smaller part of the mound on the northeast side, closest to the site causeway. Architectural and artifactual evidence recovered in these excavations confirm the primary use of the terminal phase of construction as residential. A more in-depth analysis of the entire structure, as well as, the recovered artifacts is required to maximize the contributions of this investigation. This report will describe the architectural features uncovered, as well as, present a preliminary description of associated artifacts.

## **ARCHITECTURE**

The final phase of architecture of Structure 51 was excavated during the 2004 field season. Construction style was primarily well-faced and roughly-faced limestone blocks, with a few river cobbles. The terminal phase of construction also consisted of a ballast floor. The main focus of this investigation was aimed at the central portion of the



**Figure 1:** Baking Pot, Cayo District, Belize 2000. Plan by: James Conlon (1993-2000).  
Survey by: James Conlon (1992-2000), Jennifer Ehret (1999-2000), Melissa Johnson  
(1996/97 Cameron Griffith (1994-1996), Shawn Brisbin (1992-1994). Revised: 01/14/01.

structure. Excavations revealed what appears to be a large courtyard area, of ballast floor, located in the center of the structure, as well as, portions of the northern and western interior structure walls (Figure 2). The interior walls are two to four courses high and the collapse around the walls suggests such walls may have been at one time four to five courses. After locating these interior walls an attempt was made to find the outer northern wall of Structure 51. However, resource limitations again kept this from being accomplished.

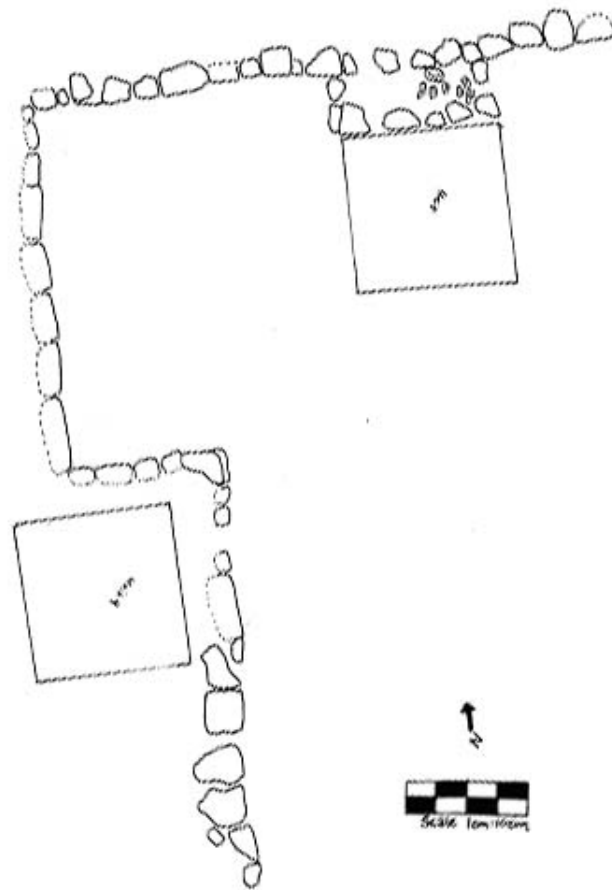
Surrounding the central courtyard area on top of Structure 51 are various platforms. The time constraints of this investigation allowed for excavation of only the northwest portion of this area (Units 1, 3, 5, 7, 8, 10, 11, and 12); therefore, we have excavated only a small section of the courtyard area and portions of the northern and western platforms of the structure. The platforms would likely have supported perishable superstructures, as no rooms, walls, or benches are present on top of the platforms. The excavated portion of the western interior wall was approximately 2 m in length along a north-south axis. However, this wall ran south from the corner of the northern wall for approximately 1 m before turning to the east for 50 cm and then turning back to the south for another meter. The excavated portion of the northern interior wall was also approximately 2 m in length along an east-west axis; Along the northern platform wall there is a small step approximately 0.5 x 1 m large and one course high (Figure 3). This step leads from the courtyard up onto the northern platform. It is possible that the western platform also has such a step in the unexcavated area to the south.

Along the interior western wall of Structure 51, where the wall turns to the east for 50 cm, Unit 9, a penetrating unit, was placed to the south and west of the walls (Figure 2). This unit was used to provide documentation of the chronological occupation of Structure 51. Unit 9 penetrated a total of five plaster floors.

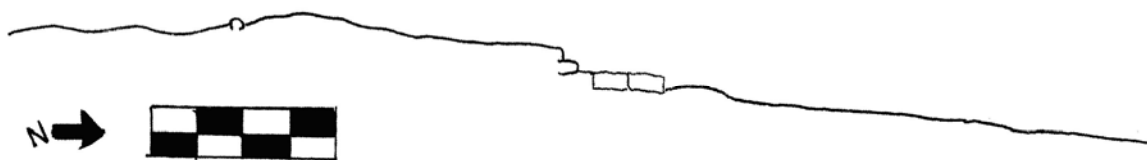
Additional excavation was undertaken on the smaller northeastern portion of the mound which unearthed further terminal phase architecture (Units 4 and 6). Here, researchers uncovered three terrace walls and a possible activity area on the southeastern area of this part of Structure 51 (Figure 4). The northern and southern terrace walls were five courses in height. Excavations only uncovered the first course of the middle terrace wall (Figure 5). Again, only the terminal construction phase was partially excavated in this area.

## **CERAMICS**

Ceramic material associated with Structure 51 was found in the humus, construction fill, and collapse. Preliminary analysis of the ceramic fragments indicates that the terminal phase of construction and occupation date to sometime in the Late-Terminal Classic period (Gifford 1976: 225-310). The majority of ceramic remains included types such as Cayo and Alexander's Unslipped as well as Belize Red and represented mostly cooking and serving vessels (Gifford 1976). An in-depth analysis of the ceramic assemblage recovered from this excavation is still needed. The abundance of



**Figure 2:** Plan View of Structure 51, Baking Pot.



**Figure 3:** Baking Pot, Structure 51, Profile View: northern interior wall and step.



utilitarian ceramic material deposited on the smaller northeastern portion of Structure 51 may, in conjunction with other artifactual evidence, indicate this as an activity area such as a kitchen; however, such an interpretation is still preliminary.

### **Miscellaneous Ceramic Artifacts**

One net sinker (Special Find #48), one partially perforated disk (Special Find #33) and one perforated ceramic piece (Special Find #51) were found in association with the fill of Structure 51's courtyard area. In addition, one possible spindle whorl (Gillis 1982:233) was recovered (Special Find #28), which might also be interpreted as a pendant (Gifford 1965) or gaming piece (Drucker 1943:87). Also, a small ceramic face figurine was excavated within the matrix of the courtyard area (Special Find #46). This ceramic face is 4.0 cm in length, 3.5 cm in width, and 2.5 cm in thickness. It appears to have once been attached to a larger ceramic artifact, possibly a flute or a censer. The ceramic assemblage of Structure 51 also contained two fragments of molded-carved vessels identified as Belize Molded-carved (Christophe Helmke pers. comm. 2004). The presence of these fragments may indicate a higher socio-economic status of occupants of Structure 51.

### **LITHICS**

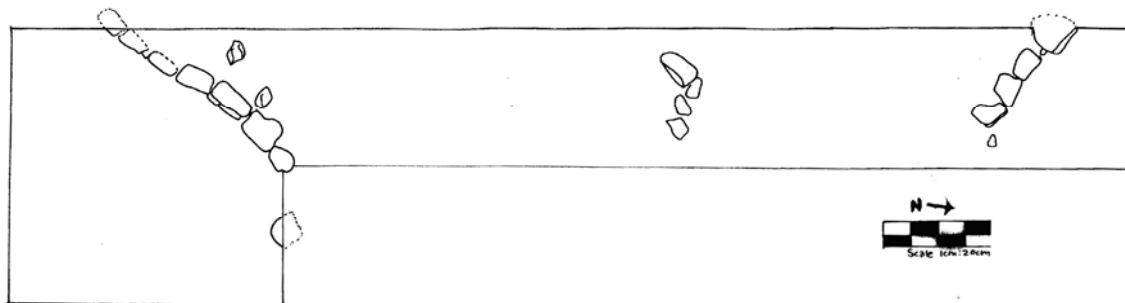
Excavations at Structure 51 recovered obsidian blade fragments and ground stone artifacts. Additionally, 1 chert biface was found in the lower northeastern portion of Structure 51 (Special Find #73). Preliminary analysis of the lithic material has not yet been completed; however the lack of flakes, shatter, and cores may indicate that this portion of the courtyard and platform areas was not a site of lithic manufacturing.

#### **Obsidian**

A total of 78 obsidian fragments were found throughout the Structure 51 excavations. Each of these is represented by prismatic blade fragments that appear to have been utilitarian in function. Thirteen of the 78 obsidian blade fragments were found in the lower part of the northeast area of Structure 51 (Unit 6 primarily). It is likely that these artifacts were used in everyday life and furthermore such artifacts would have been accessibly to the majority of the Baking Pot populations (Piehl 1999).

#### **Ground Stone**

Most of the ground stone artifacts recovered from Structure 51 are fragments of granite *manos* and *metates*. In total, 8 *mano* and 4 *metate* fragments were found in this excavation. Three of the *mano* fragments were found in the excavation of the lower part of the northeast area of Structure 51. All of these artifacts were found within the collapse and fill of the structure. In addition to the *mano* and *metate* fragments found in the excavations of Structure 51, 4 grooved stone artifacts were also recovered from this investigation.



**Figure 4:** Baking Pot, Structure 51, Units 4 and 6: plan view of terrace walls.



**Figure 5:** Baking Pot, Structure 51, Units 4 and 6: profile view.

## MISCELLANEOUS

A tooth pendant (Special Find #24) was recovered from the excavations of Structure 51. This pendant was approximately 3.5 cm in length and shaped to be a jaguar tooth. A single perforation is present through the proximal end of the tooth and would allow for this artifact to have been worn as a pendant on adornment, such as a necklace. Further analysis is necessary to determine the material of this pendant.

## CONCLUSION

While this report precedes most of the major analysis of cultural material from Structure 51, several conclusions may still be formed. Structure 51 functioned as a residential structure in its terminal phase of construction, consisting of multiple platforms surrounding a central floored space. The residents of Structure 51 had access to a variety of material goods including: ceramics, limestone, granite, and obsidian. A more extensive horizontal and vertical investigation of Structure 51 would facilitate deeper insight into the architecture of the terminal phase of occupation, as well as, the earlier phases of construction. Continued excavation at Structure 51 has the potential of contributing to understanding of settlement and domestic life within varying socio-economic status groups at Baking Pot and within the Belize Valley region.

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# **UTILIZING SOIL PRODUCTIVITY TO ESTIMATE MAYA POPULATION AT BAKING POT**

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## **INTRODUCTION**

Any attempt to estimate the population of a Maya site must evaluate not just the maximum possible production from its soil resource, but must also determine the levels of production, which can be sustained for a significant time period. To date, estimates of maximum possible output have been relatively successful, within limiting assumptions. A common method is to measure the land area, determine how many people could be supported per hectare under some production system, multiply, and find the population maxima. Dickson utilizes this approach in his linear programming analysis of the “carrying capacity” of the Tikal sustaining area (Dickson 1980). A typical weakness of such an approach, given the lack of more precise information, is the necessary treatment of soil as a homogeneous resource. An even more problematic assumption is that expected production is going to be the average production, and that this production can be infinitely sustained.

## **CONSIDERATIONS FOR POPULATION ESTIMATION**

It is necessary to calculate agricultural sustainability as well as maximum productivity of the soil resource before estimating the population of a site or an area. One purpose of simulating soil productivity is to determine what might occur in short, ideal periods, but these results might not be replicable over the long run.

In the case of Baking Pot, occupation extended over at least a millennium. While we now know that the vast populations once hypothesized by scholars dazzled by the scale and elaborateness of sites such as Tikal were not necessary to construct these sites (Abrams 1994), there was still a need for labor and for food production to support the elite. Baking Pot is considerably smaller in area and total construction volume than major Maya sites such as Tikal, of course, but its two main groups contain a significant amount of stone brought from at least a kilometer and a half away, and its burials demonstrate a level of wealth comparable to a much larger site.

Therefore, evaluating agricultural sustainability is extremely important if the population arc of Baking Pot is to be estimated. After all, while it is true that, to quote John Maynard Keynes “In the long run we are all dead.” it is wiser to quote Yogi Berra, “It’s not over ‘til it’s over.”

## **Site Specification**

The first step in estimating the population of a Maya site is to determine the extent of that site. In the Belize River Valley, where housemounds and other, larger mounds are frequent, it is difficult to determine where one site ends and another begins. The central core of Baking Pot is easy to delineate, but on the east (North Caracol Farm, as mapped by BVAR, possibly a continuation of the “Spanish Lookout” described by Willey, *et al.*) may either be an outlier of Baking Pot, or a separate, minor site. Similarly, to the west of the mound concentration at Baking Pot is a substantial mound (Listowel, since it is located on the school land of the same name?) built on an old river terrace with associated housemounds. Is this a separate ritual or residential center, or is it also part of Baking Pot? Since both North Caracol and Listowel are separated from Baking Pot by substantial drainages, they will be excluded from this analysis, with the area of the drainages divided between the postulated sites. On the other hand, since there are no other known concentrations of housemounds between the southernmost mapped at Baking Pot and the beginning of the hills to the south (approximately 1500 meters from Baking Pot Group II), the site will be considered to have extended to the rise of the hills.

## **Swidden Agriculture and its Discontents**

Mayanists take as an operating assumption that the basis of Maya agriculture was the swidden system. Generally speaking this was true for many inhabitants of Yucatan and tropical Mesoamerica at Contact. Most calculations of the productivity of Maya agriculture take the ethnographically documented swidden farmer as their basic production unit, although evidence has also been advanced for raised beds, drained fields, agricultural terracing, management of wild foods and silviculture. Almost no attention is given to the possibilities of annual, continuous cultivation to sustain a relatively dense Maya population. There are objections that this type of agriculture is too labor-intensive, or that fields could be invaded by weeds or grasses and forced out of production. All of this could be true, yet these negatives must be weighed against 1) the cost of clearing new plots each year to balance the plots lost to fallowing and 2) the reduction of total production with three-fourths or more of the land out of productive use at any given time (Atran 1993). The swidden strategy is necessary where soils are thin, easily depleted or erodible. It is not clear that swidden agriculture was the first choice of all Maya. In the Blue Creek area of northern Belize, it appears that some land was in continuous cultivation until rising groundwater forced ditching in the late Preclassic (Lohse 2004); John Wingard thinks it likely that annual planting was the initial Maya strategy on the alluvial Copan Pocket before expanding populations forced cultivation onto the fragile hill slopes (Wingard 2004). The soils of the Belize River Valley, particularly in the zone from Baking Pot to Bacna, are of excellent quality, meters deep, generally flat or gently sloped. They also demonstrate that the Maya were aware of differences among soils and were willing to invest the labor necessary to improve the distribution of water among the soil zones (Conlon and Powis 2004; Kirke 1980). This labor investment is another indication of intensive land use, rather than swidden cultivation. Therefore, in simulating the productivity and sustainability of Maya agriculture at Baking Pot, it seems justifiable

to begin by assuming an annual single or multiple crop strategy to determine the potential population.

## **SIMULATION METHODS AND INPUTS**

Soil productivity at Baking Pot was simulated utilizing the Erosion Productivity Impact Calculator (EPIC). Since its creation in the 1980s, EPIC has been used to model many scenarios: productivity of different crops changes in fertilizer or irrigation routines on Midwestern farms; streamflow impacts of global warming, soil erosion changes with different conservation techniques and dairy management strategies. John Wingard utilized the earliest version of EPIC to model Maya agricultural production and population impacts at Copan (Wingard 1996). Tim Murtha has used a more recent version in modeling terrace construction and in calculating the food contribution of infield plots at Cohune Ridge (Murtha 2002, 2004). Although it is complicated, data-intensive and cumbersome for a beginner to use, it now has the iEPIC shell, written with Microsoft Access, and is capable of running simulations of a thousand years or more, with results far more comprehensive than for any other currently available agricultural simulation. EPIC is ideal for the simulation of crop rotations. A sequence of planting, tillage and harvest activities can be created for any number of years and any consecutive varieties of crops. It can then be run repeatedly for a set time period, reporting annually the output, production costs, changes in soil fertility and depth and much other information.

It is necessary to have accurate information on soils, weather, plants and cultivation techniques in order to simulate agricultural productivity in EPIC. The soil maps for Baking Pot are probably the most accurate of any in Belize. Limited mapping was conducted on Central Farm itself in the 1950s. A manuscript and map of soil sample locations for this project are in the Central Farm library. The more comprehensive soil mapping of Belize is by Birchall, Jenkin and associates, who conducted a soil analysis, classification and mapping of central Belize in 1969-71 for the Land Resources Development Centre, later the Overseas Development Natural Resources Institute (ODNRI) of Great Britain (Birchall and Jenkin 1979). The 1:50,000 soil maps designate locations of soil subsites and series within several hectare accuracy, and include sampling density data for each map of the survey. The authors indicate areas where “pockets” of different soils are intermixed with another more plentiful soil. Profiles were recorded for a number of the more commonly occurring soils, including the location in which the soil was sampled, the slope of the land, the vegetation and detailed laboratory analysis. This report is an excellent source of soil information with two exceptions. First, it lacks soil profiles for several abundant soil types, although they are included in the agricultural use classifications, so it is possible to estimate their similarity to other, more thoroughly documented soils. Second, the map is based on the British government topographic maps, which contain some errors, and these errors are perpetuated on the soil maps.

Weather data are more problematic. The two nearest weather stations with complete data on temperature, wind, solar radiation and relative humidity are at the

Belize International Airport and the airport in Flores, Guatemala. Neither has a climate cycle closely similar to the Belize River Valley area. Fortunately, the agricultural college students at Central Farm kept monthly precipitation records for 34 years, so a reasonable representation of the weather at Baking Pot, can be used, augmented by variables derived from the other stations.

Variables for “landraces” of maize and beans that would best represent the varieties likely to have been grown by the Maya are still being developed for EPIC. Recent maize experiments in Chiapas have not been published, and bean variables are for north central Mexico, a very different region than the Maya lowlands. Therefore, current US maize and dry bean variables were utilized in the simulations. An agronomist who works with the Mexican projects speculates that the performance of these modern plants under conditions of hand clearing and cultivation, without fertilizers, herbicides, insecticides or irrigation would probably be similar to that of the Maya varieties which had been developed and survived under these conditions for centuries (Kiniry 2004). One difference which will affect the estimated yields, however, is that Maya maize cultivars, such as Nal-tel, produce significantly smaller ears, and therefore lower weights of grain than modern varieties.

Finally, it is necessary to utilize variables for the depth and degree of tillage, mulching and other hand labor inputs to represent as closely as possible the impact of Maya land cultivation with chert hoes and digging sticks. Planting densities were based on ethnographic data on recent Maya farmers observed in the Peten (Atran 1993).

## **CLASSIFYING SOIL PRODUCTIVITY FOR MAYA AGRICULTURE**

Scott Fedick revised the agricultural use classifications of the Birchall, Jenkin *et al.* soil survey to create a Maya agricultural classification system, which he applied to the soils north of the Belize River (Fedick 1996). I extended the reclassification, following his methodology, to the soils south of the Belize River (Hayes 2004). Fedick has also reclassified these soils but not distributed his reclassification (Fedick 2000).

Soils are evaluated with respect to five factors, namely effective root zone, susceptibility to erosion, workability, drainage and fertility. Both conventional farmers and traditional Maya farmers would prefer the Class I soils, which are deep, well drained, fertile, easily worked and almost level. These soils are the alluvial deposits along the Mopan, Macal and Belize Rivers, Barton Creek and in the Roaring Creek valley. The Class II soils, from the Maya perspective, would include easily worked, well drained, reasonably fertile soils on gentle slopes, possibly containing some rocks or limited by shallow root zones over bedrock. Class III soils are those on steeper slopes, or with shallower root zones, fertile, but possibly with a higher clay content impeding drainage or workability. Class IV soils tend to be nearly level, but are hard to work by hand, since they are heavy clay. They have undesirably low pH, and often have drainage problems. Conventional farmers have no problems with these soils, since they can mechanically cultivate them, tile for drainage and apply fertilizers and other soil amendments. On the



other hand, they would avoid the rocky, shallow soils or the slopes characteristic of Class II and III zones.

Fedick proposes Class V for soils with even greater limitations. Garbutt, which otherwise corresponds to his Class I and adjacent to other Class I areas, is reduced to V because of annual flooding (Fedick 1996). Class V soils in drainages or along creeks associated with Class I soils might still have been utilized for specialized plantings such as cacao, for example, but could not have been depended on for subsistence agriculture.

## THE BAKING POT SOIL RESOURCE

Maize was selected for the Baking Pot simulation because of its central role in Maya diet and ritual. Dry beans are frequently planted in modern *milpas* (Atran 1993) and they fix nitrogen, which maize depletes from the soil, so they also were selected for the simulation.

Fedick		Hayes	
Listowel	Class I	Listowel	Class I
Morning Star	Class I	Morning Star	Class I
Young Girl	Class I	Young Girl	Class I
Esperanza	Class II	Esperanza	Class II
Meditation	Class III	Meditation	Class II
Garbutt	Class V	Garbutt	Class I or V
Norland	Class V	Norland	Class V

**Table 1:** Soil types in the Belize Valley and their classifications. The Baking Pot soils fall into Fedick's Class I, Class II, Class III and Class V, and Hayes' Class I, II, and V.

Average productivity of each of these soils was calculated for four crop rotations: Annual maize only; maize with beans planted ten days later; summer maize, winter beans annual maize with winter beans every other year.

Maize density was 6 plants per square meter. Interplanted beans were 10 plants per square meter; the winter beans were planted at 30 per square meter.

Each rotation was run on each of the soils with comparable profiles in Classes I-V, assuming 0.1 % slope, for both 50 and 100 years. The maize results are as follows:

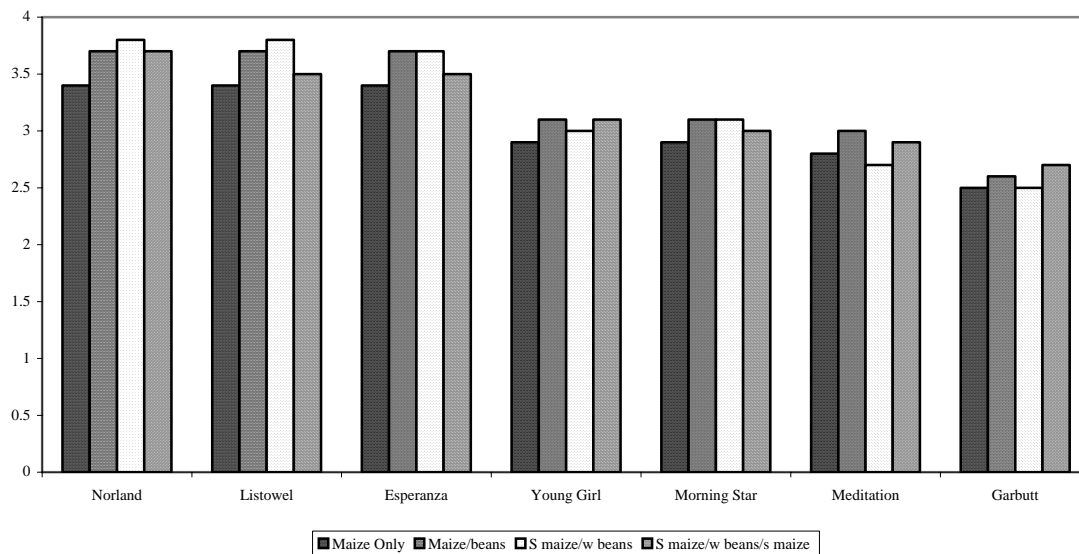
## 50 year rotations

Soil Name	Maize only	Maize with beans	Summer maize winter beans	Summer maize winter beans summer maize
Norland	3.4	3.7	3.8	3.7
Listowel	3.4	3.7	3.8	3.5
Esperanza	3.4	3.7	3.7	3.5
Young Girl	2.9	3.1	3.0	3.1
Morning Star	2.9	3.1	3.1	3.0
Meditation	2.8	3.0	2.7	2.9
Garbutt	2.5	2.6	2.5	2.7

**Table 2:** Baking Pot soil productivity under four hypothetical rotations. Production is in metric tons per hectare, dry weight.

These results were surprising. Esperanza, whom both Fedick and I placed in Class II, was comparable to Listowel, and Norland, a Class V, was equally productive over this extended period. The two predicted Class I soils, Young Girl and Morning Star, were both very productive, but significantly lower than the first three. Meditation, my Class II and Fedick's Class III, was only slightly below the Young Girl and Morning Star. The least productive soil over the fifty year rotation was the Garbutt, which superficially appeared to be among the Class I soils except for the problem of periodic flooding.

50 Year Average Maize Production per Hectare, Baking Pot Soils

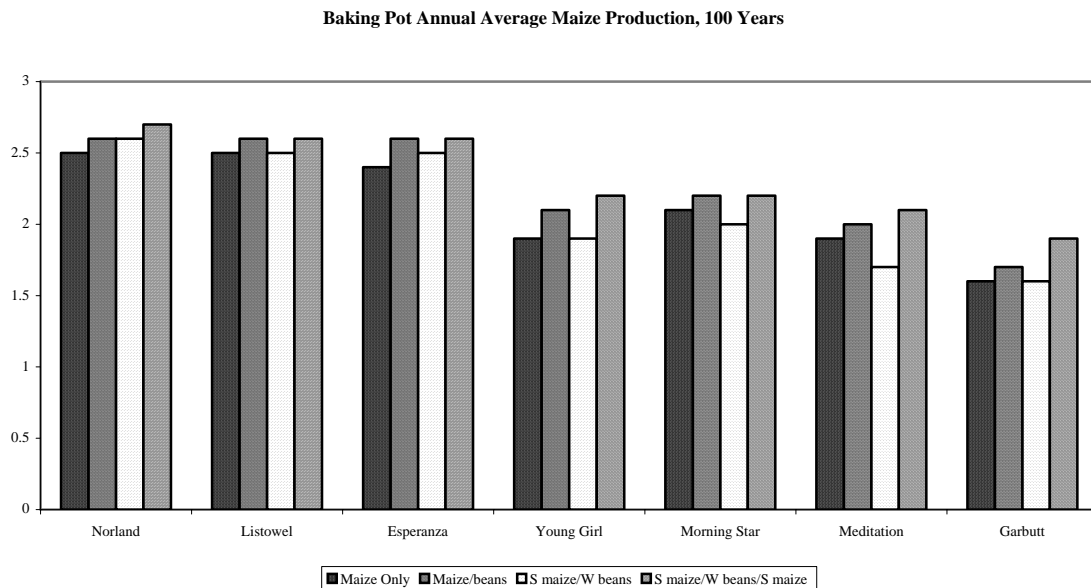


When the simulation was run over one hundred years, results followed a similar pattern, but average annual yields were much lower.

### 100 year rotations

Soil Name	Maize only	Maize with beans	Summer maize winter beans	Summer maize winter beans summer maize
Norland	2.5	2.6	2.6	2.7
Listowel	2.5	2.6	2.5	2.6
Esperanza	2.4	2.6	2.5	2.6
Young Girl	1.9	2.1	1.9	2.2
Morning Star	2.1	2.2	2.0	2.2
Meditation	1.9	2.0	1.7	2.1
Garbutt	1.6	1.7	1.6	1.9

**Table 3:** Baking Pot soil productivity under four hypothetical rotations. Production is in metric tons per hectare, dry weight.



In both the shorter and the hundred year rotations the presence of beans in the field, whether interplanted or growing in alternate seasons, almost always increased the maize production. The only exception was in Meditation, a soil with more clay than the other Baking Pot soils. An interesting difference between the fifty year rotations and the hundred year rotations is that in the shorter rotations the alternating summer maize and winter beans maintained higher annual maize output on the best soils than the fourth rotation, which had beans planted only every other winter season. On the hundred year rotations, however, the every other year bean rotations maintained higher production on

all the soils. Agronomic questions remain, to be investigated outside the scope of this paper.

It should also be noted that there were differences in the annual average bean production over time. Even though the bean production would have been much lower than the maize, the nutritional contribution of the beans, particularly the protein, complements the maize in the diet, while the bean plants helped replenish soil nitrogen depleted by the maize.

Bean production, 50 year rotations				Bean production, 100 year rotations			
1	2	3	4	0	0.1	0.1	0.4
0	0.1	0.2	0.4	0	0.1	0.1	0.4
0	0.1	0.2	0.1	0	0.1	0.1	0.4
0	0.1	0.2	0.3	0	0.1	0.1	0.4
0	0.1	0.2	0.3	0	0.1	0.1	0.3
0	0.1	0.2	0.3	0	0.1	0.1	0.4
0	0.1	0.1	0.3	0	0.1	0.1	0.4
0	0.1	0.1	0.3	0	0.1	0.1	0.4

**Table 4:** Bean production according to 50 and 100 year rotations.  
Production is in metric tons per hectare, dry weight.

It should be noted that all the soils were simulated with the Central Farm weather data, without reference to topography. If the Norland simulation had been constructed to reflect its typical location in the drainages at Baking Pot, the greater frequency of water, both flowing and standing, might have reduced the maize and bean output. This would not necessarily be true for other crops. Both root crops such as manioc and tree crops such as cacao would thrive in the wetter conditions provided by the Norland drainages; in low precipitation years both the Norland and the heavier Meditation, which in wet years might have been ditched to improve drainage, as it appears to have been at Bedran, may have been more productive than the lighter, easily draining soils such as Listowel and Young Girl.

In order to adjust the production simulated in iEPIC, the dry maize produced must be scaled to reflect the smaller cob size of the Maya variety, likely Nal-Tel (Willey et al. 1965). Tentatively, scaling is likely to reduce estimated yield, and therefore population, to between one-third and one-half the present numbers. Atran notes that the yields reported by Peten Maya farmers are lower than the actual maize consumed, since all growing ears damaged by parrots or other animals are used for humans or domestic animals and no green maize consumed is counted (Atran 1993). Therefore, these simulations, which do not consider any “salvaged” damaged maize, underestimate maize available for consumption.

## SOIL AVAILABLE FOR AGRICULTURE AT BAKING POT

Calculations of soil area at Baking Pot use a revised classification based on the simulation results. Norland is kept in Class V because of known location in drainage areas, but the Garbutt is moved into Class III, as explained below.

Soil classes	Class names	Surface area (hectares)
<b>Class I</b>	Listowel Esperanza Young Girl Morning Star	228.55
<b>Class II</b>	Meditation	95.05
<b>Class III</b>	Garbutt*	28.31
<b>Class V</b>	Norland Garbutt*	105.28 36.45
<b>Total:</b>		<b>493.64</b>

\*The Garbutt is divided into two zones, that on the same altitude as most of the site, and a lower terrace. Interview with the vendor at the Spanish Lookout ferry and measuring the height above river level of a sign he reported at waters' edge during severe floods confirmed that the lower Garbutt (Garbf on the soil map) would flood approximately once every eight years, and so should be in Class V. The Garbutt (Garbh) on the higher terrace should be in Class III, based on productivity, but not flood, as shown by the presence of numerous house mounds.

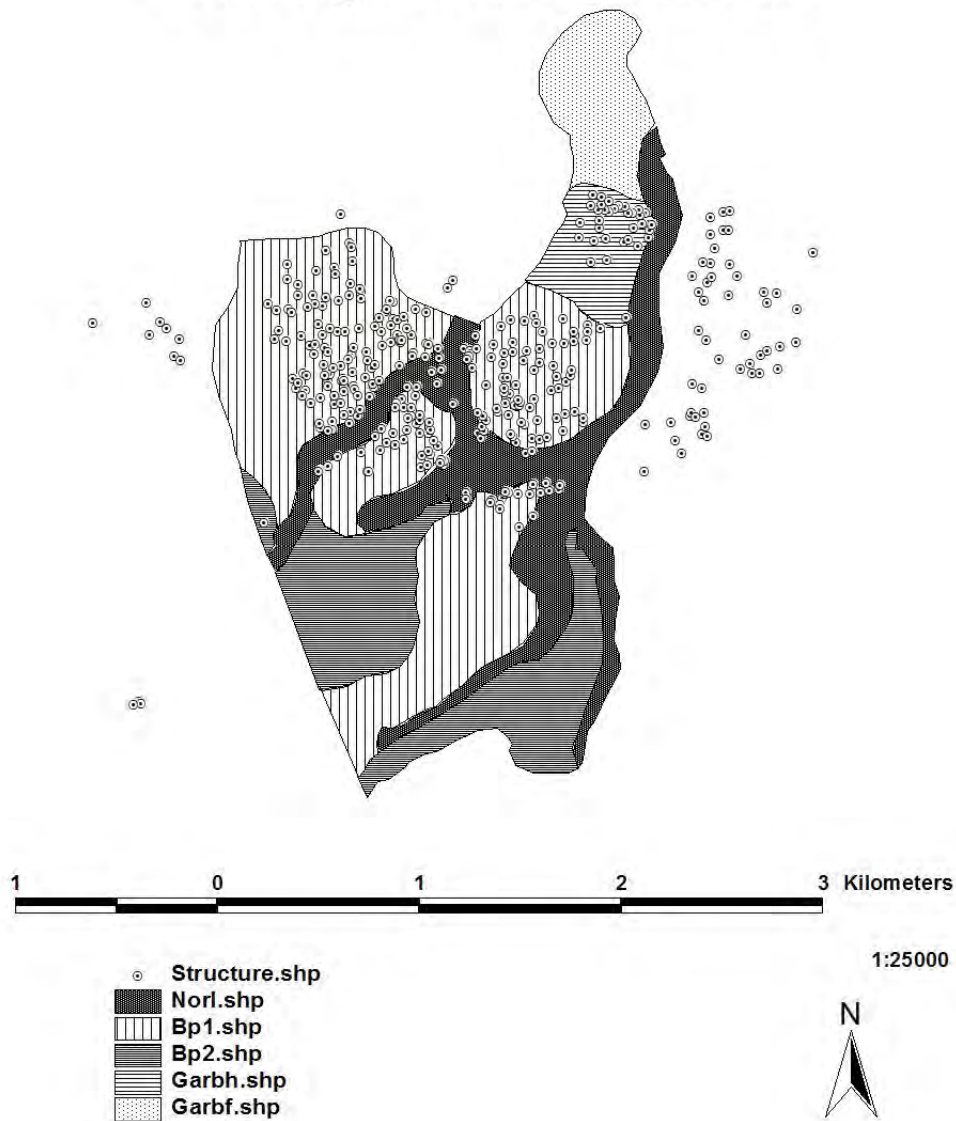
**Table 5:** Surface area of soil classes in the Baking Pot are.

## CALCULATING THE POTENTIAL POPULATION OF BAKING POT

Given the postulated land resource, how many people could have lived at and near the site of Baking Pot, and what levels of population could have been supported for extended periods?

The average annual maize output for the Class I soils planted with a May maize crop and a winter bean crop was 3.2 metric tons of maize and 0.2 metric tons of dry beans. Reducing the maize yield by half to reflect smaller cobs gives an annual average of 1.6 metric tons of maize. If it is assumed that a kilogram of maize provides sixty percent of the adult daily caloric allowance, each person would consume 365 kilos annually. Each hectare of Class I soil could therefore provide maize for 4.38 persons and some vegetable protein from the beans. Over one hundred years, average annual maize production would be lower, 2.25 metric tons, with 0.1 metric tons of dry beans. Again

## Baking Pot Soil Classes



**Figure 1:** Map of the Baking Pot area indicating soil classes and ancient house mounds.  
Note the monumental site epicenter is not represented.

discounting for smaller cob size, the maize would average 1.12 metric tons, enough to support 3 persons at one kilogram of maize per day. The Class II Meditation averages a lower fifty year production, 2.7 metric tons of maize and just 0.1 metric tons of beans. Discounting the maize production gives 1.4 metric tons annually, which could support 3.7 persons; the hundred year average maize yield is best without the beans, and discounted

by half is 0.95 metric tons, which could support 2.6 persons. Finally, the higher elevation Garbutt, which does not flood, could support 3.5 persons at its fifty year discounted maize output, and 2.2 with the discounted hundred year average annual maize yield, plus 0.1 metric tons of beans. The lower terrace Garbutt would have a lower expected value for the maize and/or beans if it were flooded some rainy seasons. For the purpose of this calculation, the anecdotal flood frequency of once every eight years will be utilized. Since it could support 3.5 persons per hectare, the expected value of the output would be 3.1 persons per hectare. The corresponding hundred year population potential per hectare is 1.9.

Soil Class	50 year average	100 year average
Class I	1001.00	685.65
Class II	351.69	247.13
Class III		
Garbutt (high)	99.65	62.00
Garbutt (low)	<u>112.27</u>	<u>69.62</u>
<b>Total:</b>	1564.61	1064.40

**Table 6:** The soil resources of Baking Pot and the populations that could be supported by the soil Classes I, II and III.

The Norland has been omitted from these calculations. The Baking Pot Maya clearly avoided placing structures in low areas; there are none on the portion of the Garbutt vulnerable to flooding in some years. Similarly, despite the higher concentrations of housemounds in proximity to the main groups, few of these housemounds are on the Norland, and then only on the upper edges of the slopes. It is reasonable to assume that the Norland was planted, except in the bottoms where water might stand or flow for months in a normal precipitation year, but what crops would have done well in the generally moister conditions? The appearance of grater bowls in the more recent deposits at Baking Pots suggests that crops such as manioc might have been grown. If so, the Norland would be an ideal environment. More interesting is that some of the Norland might have been planted in cacao and its shade orchards.

Baking Pot was clearly a wealthy locale. Did its wealth derive from political or ritual power? Neither its size nor its main structures make it appear more than a parallel to relatively close sites such as Cahal Pech. Neither is Baking Pot endowed with mineral assets such as the slate at Pacbitun or the chert being worked at El Pilar. Given its location on the Belize River, it might be that some of Baking Pot's wealth was derived from functioning as a trade center. The most likely scenario, given its land resource, is that Baking Pot could produce sufficient agricultural surplus above its food requirements to enable it to engage in trade.

What traded commodities could have been successfully grown at Baking Pot? Cotton is unlikely. It grows in soils much poorer than Baking Pot's and does not tolerate excessive moisture. Tobacco will grow almost everywhere in the Maya lowlands and is unlikely to have been a valuable trade good. Cacao, on the other hand, is a demanding crop which must have the right amount of shade and humidity in order to grow successfully (Dahlin 1979). Although cacao is not specifically mentioned, there are Contact period accounts of "orchards" and their prosperous owners encountered in the central zone of the Belize River Valley (Jones 1982). Drainage areas such as those in which the Norland soil is located would provide an ideal environment for cacao. The present cacao orchard on the northwest edge of the Baking Pot site, on Young Girl soil, is planted just above the bottom of the broad drainage which separates Baking Pot from the Listowel mounds. Norland maize production was the highest of all the soils simulated, supporting 4.7 persons in the 50 year rotation and 3.6 in the 100 year rotation. Hypothetically, using Norland to grow maize and beans could support 490.6 people on the fifty year average yield or 374.8 on the hundred year average. The physical reality challenges these results. While some of the 105.3 hectares of Norland which were the best-drained could well have been planted in maize or other annual crops, much of the Norland is too low-lying and soggy during the rainy season. Once Baking Pot food needs were met, the highest and best agricultural use would likely have been to grow cacao. With significant quantities of the ideal soil resource, at Baking Pot the potential for wealth was impressive. Baking Pot could well have been a place where money grew on trees.

## CAVEATS

All these calculations have been made, as noted above, without reference to the site topography. In two specific instances, the drainages in which Norland occurs and the lower Garbutt terrace, the simulated output has been modified to reflect the reality. Since these are not the only areas of the site where water may flow or stand, treating the soil as a homogeneous resource overestimates its production potential. Furthermore, simulating soil use for periods beyond a hundred years produces, as should be expected, a continuing decline in maize productivity. While interplanting or alternating beans with the maize maintains nitrogen levels higher than they would be in the absence of the beans, the nitrogen fixed by each bean planting does not fully replace the nitrogen taken up by the maize. The hundred year simulation was mainly done to test whether declines in soil productivity would have been significant enough to alert the Maya to a pending problem. How they reacted to such declines would determine whether future population could be supported at a similar level.

In addition, the "maximum" population estimated can only be supported under ideal conditions. Precipitation is an essential component of agricultural production. Significant variations in precipitation are extremely important. While, with annual average precipitation the simulated output would be adequate to support the population, nature does not operate on averages. Annual rainfall variations in timing and quantity can cause both bountiful harvests and dangerous shortfalls. Maize requires 1.5 inches (38.1 mm) of water to sprout and grow its first fifteen days. Beans have similar requirements.



Ten of the thirty-four May Central Farm monthly precipitation totals fall below this minimum; seven are half the minimum or less. A mid-May planting without sufficient soil moisture or subsequent rain would fail.

Clearly, failure of the first planting creates two problems. One is that setting aside enough seed from a year's harvest to have available if replanting should be necessary next year, reduces the amount of the crop available for consumption until the next harvest. The second problem is the delay in the year's harvest created by the failure of the first planting. While some of the uncertainty might be hedged by planting fields in two or three separate areas where precipitation might differ, this is merely a strategy to reduce risk, not to assure success. A second planting might also fail. In early years, with a small population relative to the land resource, wild foods might be utilized until the next successful harvest. As population increased, plant and animal habitat would be altered, dependence on agriculture would increase, and the wild resource would be inadequate. At that point, starvation, rather than scarcity, is probable.

Overly optimistic population estimates which do not account for variation in precipitation may "pass" for a number of years because of a string of good weather, but the opposite, a multiple-year dry weather pattern, could lead to population losses or out-migration, which could create could lead to social stresses and from which rebuilding would be difficult.

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# BAKING POT, SETTLEMENT SURVEY

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## RESEARCH DESIGN

During the course of the 2004 season of the Belize Valley Archaeological Reconnaissance Project the settlement area of Baking Pot was surveyed by William Poe and Sue Hayes. The purpose of the survey was to verify with GPS the survey completed by James Conlon, *et al.* in 1997 and in particular to confirm the settlement density. There was also an attempt to delineate the site boundary, marked by the cessation of mounds, on all sides.

## METHODOLOGY

Previous mapping information, including the 1997 Conlon plan of the site, GPS mapping of site features by Poe, Hayes *et al.* in the 2000, 2001, 2002 and 2003 seasons, and Landsat 5 imagery was built into an ArcView 3.3 geographic information system. This system was converted into an ArcPad 6 system and loaded into an HP 4355 Pocket PC. The 1997 Conlon plan was geo-referenced during the 2000 season by the GPS occupation of three monuments incorporated by Conlon into the plan. Two of these monuments are on North Caracol Farm and one, no longer extant, was on the north side of the Western Highway in the vicinity of the airstrip. All of these monuments are a significant distance from the core zone of Baking Pot and their location was the result of long open traverses. As a consequence of GPS surveying in the 2000 and 2001 seasons the locations of these monuments are known to within a few centimeters.

For the 2004 season survey, a small GPS receiver was connected to the Pocket PC by a wireless Bluetooth connection. This arrangement permitted all of the GIS data to be displayed with real time GPS tracking during the course of the survey. Mounds from the 1997 survey appeared as symbols on the GIS map. Mounds were visually located, were occupied by standing on the top center of the mound, the appropriate symbol was identified and tapped with a stylus on the Pocket PC screen and a new location was defined for the feature as the average of 120 GPS measurements taken at one-second intervals.

Two known control points whose location were defined by dual-frequency geodetic receivers to the centimeter level were occupied on several occasions during the course of the season to define a level of precision that could be assigned to the 2004 survey. The standard deviation from the average value of the reoccupations was in each case less than two meters. In addition, a number of mounds whose locations had been defined to a sub-meter level of precision in the 2003 season were reoccupied. These data

imply that the 2004 survey has a typical precision in the neighborhood of 1 to 2 meters. These data are consistent with other data gathered by the author over the course of the last several years.

## **FINDINGS**

### **Site Boundary Delineation**

The survey was extended to into a set of fields west of the completed 1997 survey. A few mounds were added to the site map as a result of this extension, including one very substantial mound, named Listowel for the nearby school. This large mound is approximately 1150 meters from Group 1 and 1400 meters from Group 2 and is separated from the main settlement of Baking Pot by a major drainage. To the north the site is bounded by the Belize River. In the fields opposite Baking Pot on the north bank of the river only three small and low mounds could be identified. Across a minor drainage to the east of Group 2 there are a significant number of mounds stretching up to 900 meters from Group 2 and ending only at the wide drainage of Garbutt Creek. There is one substantial *plazuela* group in the middle of this distribution of mounds about 500 meters from Group 2. To the northeast of these mounds, separated by a drainage is a distribution known as Northeast Baking Pot. The mounds in this distribution are highly degraded by repeated plowing. Scatters of rock and sherds and little more mark most of them. A terrace edge marks the northern boundary of this distribution. North of this boundary to the river there are no mounds; the area lies within the ten-year flood zone of the river. To the east the site of Baking Pot is separated from the site of North Caracol Farm by the drainage of Garbutt Creek. North Caracol Farm is marked particularly by a number of medium to large solitary mounds located near the eastern edge of the Garbutt Creek drainage and ranging from about 1200 to 1700 meters from Group 2. To the south mounds are found to about 850 meters south of Group 2 with a major *plazuela* group found about 385 meters south of Group 2. The southern edge of the valley floor is about 1800 meters south of Group 2. To the southwest the valley floor extends somewhat further to the south. A large *plazuela* group, known as Bedran, is found approximately 2000 meters southwest of Group 2.

Whether or not North Caracol Farm and Listowel should be seen as separate sites from Baking Pot remains a matter of the interpretation of the settlement pattern and of the nature of the polities in the valley.

### **Topographic Analysis**

The drainages that mark the mound distribution at Baking Pot and its neighbors are a combination of drainages running from the hills to the south and ancient oxbows of the Belize River. The creeks from the hills run into the old oxbow depressions and isolate groups of mounds. Likewise rising water from the Belize River would fill these drainages.

There are no places other than Baking Pot where there is a significant amount of land both close to the river and rising above its ten-year flood plain from Blackman Eddy in the east to Cahal Pech and Xunantunich in the west. At the site of Blackman Eddy the hills that mark the southern boundary of the valley are close to the river and the site can be constructed both close to the river and well above its flood stage. Further upstream, the sites of Cahal Pech and Xunantunich are located where hills are adjacent to the Macal and the Mopan Rivers.

## **COMPARISON OF THE 1997 AND 2004 SURVEYS**

The 2004 GPS survey used as its control the reoccupation of well-known positions. At least part of the 1997 optical survey used the Spanish Lookout Ferry Road as a base line and assumed the accuracy of the mapping of the road as displayed in the 1:50,000 map of Belize. GPS survey of the road conducted in 1999 and repeated in several seasons since has confirmed that the current alignment of the road is significantly different from that indicated on the 1:50,000 map. The most significant difference is from the last major turn in the road north to the south bank of the river. It was this portion of the road that was used as a base line for the mapping of the mounds in the northernmost part of Baking Pot.

Because of the methodology of the GPS survey, each mound location could have a likely error associated with it of approximately two meters. However, unlike an optical survey, each measurement is independent. In an optical survey errors accumulate. If the traverse is open, there is no method available for determining the error.

In general the 1997 and 2004 surveys agree reasonably well. The 2004 locations of mounds are commonly several meters east northeast of the 1997 survey. I suspect a systematic error in the 1997 survey resulting from the long open traverses to establish the three points that became the control points for the two surveys. The greatest differences lie in the northern part of the site where the road depicted in the 1:50,000 map was assumed to be the current alignment.

There are a number of mounds in the 1997 survey that were not relocated as part of the 2004 survey. There are also a few mounds found by the 2004 survey that were not identified in the 1997 survey. There were some areas in the 1997 survey, particularly in the southeast of the site that were not re-surveyed in 2004.

The most important finding of the 2004 survey is a mound density about the same as that reported in 1997, that is, nearly 300 mounds in just less than 500 hectares, approximately sixty mounds per square kilometer.





# **GEOPHYSICAL EXPLORATIONS AT BAKING POT**

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## **INTRODUCTION**

The Belize Electromagnetic Explorations Program ([www.BEMEP.org](http://www.BEMEP.org)) undertook geophysical explorations using Electromagnetic Induction (EMI) to measure subsurface conductivity in several locations during June of 2004 at the ancient Maya site of Baking Pot, Belize. This survey was conducted under the permit held by the Belize Valley Archaeological Reconnaissance Project (BVAR). The field team included BEMEP members Tracy Sweely and Gerald Trainor. The primary goal of the survey was to locate invisible dwellings indicated by non-platform floors in the settlement zone. A second goal of the survey was to locate caches, offerings and/or burials in plazas, to examine the conductivity pattern of a section of a causeway (or *sache*), and to further develop a “catalog” of conductivity signatures for use in future investigations.

## **BEMEP RESEARCH GOALS**

As its primary goal, BEMEP examines the social significance of prehispanic Maya commoner dwellings, in the form of non-platform floors, as they evolved through time. EMI survey with follow-up ground-truthing excavations seeks to confirm the presence of non-platform commoner dwellings. By locating non-platform dwellings and examining the socio-economic differences between their inhabitants and the occupants of platform dwellings, BEMEP seeks to examine what social bases existed for dwelling differentiation and what caused some households to persist and expand into platform dwellings while others did not.

Secondarily, BEMEP uses EMI to survey selected plaza locations. During her EMI survey at the site of Chau Hiix in northern Belize, Sweely (2002, 2005) recorded distinct conductivity signatures for various types of cultural features. Since her study did not test the EMI instrument in plaza locations, conductivity signatures for cultural features that may be found in plazas have not been identified. These features include caches, crypts, and construction features. BEMEP will test the EMI instrument in these locations and compile the conductivity signatures into a catalog while simultaneously locating these features for possible future excavation by BVAR.

## **GEOPHYSICAL PROSPECTING – ELECTROMAGNETIC INDUCTION**

The basic premise of EMI is that through measuring the ease or difficulty by which an electrical current passes through the subsurface, subsurface conductivity maps can be created that distinguish variations in subsurface composition. EMI uses an electromagnetic current that is induced into the subsurface by way of a transmitting coil. As it flows through the subsurface the current becomes attenuated, or dissipated, in relation to depth of penetration and subsurface composition. The attenuated, secondary electromagnetic field that is generated by the subsurface is then detected by a receiving coil and the value is recorded using a data-logging device (De Vore 2002). This value, being an averaged conductivity reading over the depth of penetration, is known as apparent conductivity (Bevan 1983). The apparent conductivity data recorded in the data logging device are downloaded to a laptop and processed to create two dimensional, subsurface composition maps. These subsurface maps are examined for anomalies that may indicate the presence of cultural features. Finally, excavations are conducted to test anomalies most likely to be target cultural features. For a more detailed discussion of EMI as well as other geophysical prospecting methods, see Clark (1996) and Bevan (1998).

BEMEP uses the Geonics EM38 Ground Conductivity Meter, or EM38 (for a detailed description of the EM38 see the *EM38 Ground Conductivity Operating Manual*, Geonics 2002), which has a depth of penetration range of 0.25 to 1.50 m. Instrument orientation affects the depth of penetration. The vertical orientation penetrates to a depth of about 1.50 m while the horizontal orientation penetrates to about 0.75 m. Collecting data in both orientations enhances accuracy of analysis by allowing layering of conductivity maps of differing depths so that anomaly depth, and thus, feature depth, can be assessed.

Subsurface composition is a critical factor when using EMI. A subsurface that is shallow or excessively rocky is a poor conductor in terms of its applicability to archaeology. The clayey soils found in southern Belize lend themselves well to EMI survey, as clay, even with very little moisture, is a good conductor of electricity. Clayey soils were encountered and found very favorable by Sweely (2002, 2005) in her research using the EM38 at the site of Chau Hiix, in northern Belize.

Topographic conditions can influence the ability to use the EM38. The ground surface must be relatively and consistently level and without excessive slope in order to maintain the EM38 at a consistent height necessary for accurate data collection. Survey lines are laid out parallel to lines of topography whenever possible. This helps keep the EM38 level and aids the surveyor in maintaining a steady gait during data collection.

## **GEOPHYSICAL EXPLORATIONS AT BAKING POT**

A review of BVAR literature and communication with BVAR personnel confirmed that the conditions amenable to EMI survey exist at the site of Baking Pot because of its location in an alluvial floodplain.

## Survey Grid Selection

BEMEP survey grid selection criteria were established during the BEMEP 2003 Reconnaissance at the sites of Pusilha and Minanha and used during site survey at Baking Pot. The following are factors that influence the selection of survey grid locations:

- 1) In selecting areas of “apparently vacant” terrain, locations are sought where grid size could be maximized given topographical conditions and the presence and density of platform architecture. If unavoidable, the presence of platforms or platform groups within the survey grid is acceptable as it provides for comparison of the conductivity signatures of platform and non-platform dwellings as well as revealing conductivity variations resulting from the superimposition of the two dwelling types.
- 2) Plazas selected for survey are associated with administrative buildings or dwellings of sufficient social status that they might include target features, e.g. caches or offerings, burials in various forms, and buried construction features.
- 3) Vegetation density and ease of clearing are considered. Survey grids can be located opportunistically, in locations already cleared by local farmers and/or burned in preparation for planting.
- 4) Topographic consistency and terrain within acceptable slope range are considered (see above).
- 5) Subsurface composition, depth of soil, and presumed depth of cultural horizons are considered (see above).
- 6) Other visible impediments such as looter’s trenches, rocks, fallen and standing trees, streams and *bajos* must be assessed. A high density of such obstructions can cause interruptions in data collection procedures, possibly reducing the accuracy of results.
- 7) Survey locations must be accessible, permission of landowner must be granted, and locations must not be planted or have plans to be planted with crops for the duration of survey and excavation.

## Field Operations

Based upon the above grid selection criteria three locations were chosen for geophysical survey at Baking Pot. One survey was added in the settlement zone approximately 300 m west of Group 2 and one at the north end of the central plaza of Group 2. Finally a small survey was conducted across the *sacbe* north of Group 2 to test the conductivity of a *sacbe*. Layout of all grids took place on 10 June, 2004. No clearing was required as the surface was either grass or had already been cleared by BVAR project staff. Grid layout was accomplished using a Brunton-style sighting compass mounted on a tripod. Rectangular grids were laid out first. Survey lines were then laid out at 5 m intervals in the settlement zone grid and in the *sacbe* grid and at a 2 meter interval for the plaza grid.

Geophysical survey and field mapping took place from 11 June through 15 June, 2004. A total of 10,620 m<sup>2</sup> were surveyed. These survey grids are referred to as Baking Pot Operations 1, 3 and 4 (i.e. B-OP#). A second survey in the settlement zone was planned in a grid called Baking Pot Operation 2 but was abandoned due to time constraints. Data collection of each grid was conducted in the vertical orientation only due to time constraints and intermittent equipment failure.

Excavations were conducted in the survey grids located in the settlement zone by BVAR staff, the results of which are reported by Hoggarth and Swain (this volume). No excavation was conducted in the plaza survey locations, but may be conducted in the future by BVAR project members to test anomalies of interest.

### **Baking Pot Operation 1 (B-OP1)**

B-OP1 is located approximately 300 m west of Group 2 and 100 m north of the seasonal river channel (Figure 1). The final measurements of this survey grid were 100.0 x 100.0 m, for a total survey area of 10,000.0 m<sup>2</sup>. Data was collected in two stages within the grid because of intermittent failure of the data-recording instrument.

B-OP1 had within its bounds two visible platforms and one possible visible platform. A possible two-track path bisected the grid along its northern end and there were several slight depressions of various sizes throughout the grid. Thick grasses covered the grid and thus surface visibility was poor.

### **Baking Pot Operation 3(B-OP3)**

B-OP3 was located in the north end of the central plaza of Group 2, oriented lengthwise at the base of Structure E (Figure 1). The measurements of this survey grid were 6.0 x 30.1 m and the total survey area was 180.6 m<sup>2</sup>.

### **Baking Pot Operation 4 (B-OP4)**

B-OP4 crossed the southern end of the *sacbe* located on the north side of the river channel northwest of Group II (Figure 1). No other visible surface features were apparent within the grid.

## **DISCUSSION**

The presentation of conductivity data in grayscale has serious limitations in interpretability because it significantly reduces the range of available differentiation. As hardcopies of this report are rendered in grayscale we direct the reader to [www.archmeme.com](http://www.archmeme.com) for color renderings of the conductivity data that are much easier to read and interpret.

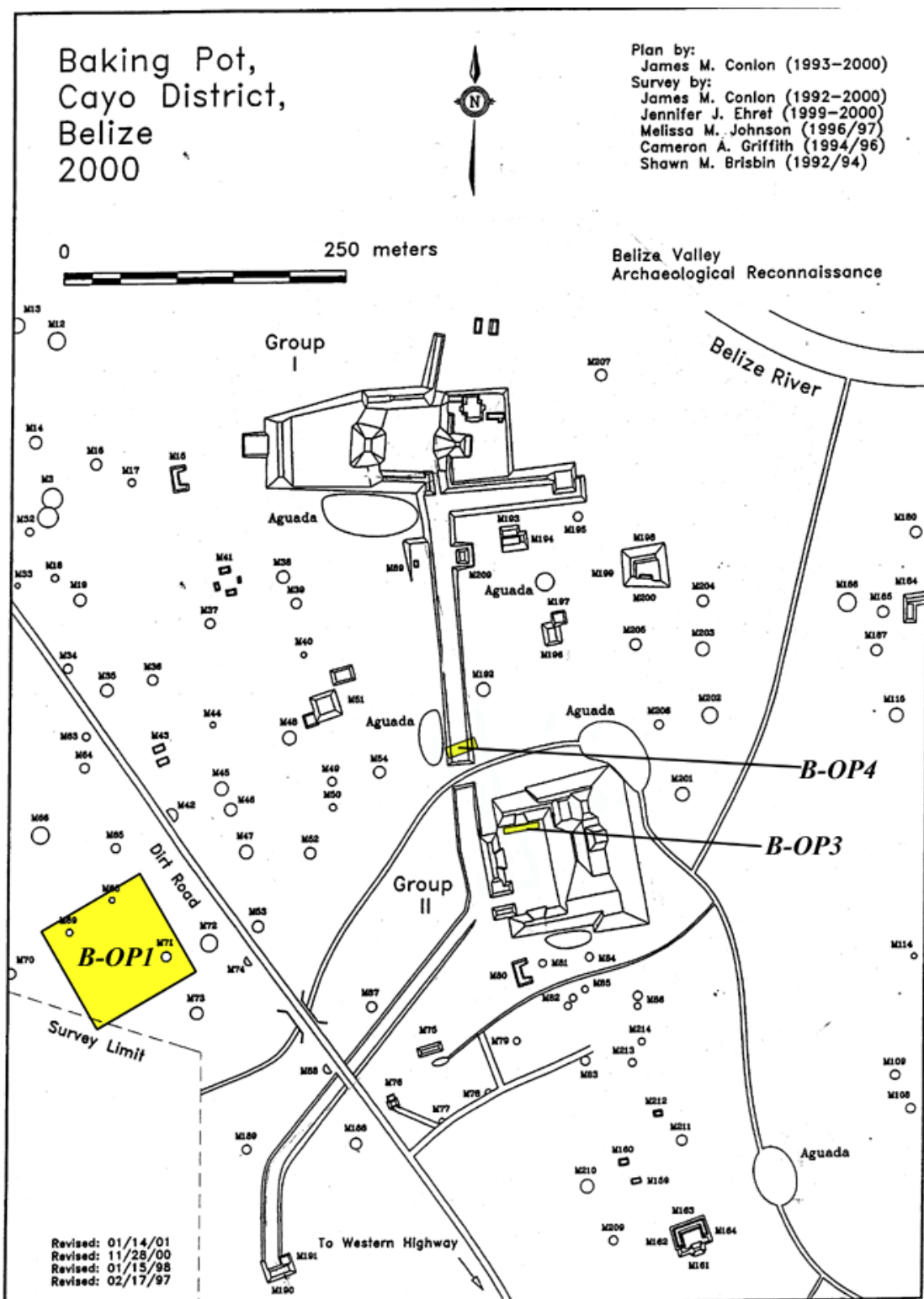


Figure 1.

Anomalies of interest are described as regions or areas of high or low conductivity that can be discrete and/or localized, or amorphous in shape. Other anomalous areas visible in the data are not considered anomalies of interest and will not be discussed. These can be generated as a factor of the data collection process, from minor natural subsurface variations or, as in the case of the plaza surveys, from minor variations in construction material content, or possibly disturbances brought about by previous excavations. Obstacles such as standing or fallen trees and palms, burned out stumps of palms, and rock outcropping slowed survey but did not affect the accuracy of data collection nor obscure subsurface conductivity patterns.

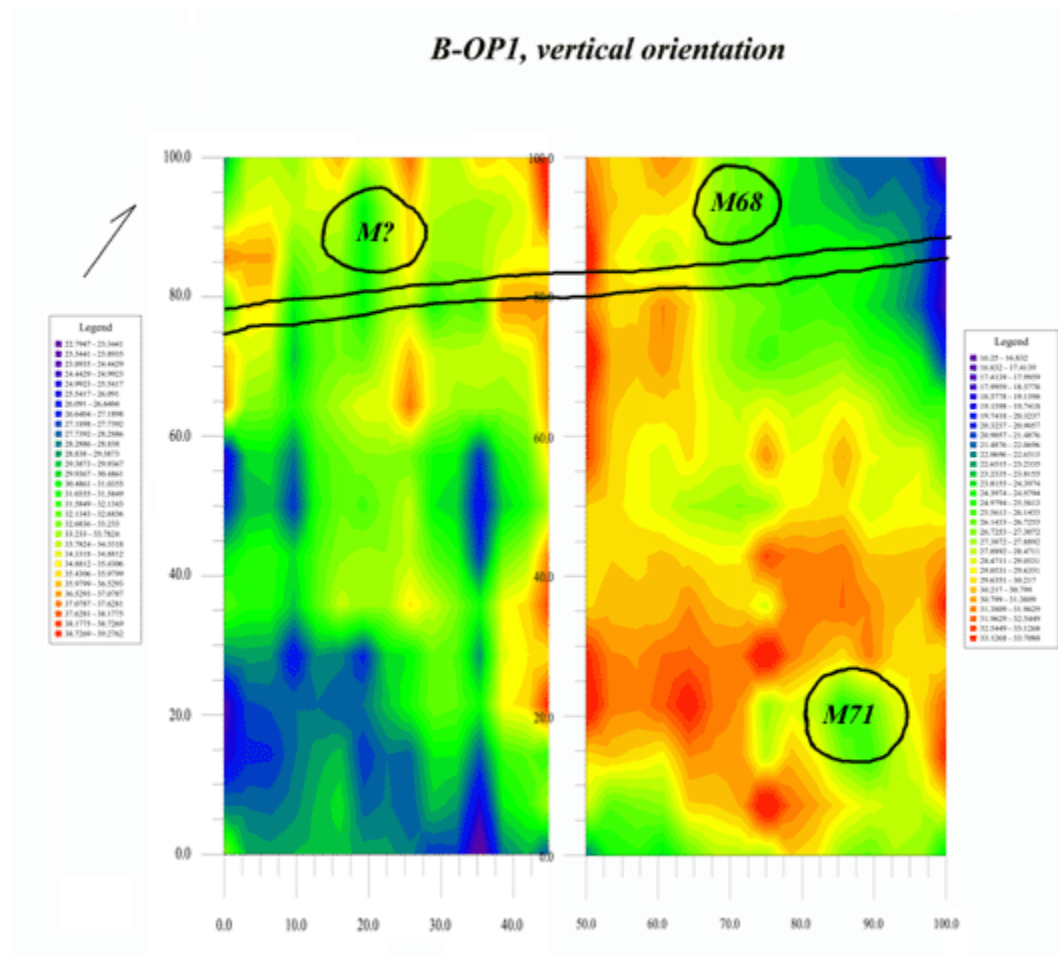
High conductivity anomalies of interest may indicate trash or mining pits, caches, offerings or burials. Low conductivity anomalies of interest may indicate stone structures, stone or plaster architectural features, agricultural terraces or capstones. Both high and low conductivity anomalies can also indicate natural subsurface conditions, with high conductivity usually indicating, within the range of instrument sensitivity, the absence of bedrock and low conductivity usually indicating the presence of same.

### **B-OP1**

Since data from B-OP1 was collected in two stages, interpolation between the two data collection sessions was not appropriate. The conductivity grid (Figure 2) is missing a segment of data through the center, but it does not appear to detract significantly from interpretation. General trends in the EMI data from B-OP1 revealed predominantly mid-range conductivities that indicate the grid is located in a region of deeply buried bedrock (Figure 2). Anomalies of interest include several small discrete regions and one large amorphous region of high conductivity throughout the center and on the lower right quarter of the grid. These could indicate regions of very deeply buried bedrock, or trash or mining pits. In addition, several small discrete regions and two localized regions of low conductivity were not associated with visible platforms. These could indicate the presence of 1) discrete near-surface bedrock, 2) buried, non-protrusive, platforms that had been constructed using a significant amount of stone or plaster, 3) buried plaster non-platform floors, or 4) some combination of these.

The anomaly in the lower left corner of the grid also fits the common dwelling form of a cluster of structures oriented around a courtyard. It is very similar in appearance to the plaster non-platform floor found during the 1996 Chau Hiix Pilot Study in survey grid CHS-1001-96 (Sweely 2005; [www.archmeme.com](http://www.archmeme.com)).

In addition, as in the Chau Hiix Pilot Study, platforms do not appear to be associated with a specific conductivity pattern (Sweely 2005). This indicates that the composition of the platform is not sufficiently different from the composition of the subsurface to generate a variation in the conductivity in the area. Platform M71 might be an exception as it does appear to be associated with a lower conductivity than the immediate region surrounding it. This could indicate that it contains plaster or a significant amount of stone in its composition.



**Figure 2.**

Of the visible surface features it is interesting to note that the possible two-track road is not associated with any conductivity pattern. If the subsurface was sufficiently compacted by the two-track, relative to the subsurface in the rest of the grid, it should register a higher conductivity than the surrounding region. That it does not may indicate that it is not compacted to a significant degree. If more moisture had penetrated the subsurface, possible conductivity differences between the track and the subsurface surrounding it may have been enhanced.

Excavations conducted by BVAR staff were unfortunately concluded at only 1.0 m below surface and thus did not probe the entire 1.5 m depth of penetration of the EMI instrument. Excavations in the region of low conductivity in the lower left of the grid revealed only clay. Willey et al. (1965), however, found plaster non-platform floors buried 1.6 m below the contemporary ground surface in excavations of platforms at the neighboring site of Barton Ramie. Given this and its similar appearance to a known plaster, non-platform floor it is feasible that it could represent a plaster floor buried

between 1.5 m below the surface and 1.0 m below the surface where the BVAR excavations ended (see Hoggarth & Swain, this volume).

### **B-OP3**

Data collected in plaza locations should differ substantially from data collected in settlement zones. Mid-range conductivities found in plaza locations can be distinguished from those found in natural, generally undisturbed subsurface locations or residential areas like that found in B-OP1 in the settlement zone, as resulting from combined stone and clay plaza construction fill. Minor variations in the conductivity in plaza locations are likely due to variations in composition of the construction fill in any given location, with lower, mid-range conductivities indicating construction fill with greater stone content, and with higher, mid-range conductivities indicating construction fill with lesser stone content.

General trends in the EMI data from B-OP3 located at the north end of the central Plaza of Group II revealed predominantly mid-range conductivities (Figure 3). The region of low conductivity on the north side of the grid likely represents slump from the stair of Structure E, although the discrete region of low conductivity on the west side might indicate a potential special deposit (e.g. cache, offering or burial with capstones). The high conductivity along the south side of the grid likely indicates that the composition of the plaza floor extending south from this location contains relatively little stone. No excavation was conducted within this survey grid.

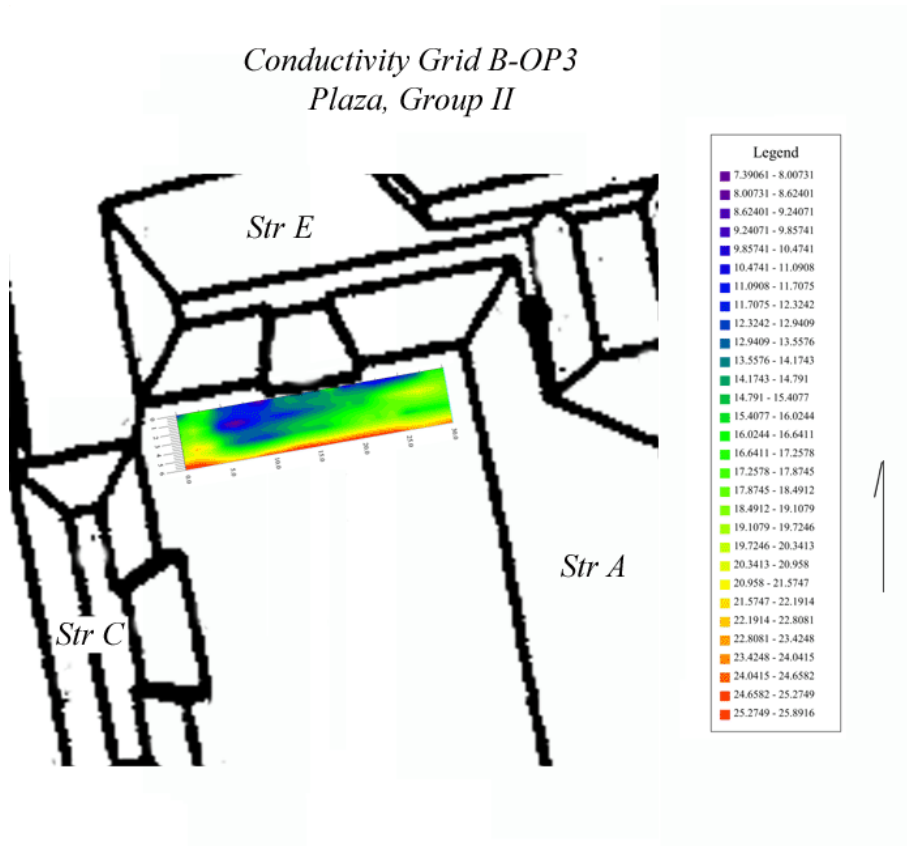
### **B-OP4**

General trends in the EMI data from B-OP4 located on the *sacbe* north of Group 2 on the north side of the river channel revealed predominantly low conductivity (Figure 4). This indicates that the *sacbe* was constructed using a significant amount of stone. The mid-range region of conductivity on the northeast end of the grid likely indicates that the subsurface northeast of the *sacbe* is composed of clay with less stone than may be found in the *sacbe*. The discrete high conductivity within this region may indicate a pit. In addition the mid-range conductivity in the northwest corner of the grid is probably generated from the presence of the *aguada*, which likely is composed of less stone than the *sacbe*. It is not known what is causing the two small, discrete mid-range conductivities on the southwestern side of the grid, but they may be locations within the composition of the *sacbe* that contain less stone or indicate erosion of the *sacbe* from runoff into the *aguada*. No excavation was conducted within this survey grid.

## **CONCLUSIONS**

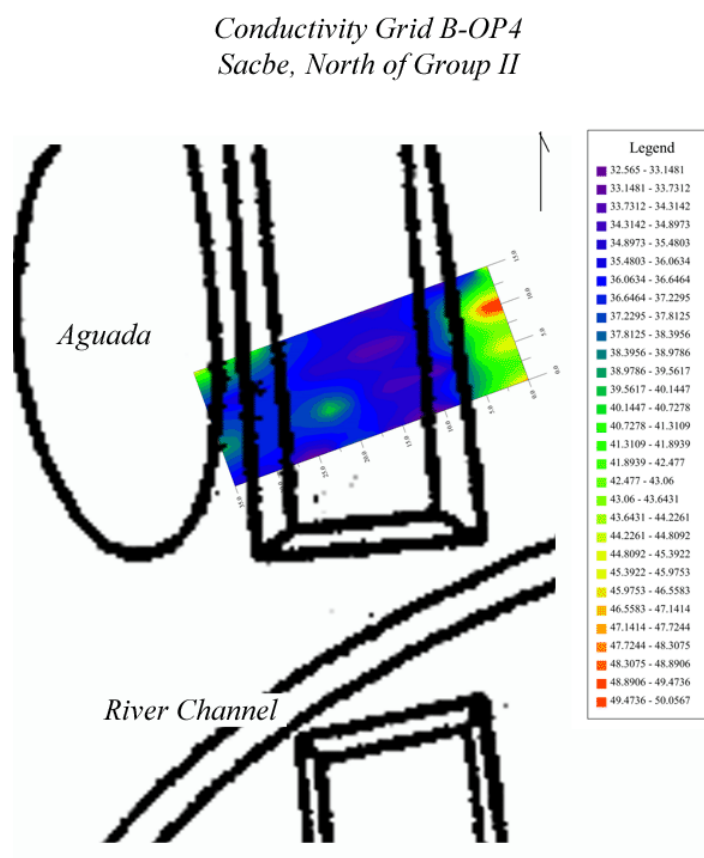
Electromagnetic Induction (EMI) was used at Baking Pot during the 2004 field season primarily in an attempt to locate invisible dwellings in the settlement zone indicated by non-platform floors and other features. While the signature consistent with a non-platform floor was evident in the conductivity data, excavations were of insufficient depth to adequately test the identity of the anomaly.





**Figure 3.**

**Figure 4.**



A second goal of the survey was to locate buried special deposits in plaza locations. Because of limited time only a small portion of the plaza in Group 2 was surveyed using EMI. Although only one possible target feature may be indicated in the data, information on variation in plaza construction fill was evident.

Finally, limited information on *sacbe* construction was revealed in the EMI data but did not reveal anything more than what is already known about *sacbe* construction. A larger survey grid may have revealed variations in *sacbe* construction not evident at the modern ground surface.

Given the results of the EMI survey, further ground-truthing excavations to adequately test the possible non-platform floor found in B-OP1 during future field seasons is suggested. Future applications of the technology are warranted in plazas for location of special deposits, buried structures and for examination of construction sequence, as well as in settlement zones to continue the search for invisible dwellings.

## **Acknowledgments**

BEMEP would like to thank Jaime Awe and the members of the Belize Valley Archaeological Reconnaissance Project for their assistance, guidance and support of BEMEP research. We would also like to thank the Institute of Archaeology of Belize. Finally, we would also like to thank all those who donated funds and equipment to the BEMEP 2004 Field Season and the Prehistoric Society Bob Smith Award Council for their generous support.

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# **PRELIMINARY REPORT ON THE EXCAVATION OF TEST UNITS TO ASSESS THE ELECTROMAGNETIC INDUCTION METHOD AT BAKING POT**

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## **INTRODUCTION**

Located along the Belize River in western Belize, the site of Baking Pot was occupied by the ancient Maya from the Late Preclassic period until the early Postclassic (Willey et al. 1965). The site is arranged into two groups, connected by a 300 meter causeway. These groups make up the site-core and comprise temples, administrative complexes, and elite residences. Hundreds of small housemounds radiate outward from the site core, extending the boundaries of the site several kilometers. During the 2004 field season, the Belize Valley Archaeological Reconnaissance Project (BVAR) worked with Gerald Trainor and Tracy Sweely from the Belize Electromagnetic Explorations Project (BEMEP) to attempt to identify “invisible” architecture and features beneath the surface. Excavations were placed outside the site core, in an area with little architecture present, or “vacant terrain” to test whether the electromagnetic induction method would yield features, and could be used in future excavations at the site.

## **METHODOLOGY**

The method that was be used to investigate invisible architecture and features at Baking Pot was electromagnetic induction. Electromagnetic induction, or EMI, works when an electric current is transmitted into the ground and reflected back into a data logging device (Bevan 1983). The data is then analyzed with software to create a two-dimensional map of the subsurface. Trainor and Sweely used the Geonics EM38 Ground Conductivity Meter to log the data from the electric current (Trainor and Sweely, this volume). These readings can indicate the presence of a subterranean feature or structure below the surface.

## **RESEARCH DESIGN AND ORIENTATION**

The area chosen to test this methodology is one of the many areas outside the site core with “vacant terrain,” or little to no architecture that is visible at the surface. It is located across the modern road that cuts through the site, near structures M65, M68, and M69. Trainor and Sweely selected this area, based on the presence of several evenly spaced structures, and open, mostly level terrain which would facilitate the data collection (Trainor and Sweely, this volume). For the purposes of the Belize

Electromagnetic Explorations Project, this area was labeled Baking Pot Operation 1, or B-OP1. A 100 x 100 m grid was set up, encompassing structures M65, M68, and M69, and the surrounding “vacant terrain.”

Both BVAR and the BEMEP investigations had specific goals before the initiation of this testing. Trainor and Sweely describe the goals of BEMEP as two-fold (Trainor and Sweely, this volume). The first is to examine the structures of the common Maya and how they changed over time. This involves identifying structures that are not visible from the surface by using the geophysical prospecting technique, Electromagnetic Induction. The second goal is to use this technique to examine plazas for cultural features, and log the signatures of these features into a geophysical catalog. The main goal of BVAR for this study is to facilitate the experimentation of this technique in order to identify if it is able to identify subsurface features at Baking Pot. Many investigations have examined areas either within the site core, or in architectural groups on the periphery of the site (e.g. Aimers 1996; Audet, this volume; Dixon, this volume). This investigation does not focus on the site core or architectural groups, but aims to examine “vacant terrain” for invisible subterranean features.

Six areas were located as areas of potential interest, based on the map of the subsurface. At these points, we set up 1 x 1 m test units to ground truth the geophysical data. These were designated as excavations Units 1, 2, 4, 5, and 6, corresponding to the numbers given to them by Trainor and Sweely. Unit 3 was excluded because Trainor and Sweely removed it from the group because they considered the reading obsolete.

## **EXCAVATION RESULTS**

Overall, no subsurface features were found in the areas we excavated. Units 1 and 2, which were located in the southern part of the test area, contained few artifacts including lithics, ceramics, and few pieces of daub. In both units, at approximately 30 cm from the modern ground surface, the soil changed from the dark grey-brown humus layer to a lighter red-brown color. This stratigraphic change is probably due to plowing, with the upper layer representing the plow zone. This stratigraphic layer (Level 2) was uniform throughout both units, and there was no evidence of any floors or clay platforms. The frequency of artifacts in Level 2 is significantly reduced in comparison to artifacts in Level 1. At approximately 80 cm from the surface, there was another soil change in Unit 1. The red-brown loam became sandier at this level, but there was no change in artifact frequency. We finished excavating these test units at 1 m below the surface, with no sign of subsurface features. One obsidian blade fragment was found in Unit 1, recorded as Special Find #1.

Unit 4 is located near the modern road separating the site, in the northwestern region of the geophysical survey area. This unit is different from the others because it is located on a natural topographic incline. In comparison with the other units, the soil of Unit 4 was much rockier than the other test units, containing small pieces of limestone. Small amounts of ceramics, lithics, and jute shell were found just below the surface. In addition to this, two obsidian blades (Special finds #2 and 3) were found at 15 cm below

the surface. There was a noticeable soil change at approximately 35 cm below the surface, changing from the dark grey-brown to the red-brown soil seen in the other test units. With this soil change, the frequency of artifacts decreased in comparison to elevations closer to the surface. Excavation was finished at 1 m, with no evidence of floors, or other cultural features.

Unit 5 is located to the northeast of Unit 2, near the eastern edge of the geophysical survey region. Test excavations revealed findings similar to Units 1 and 2. Like Units 1 and 2, the grey-brown humus layer transitioning into the red-brown loam at approximately 35 cm from the surface. Small amounts of lithics, ceramics and daub were found in Level 1, with even fewer found, mostly in the upper layers of Level 2. Excavations in this test unit were closed at 1 m below the modern ground surface, with no evidence of cultural features being discovered in the process.

Unit 6 is located on the western area of the geophysical survey area, in a slight depression in the ground. There was only a small humus layer, only measuring approximately 4 cm in thickness. This is probably due to the unit's location in a slight depression. There is evidence that although the dark grey-brown humus layer is missing from this unit, that the plow zone reached at least 5 cm below the modern ground surface, as evidenced by the presence of several pieces of barbed wire at this elevation. There was a large tree root near the northern wall of the unit, which may explain the depression in the terrain. Lithics, ceramics and daub were found in very small quantities, primarily within the upper 40 cm. No artifacts were found at a depth of 1 m below the modern ground surface, where excavations were closed.

Unit 7 was set up to investigate a possible feature. It is located 3.85 m northwest of Unit 4. No features were found at this location, only a large animal burrow. The burrow began at 50 cm from the modern ground surface and continued to a depth of 80 cm. Two obsidian blades were found in this unit (Special Finds #4 and 5), as well as ceramics and lithics. Upon discovery of the animal burrow, excavation was concluded.

## **CONCLUSIONS**

In summary, no cultural features were located in the six test units. Artifact frequencies were low for all of the units, with the majority of artifacts found within the uppermost 40 cm. There was no evidence for the presence of “invisible” structures, floors, or clay platforms at these locations. While this method has been successful at some sites within Belize, it does not appear that the technique has the same potential for identifying subsurface features at Baking Pot. With the information from these test excavations, we hope that the BEMEP project can add to their catalog of geophysical anomalies, and include sites in the Belize River Valley, and throughout Belize. Understanding how the common Maya lived is a subject that is often neglected, and needs to be more thoroughly examined. Geophysical explorations can provide important new information in this area, and will be an important tool for archaeology in future studies.

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# BAKING POT, OSTEOLOGICAL ANALYSES

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## INTRODUCTION

This technical report provides a provisional summary of the analyses conducted by the author on the skeletal remains recovered as part of Belize Valley Archaeological Reconnaissance investigations conducted at Baking Pot between 2001 and 2004. The burials from several operations are provided here including those that focused on Structure 190 (the causeway terminus to the southwest of Group 2); Str. 198 (the northern range structure of the so-called Yaxtun plazuela); Str. 209 (the shrine structure built along the eastern side of the causeway spanning between Groups 1 and 2); Str. 215 (an eastern shrine part of a small plazuela group to the north of the causeway terminus); and Str. E (the principal pyramidal structure defining the eastern perimeter of Plaza 2 in Group 1). The osteological analyses were undertaken as part of Carolyn Audet's the doctoral research, under the auspices of the BVAR Project. All analyses presented herein are provisional and require further analyses for added corroboration.

## METHODOLOGY

The standards and criteria used for assessment of the remains were from *Standards for Data Collection from Human Skeletal Remains* by Buikstra and Ubelaker (1994). The author first observed specimens during the 2004 field season at Baking Pot. The material had been preserved in aluminum foil and plastic bags since excavation. The material was cleaned via removal of hard soil with a dry brush and dental pick and washed in plain water with a wet brush. The initial step in recording skeletal remains was the creation of an inventory for each burial. In addition to the inventory, several burials were systematically photographed, both as isolated bones and, where possible, as full skeletons. Attempts were made to make assessments of biological sex, age at death, dental data collection, measurements, non-metric skeletal traits, post-mortem changes, cultural modifications, and palaeopathology, where possible. Stature estimations were not attempted on any individual due to the fragmentary and incomplete nature of the remains. Where feasible, cranial and post-cranial measurements along with non-metric traits were used in conjunction with morphological traits to make assessments of biological sex, age at death, and activity patterns.

## STR. 209 - BURIAL 1

**Introduction:** Overall, Bu. 209/1 is a very fragmentary individual with roughly only between 50-60 % present. The remains have been badly damaged by taphonomic and

environmental factors. As such, any definitive examination is not possible with any high degree of certainty.

**Bones Present:**           Cranial:           50 %  
                                  Post Cranial: 40 %

**Pathology/Non-Metric Traits/Biomechanical Markers:** The majority of the pathology occurred on the left side of the individual. His cranium showed much pitting and sclerotic activity with evidence of *porotic hyperostosis* (Figure 1). Most instances of this condition in the New World are a result of nutritional deficiencies, infectious disease, and/or parasitism (Buikstra & Ubelaker 1994: 120).



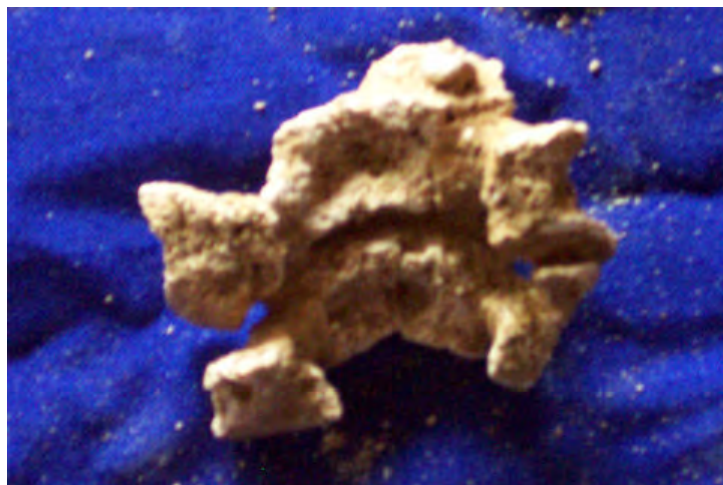
**Figure 1.**

The vertebrae were very fragmentary and only partially present. The vertebral bodies showed evidence of severe pathology on the cervical, lumbar and thoracic. Fusion of several vertebrae appears to be ankylosing spondylitis (Figure 2).

The pelvis was similarly very fragmentary with less than 20% available for assessment. The right

femoral head was fused to the acetabulum with evidence of new bone growth over the fovea capitis (the small, non-articular depression near the centre of the femur's head). There is some evidence of what could be osteoarthritis where the femoral head has fused with the acetabulum and produced a build-up of osteophytes around the perimeter. There is also evidence of resorption at this same location (Figure 3).

The left humerus has a small hole in the middle 1/3 anterior, approximately 7 mm long. It appears to be an osteomyelitic lesion possibly caused by an infected injury that never quite healed properly. Similarly, the left radius has a long hole, approximately 20 mm long, on the anterior distal 1/3 which also appears to be osteomyelitis (Figure 4), and



**Figure 2.**



**Figure 3.**

is fused. The 1<sup>st</sup> metatarsal at the proximal end shows abnormal bone formation with extra growth. The 1<sup>st</sup> and 2<sup>nd</sup> phalanges are fused together. The right foot has a very thick 1<sup>st</sup> proximal phalanx measuring at 13 mm medio-laterally, while the 1<sup>st</sup> metatarsal exhibits proximal extra bone growth.

The left hand shows fusion of the carpals and fusion of two metacarpals and proximal phalanx ends.

The right tibia has a square section of bone removed (Figure 6).

**Trauma:** This individual exhibited a very high instance of trauma throughout most of the body. There were cut marks visible on various areas of the pelvis including the acetabulum. They also appeared on the proximal epiphysis of the right tibia, along the anterior and lateral section of the left tibia (Figure 7), the distal 1/3 (proximal to the flare) of the right femur, the left femur, the proximal left fibula, the right humeral head, the base of the left radial head, and around the radial tuberosity of the right radius. There were also several post-mortem cut marks on a fragment of the left femur, the left fibula, the left ulna, and on the occipital.

There is evidence of fractures along several long bones, caused by taphonomic factors rather than accidents or injuries. The left and right femurs, the left and right humerus, and the right fibula show severe compression, most likely caused by the weight of the matrices overlying the burial.

the right tibia has a square section of bone removed.

The left patella shows excess bony growth on the posterior surface medially, possibly a button osteoma or a healed lesion.

The feet of Bu. 209/1 have extensive pathological trauma. The left foot, at the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> metatarsals is fused together at the proximal and distal ends (Figure 5). The proximal middle phalanx



**Figure 4.**



**Figure 5.**



**Figure 6.**



**Figure 7.**



**Age at death and biological sex:** The pelvis is very fragmentary and only approximately 30% present. Consequently, no secure sex determination is offered.

Similarly, age at death estimation proved difficult due to the pelvis being too poorly preserved. However, the cranium proved to be adequate using endocranial and ectocranial suture closure as a basis for measurement along with the age determinate pathology present. Based on the complete obliteration of the cranial sutures and the composite scores of the cranial vault sutures and the lateral-anterior sutures, the individual is estimated at 40+ years of age. As is stated in *Standards*, “individuals whose sutures are fully closed fall into the older adult category” (Buikstra & Ubelaker 1994), putting this individual in the age range of 55+.

**Summary:** There is a lot of taphonomic and environmental damage to Bu. 209/1 as is evidenced by the extreme compression and fractures of the long bones. These types of compression fractures are usually caused by excessive pressure on the bone from the weight of the soil or other heavy objects. There is also evidence of weathering through most of the skeleton and can be seen by way of the coarse, yet brittle and flaky nature of the bones.

During initial cursory examination sex and age was indeterminate as there were no evident morphological features available. Taphonomic changes have altered the size and shape of the pelvis and as such, no discernable morphological features are available for sex determination.

Several bones exhibited cut marks, which are inconclusive in nature due to the extremely fragmentary nature of the skeleton. There are, however, several cut marks, which appear to have occurred at or near the time of death. The majority of these cut marks are at either the proximal or distal ends of the long bones. They are not very deep and were most likely caused by a small sharp cutting instrument. The post-mortem cut marks were most likely caused by rodents or damage from excavation.

This individual had lived for most of his life with these crippling illnesses and pathological conditions. The individual would have been immobile for most adult life, as the conditions appear to have onset after all epiphyseal fusion ceased. The individual would not have been able to move most of the left side due to the severe fusion in the feet and hands. This would have caused severe discomfort while walking as well (if at all able to do so). Mobility would have been limited as regards the spine due to the ankylosing spondylitis, which would have disabled the individual from flexing its back. It is a chronic and usually progressive disease that affects the vertebral column where the associated ligaments of the spine ossify and the inter-vertebral joints become immobilized (White 2000:400).

Severe instances of porotic activity were observed in the cranium most likely caused by some form of malnutrition or disease. To what extent this affected daily life is unknown. In addition, a small hole in the parietal that showed evidence of healing and

was therefore caused well in advance of his death. This hole was approximately 4 mm in diameter and upon excavation exhibited with a piece of faunal bone through it (Figure 8).



**Figure 8.**

It appears that at some stage the individual would have injured the patella and it healed by growing bone over the affected area.

This individual exhibited severe degenerative, pathological and morphological changes throughout yet lived to be at least 40+ years of age.

## **STR. 209 - BURIAL 2**

**Introduction:** The material of Bu. 209/2 represents the commingled remains of what appears to be juvenile fragments and adult remains mixed together. Though few bones were represented, mostly bones of the right side are represented.

**Bones Present:**

Cranial:	5 %
Post Cranial:	5 %

**Pathology/Non-Metric Traits/Biomechanical Markers:** The only visible pathology was exhibited in the vertebrae and the cranium. The vertebrae were fused at the cervical and thoracic with a cloaca visible in one of the thoracic (Figure 9). The cranium exhibited evidence of possible carcinoma with very serious sections of *porotic hyperostosis* and sclerosis.

**Trauma:** No evidence of trauma.

**Age at death and biological sex:** Age at death and biological sex estimation is unavailable as there are no bones present that can be used for these assessments.

**Summary:** There is not enough material from this particular burial to make any discernable analysis, except to say that this individual



**Figure 9.**

had at some point suffered some form of disease or trauma that would have caused fusion of several vertebrae.

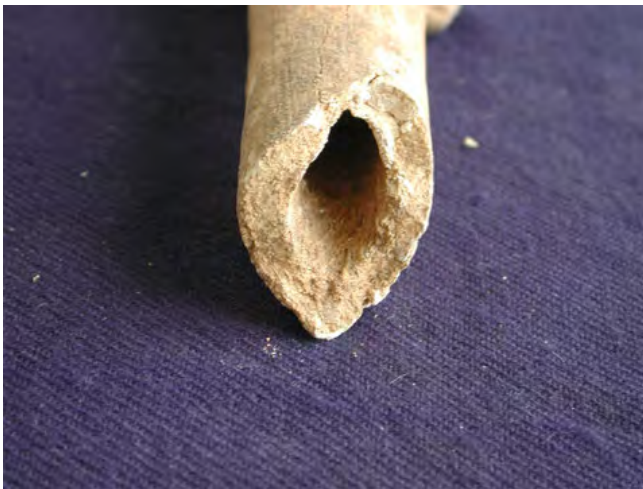
The severe nature of the porotic hyperostosis and sclerotic activity at the cranium was most likely caused by malnutrition, anaemia or a very aggressive illness.

### **STR. 209 - BURIAL 3**

**Introduction:** The remains are quite desiccated and brittle due to weathering and taphonomic changes. Approximately 60% of the skeleton is present. Overall the remains seem to be in good condition. Several bones are fairly robust which makes aging and sexing slightly problematic.

**Bones Present:**           Cranial:       30 %  
                                  Post Cranial: 70 %

**Pathology/Non-Metric Traits/Biomechanical markers:** There appears to be no extreme pathology on Bu. 209/3 except for several instances of abnormal bone matrix formation. Several bones appear to be fairly robust and abnormally thick (Figure 10). No definitive assumption can be made as to the nature of this formation without further histological analysis.



**Figure 10.**

The left humerus is fairly robust with a midshaft diameter radius of between 18 – 22 mm. There is also a medium septal aperture present, which has been noted to occur in females more frequently (Bass 1987:154). The right humerus has evidence of minor sclerotic pitting on the anterior distal 1/3.

The left femur is similarly robust at the medial epicondyle with a measurement of 18 mm in diameter and 28 mm in height. There are muscle attachments

present at this location, which may be a result of stress indicators.

The left and right calcanea are very large and robust with evidence of musculature attachments still visible. They average 35 mm in diameter at a length of 78 mm. The metatarsals are just as robust at 55 mm in diameter (around) and 15 mm wide.

The right hand has severe arthritis, possibly rheumatoid, on the dorsal side of the 2<sup>nd</sup> metacarpal. It is exhibiting severe bowing and extra bony growth (Figure 11). The

left hand appears to have a milder case of arthritis on the 1<sup>st</sup> middle phalanx, as it is very large and robust.



**Figure 11.**

Although there is no pathology evident on either the left or right os coxae, the left os coxa appears to be much smaller in size than the right.

The cranium has evidence of porotic hyperostosis in various forms and of various degrees of expression. There is true porosity, coalescing pores, and coalescing pores with expansive changes (Figure 12). There also appears to be

evidence of a different form of porotic hyperostosis called HFI – Hyperostosis Frontalis Interna – that affects the frontal bone by way of large pores and thickening. This specimen has excess growth on the inner table, which is jagged in some areas and smooth in others combined with large pitting in the frontal bone.

**Trauma:** There does not seem to be any trauma visible on Bu. 209/3.

**Age at death and biological sex:** There are not enough morphological traits available to make a definitive assessment of age or sex. However, although the right os coxa is missing the pubis region, it is nevertheless in excellent condition and is used to make an assessment of biological sex. Of the six pelvic markers normally used to estimate the biological sex of an individual, three of them definitively point to female and one is ambiguous.

A measurement of the cranium shows the skull to be fairly gracile at 145 mm from one euryon to another and has a small mastoid process, again pointing towards the individual being female.

The left humerus has a septal aperture, which is seen more in females than males. The right humeral head has a vertical measurement of 43 mm and a



**Figure 12.**



transverse one of 37 mm falling within the female measurements.

The auricular surface is used to determine age at death and is expressing at a phase 3 or 4 in this individual, which places them between ages 30-39. The suture closures all appear to be of significant closure putting Bu. 209/3 between the ages of 30-55 with a mean age of 40.

**Summary:** The remains of Bu. 209/3 were quite desiccated and brittle which made analysis difficult in some instances. There appears to be extensive weathering on some bones, possibly from exposure to the sun and elements. The amount of markers, both morphological and pathological, that appear on Bu. 209/3 are predominately those found in females between the ages of 30-55.

The extent of pathology present was not severe, expressed by way of some porotic activity, arthritis, robusticity of certain long bones and abnormal bone matrix formation. Without further histological and radiograph testing, it is difficult to say whether the robusticity is due to mechanical stress or disease. If, upon radiography of the thick bones, there appears to be involvement of the medullary cavity, then it is definitive evidence of disease.

However, this particular individual did show other signs of many stress indicators through muscle attachments at the humerus, femur, tibia, and hands and feet, combined with what are termed “squatting facets”. These are extra muscle attachments found in certain individuals who do certain types of repetitive, laborious activity throughout the course of their lifetime.

There appears to be a different form of porotic hyperostosis present in Bu. 209/3. The markers indicate the possibility of a condition called HFI – Hyperostosis Frontalis Interna. This disease affects the frontal bone by way of large pores, sclerosis and thickening. It predominately affects post-menopausal women and although it is not been prevalent in the archaeological record there are several documented cases. It expresses by producing more masculine features in women – more facial and body hair, abnormal bone thickening, larger bones, and increasing obesity. Without further testing through radiographs and histology, it is uncertain if this condition is in fact present in this individual.

Several bones of the hands exhibited severe arthritis, possibly rheumatoid. Arthritis in general is usually a result of trauma or bone and joint infections. Rheumatoid arthritis usually affects middle-aged women causing bone atrophy and bone changes, focused in the hands and feet. There may be evidence of arthritis of the hip as the left os coxae is much smaller than the right and appears to be atrophied. There is recent evidence of rheumatoid arthritis in the New World archaeological record (Rothschild & Woods 1990; Rothschild et al. 2000).

Although all of the age-related criteria are not available for Bu. 209/3, several markers indicate that this individual was between 30-55 years of age at the time of her

death. The significant suture closure along with the auricular surface and several age related pathological conditions places her at a mean age of approximately 40 years of age.

#### **STR. 209 - BURIAL 4**

These remains were commingled in a jar, which appears to be a secondary interment. One set of remains seems to have been buried, exhumed and then placed in the jar with the new individual, as these remains seem to be in worse condition than the other. The MNI is 2, possibly 3 individuals. There are no signs of pathology or trauma. There are, however, several faunal bones mixed in with the human remains – possibly those of peccary, deer, and dog.

#### **STR. 190 - BURIAL 1**

These are juvenile remains in extremely fragmentary condition. The cranium cannot be reconstructed due to its fragmentary nature but there are several teeth available for further analysis to determine age. There is not enough of the skeleton present for any biological sex determination. The age at death estimation is between 2-5 years old.<sup>1</sup>

#### **STR. 190 - BURIAL 2**

**Introduction:** The remains of this individual seem to be in fairly good condition with the usual taphonomic changes that would affect a burial within the environment that characterizes the environs of Baking Pot. The skeleton appears to be approximately 70 % present with certain areas showing extensive porotic activity and several bones with rodent gnawing and/or cut marks. There was no skull found either within or around Burial 190/2.

<b>Bones Present:</b>	Cranial	0 % (no cranium found in burial)
	Post-cranial	70 %

**Pathology/Non-Metric Traits/Biomechanical Markers:** Many of the long bones exhibit mild to severe cases of porotic and/or sclerotic activity, which appear to be various stages of Porotic Hyperostosis. The bones affected by this condition are the left and right femur, left and right tibia, and the left and right fibula. Several bones also exhibited abnormal matrix formation and thickening.

The right clavicle has what appears to be an osteomyelitic hole 8 mm in diameter. This was most likely caused ante-mortem, as there is evidence of some healing. Osteomyelitis is bone inflammation caused by bacteria that usually enters the bone through a wound. Alternatively, this wound may be abnormal bone loss in the form of a resorptive lesion with sclerosis (Figure 13).

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<sup>1</sup> Note, this is a very cursory examination of age at death and without further testing is inconclusive.

The acetabulum shows degenerative changes exhibiting characteristics of osteoarthritis (degenerative joint disease). There is evidence of lipping and spur formation caused by destruction of the cartilage followed by the formation of adjacent bone (Figure 14).



**Figure 13.**

Several long bones show biomechanical stress markers through muscle attachments and/or larger bones in order to accommodate the activity. The left and right femur, left and right humerus, and the left and right patella all have evidence of repetitive, laborious activity. The patellae have what could be a button osteoma or a healed lesion.

**Trauma:** There is evidence of post-mortem rodent gnawing and cut marks, and some inconclusive (possible ante-mortem) on the right

humerus, right ulna, left ulna, left and right radius, and right clavicle.

**Age at death and Biological sex:** As there is no cranium available to aid in assessing age at death and biological sex, the pelvic region, humerus and scapula was used. The individual has a very large sciatic notch, with a long pubis and very wide pubic angle. Both the left and right humerus had a small septal aperture present, which is found to be more prevalent in females. As per Krogman (1962), the length of the scapular-glenoid-cavity can be used for sex estimation. In this sample it measures at 32 mm, which is well below the minimum length for females.

The onset of osteoarthritis and porotic hyperostosis may put this individual at an age range of 40+ years at death. There are no other morphological markers available to make a definitive assessment of her age at death.

**Summary:** There was no cranium found with Bu. 190/2 therefore no definitive ageing and sexing criteria could be met. There were, however, alternative markers used to assist in making these determinations.



**Figure 14.**

Since the gnaw/cut marks appear to have occurred only on the upper extremities, it would seem that Bu. 190/2 had been exposed to the elements or the upper torso was buried shallower than the lower half, giving access to rodents and other small animals.

These remains showed various pathological and biomechanical stresses. There is evidence of various stages of porotic hyperostosis at varying degrees, which may have been caused by an anaemic (low iron) condition. This type of hyperostosis usually only affects the cranium, but has been documented in long bones as well.

Other degenerative changes include possible osteoarthritis of the hip, which is usually associated with load-bearing joints and is an inherent part of the aging process. There is a possible osteomyelitic or resorptive lesion in the right clavicle. This lesion appears to have gone through the healing process at some point during life. It may have been caused by an injury of some sort or from a lesion caused by an infection.

The biomechanical stress markers of the long bones, specifically the patella indicate that this individual most likely worked or lived the majority of her life in a kneeling or squatting position. Both patella show extensive muscle attachments and wear consistent with this pattern. This repetitive activity would have required the body to strengthen the bones causing them to grow beyond the normal size listed for females – thus making the individual seem robust.

As there were only a few markers available for ageing and sexing Bu. 190/2, no definitive assessment can be made. Nevertheless, this individual exhibits the morphological signs of a female, aged 40+.

### **STR. 190 - BURIAL 3 (Cranium)**

This cranium shows severe sclerotic activity on the cerebral surface with large pitting, which could be porotic hyperostosis. There is evidence of minor burning to the right frontal bone. The right frontal bone also has two possible sharp force trauma wounds, which could be stab wounds, and several smaller and shallower “scratch” marks in between the two larger wounds. The angle and depth of the stab wounds indicates that they were administered with very heavy force at a depth of 15 - 20 mm (Figure 15).<sup>2</sup>

### **STR. 190 - BURIAL 5 (Cranium)**

**Introduction:** There is extensive taphonomic damage to this specimen from extreme soil compaction and pressure on the left side, laterally and medially, affecting the frontal, parietal and maxilla. As such, all measurements taken were done so only in areas not affected by the taphonomic changes.

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<sup>2</sup> Further microscopic tests will need to be done to determine if there is evidence of a kerf wall on the stab wounds.

**Bones Present:**

Cranial	80 %
Post-cranial	0 %

**Pathology/Non-Metric Traits/Biomechanical Markers:** There was no pathology on the cranial remains of this individual. Non-metric traits were observed were the parietal foramen, Inca bone, mastoid foramen, mental foramen and myohyloid bridge (Figure 16).



**Figure 15.**

This specimen has a Y5 cusp mandibular molar pattern. There are three labial alveolar channel abscesses and two occlusal surface caries on the maxilla. There are four occlusal surface caries and two lingual perforation abscesses on the mandible.

**Trauma:** No trauma.

**Age at Death and Biological Sex:** Of the traits available to sex the individual, only two from the cranium were significant. The mastoid process and the nuchal crest

both indicate that this individual was a female. This individual was quite young at the time of death as the ectocranial and endocranial sutures were all open or with minimal closure, placing this individual between 18-34 years of age.

The dental enamel and cusp also shows a young individual between 15-30 years of age.

Since the age of this individual is a young adult, it is slightly difficult to assess a biological sex with any degree of certainty.

**Summary:** This individual was found without any post-cranial remains and the cranium was encased in soil, which had compacted some of the facial bones. When the cranium was reconstructed it was observed to be of a gracile form with no evident pathology or trauma. It appears to have been a healthy, young female.

There were several abscesses and dental caries on the



**Figure 16.**

specimen which, for such a young individual, would indicate that she was either malnourished or she suffered from some type of anaemia (Figures 17 and 18). The enamel hypoplasia evident on most of her teeth would support this hypothesis. There was no other excessive wear pattern on the teeth eliminating any kind of work being done with them. They otherwise seem to be in fairly good condition for someone between 18-30 years of age with minimal wear.

Assessing biological sex of a young adult can be difficult since immature remains sometimes express markers of the opposite sex. A young man may appear to have gracile features such as a woman, and a young girl may be more robust and highly developed, giving the appearance that she is male.

#### **STR. 198 - BURIAL 1**

These remains are of a small child/juvenile, but age is indeterminate due to the lack of material and their fragmentary nature.

#### **STR. 198 - BURIAL 2**

These remains are of a small child/juvenile that are in very good condition. The long bones are intact and the cranium is in sufficiently good condition to warrant reconstruction. The lower left molar is unerupted possibly making the child less than two years of age at death. The incisors and canines appear to be modified exhibiting a scalloped pattern along the edge.

#### **STR. 215 - BURIAL 1**

These remains show evidence of bone thickening but no other pathology. They are possibly juvenile but too few and fragmentary to make any discernable diagnosis or analysis.

#### **STR. E - BURIAL 2**

All bones in this assemblage are extremely brittle, possibly from extensive weathering and taphonomic changes, giving them a dry, sun-bleached appearance. There appears to be some possible limestone or calcification residue on several bones.

There appear to be possible post-mortem rodent or cut marks on the left femur. The left scapula has similar markings and a red discoloration.

The metacarpals and metatarsals are excessively large in size and very robust.



**Figure 17.**



**Figure 18.**



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