CHAN PROJECT

THE CHAN PROJECT:
2007 SEASON

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THE 2007 CHAN PROJECT LABORATORY SEASON: AN INTRODUCION

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The 2007 season was the first of three planned laboratory seasons (2007-2009) at the Chan site in Belize. The 2007 season was generously funded by the National Science Foundation and the subsequent 2008 and 2009 seasons will be funded by the National Endowment for the Humanities.

During the 2002 to 2006 excavation and survey seasons at the Chan site the project collected a substantial dataset on the 2000 year history (1000/800 B.C. – A.D. 1150/1200) of the farming community of Chan. The accomplished goal of these prior seasons was the completion of horizontal excavations at (1)19 households (a 7% sample) representing the socio-economic and occupational variability in Chan's households, (2) all buildings in Chan's ritual and administrative core, and (3) terrace sets at different locations across the site's settlement. Standardized excavation procedures allowed the comparable collections of materials from all location and included the recovery of the macro-artifact materials traditionally collected from Maya sites, as well as soils from stratified contexts and micro-artifacts and carbonized remains recovered from flotation samples. The contextual analysis of excavated materials at Chan provides an ideal opportunity to explore the founding, development, long sustainability, and ultimate demise of an agrarian community.

To take advantage of this opportunity three laboratory seasons were designed to complete the analysis of the substantial collection of material remains from Chan. This analysis will allow us to address our two project goals (1) to assess the organization of the farming community across its over 2000 year occupation history, and (2) to examine how changes in farming community life affected and were affected by broader political-economic changes in Maya society, particularly the late rise of the nearby polity-capital of Xunantunich.

The 2007 Chan laboratory researchers included (1) Dr. Laura Kosakowsky (University of Arizona) who was assisted in her analysis of the Chan ceramics by Elise Docster (BA student, Northwestern University) and artist Carmen Ting (BA student, University College London), (2) Dr. Angela Keller who was assisted in her analysis of the Chan shell materials by Joyce Tun (Belize Institute of Archaeology) and Silvia Batty (Belizean student intern), (3) Nick Hearth (MA, University of California – Riverside) who analyzed lithic materials, (4) Anna Novotny (MA, Arizona State University) who analyzed human skeletal materials, and (5) Chelsea Blackmore (MA, University of California – Riverside) who analyzed faunal material. The results of these five analytical projects are contained in this report.

PRELIMINARY REPORT ON THE ANALYSIS OF THE CERAMICS FROM THE CHAN PROJECT
2007 Laboratory Season

Laura J. Kosakowsky
University of Arizona

INTRODUCTION

In order to complement the ceramic analysis, begun in 2006, which concentrated on the ceramics from the Chan site center E-Group, a decision was made to begin this year's work continuing the focus first on the site center and then moving outward to get better chronological control for the settlement area of Chan. Hence, the analyses this year included ceramics from Operation 1, an excavation in the central plaza of the site completed in 2003 (Blackmore 2003) that documented both the sequence of plaza floor construction and evidence of ritual activity in the open plaza area; Operation 3, excavated in 2004 (Robin et al. 2004), which included posthole tests and test pit excavations within a 50 m area in each direction from the central plaza; Operation 29, posthole testing and test pit excavations in mound group C-199, which lies some 970m south of the site core completed in 2006 (Meierhoff 2006); and finally an analysis of the surface survey ceramics sampled in 2002 and 2003 (Robin et al. 2002; Wyatt & Kalosky 2003) in order to identify the chronological history of the Chan site settlement area.

As in 2006, the methodology for the ceramic analysis involves sherds, which were laid out in stratigraphic sequences, beginning with the lowest levels of the excavation and moving upward, keeping all lots un-mixed (Kosakowsky 2006). All lots were pre-sorted into sherds with identifiable surface finish and decoration, which were separated from eroded and unslipped body sherds, with the assistance of Elise Docster (Northwestern University). The eroded and unslipped body sherds that were not identifiable were counted and re-bagged, in order to get some measure of what percentage of each lot was identifiable. The complete analysis proceeded then using all rim sherds and body sherds with identifiable surface finish, decoration, or formal characteristics; body sherds recognized on the basis of paste characteristics (such as Mars Orange or Holmul Orange Wares, British Honduras Volcanic Ash Wares, and Vinaceous Tawny Wares, all of which are easily identifiable in the absence of preserved surfaces) were also included in the analysis. Within each lot complete counts by ceramic group were made, and as the analysis has progressed it has been possible to make some preliminary assignments to type and variety. Exemplar sherds for all identified ceramic groups were pulled from lot bags and were illustrated by Carmen Ting (University College London), and as a reference type collection. Sherd counts from the analysis are presented in the tables below. Where sample sizes are small, the preliminary type designations are included (Ops 3 & 29), but where samples are so large as to make reading the tables unwieldy (Op. 1 and Survey ceramics), only ceramic complex designations are listed , though complete counts are available for all analyzed lots.

CERAMIC CHRONOLOGY

As determined in 2006, the Chan site appears to have been occupied from the Late Early Preclassic/ Early Middle Preclassic (ca. 1000/800 B.C.) until the Early Postclassic (ca. A.D. 1150/1200), although the major occupation falls between the Middle Preclassic and Terminal Classic, with only sparse evidence for the earliest phase and a population decline in the Terminal Classic, followed by abandonment in the Early Postclassic period (Kosakowsky 2006; Robin 2002, 2003, 2004).

CERAMIC CHRONOLOGY FOR THE CHAN SITE, BELIZE RIVER VALLEY, BELIZE

Time Period	Calendar Years, approximate*	Chan Ceramic Complexes**	Regional Ceramic Spheres
Early Postclassic	AD 900- 1150/ 1200(?)	(Not a complete complex)	New Town
Terminal Classic	AD 800/ 830 – 900	Vieras	Tepeu 3
Late Late Classic	AD 670 – 800/ 830	Pesoro	Tepeu 2
Early Late Classic	AD 600 – 670	Jalacte	Tepeu 1
Early Classic	AD 250 – 600	Burrell	Tzakol (1, 2, 3)
Terminal Preclassic	AD 100/ 150 – 250	Potts	Floral Park
Late Preclassic	300 BC – AD 100/ 150	Cadle	Chicanel
Middle Preclassic	650 BC – 300 BC	Boden	Mamom
Late Early Preclassic/ Early Middle Preclassic	1000(?) / 800 BC – 650 BC	(Not a complete complex)	"Cunil/ Kanocha" "Swasey/ Bladen" "Eb" & "Xe"***

* Until radiocarbon dates become available for the Chan sequence, approximate dates based on major site sequences are utilized here.

**Ceramic complexes at Chan are named for creeks in southern Belize.

***All the regional ceramic complexes for the Late Early Preclassic/ Early Middle Preclassic are listed in the above table because regional spheres have yet to be agreed upon for the Belize Valley.

CERAMICS FROM OPERATION 1

Operation 1 excavations focused on the central plaza area of the large platform group that comprises the Chan site center (Blackmore 2003), and consisted of 5 2x2m test pits. Sub-operation B placed in the center of the plaza revealed two pits cut into the limestone bedrock and the excavations were expanded to better understand the relationship among these deposits, and a previously discovered uncarved stela in the center of the plaza. The excavations ultimately uncovered a low-lying rubble platform, a number of stela and altar fragments, and a series of pits that included a burial and other ritually cached items. (See Blackmore 2003 for a complete discussion.) The ceramics from the Operation 1 excavations are not unique, with typical types and forms from the Middle and Late Preclassic in the lower levels, and from the Classic period in the upper levels. (See Figure 1 for Middle Preclassic examples.)

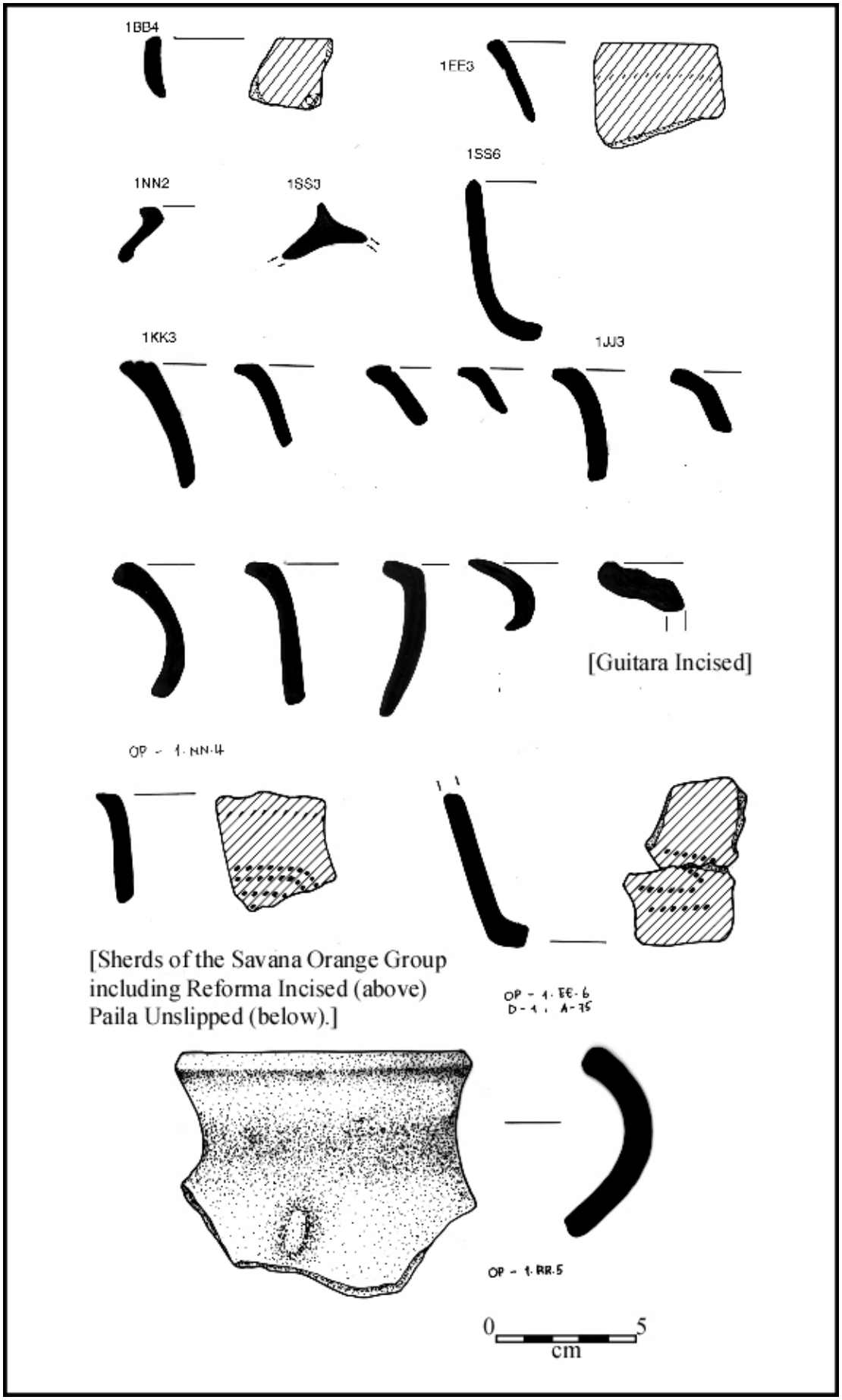

Figure 1: Typical Middle Preclassic Boden Ceramics from Operation 1 (illustrated by Carmen Ting).

However, the ceramics from Operation 1 include an unusually large number of whole vessels (see Figure 2), figurines (see Figure 3), figurine fragments (see Figure 4), and incensario plugs (see Figure 5), and confirm the initial interpretations (Blackmore 2003) that the open plaza at Chan was not simply a vacant space. Chan's plaza was clearly a locus for important ritual activity, such as caching and burials, as early as the Middle Preclassic, similar to other sites in the Maya lowlands (Hammond 1991; Robin 1989), and may reflect the establishment of an ancestral lineage (McAnany 1995). LeCount's (2003) preliminary analyses of Operation 1 included some contexts that I did not examine in 2007, though both analyses demonstrate a similar sequence. The analysis of the Operation 1 ceramics are still ongoing, and the table below represents only a preliminary analysis that will be completed in 2007, as will more complete interpretations of the ritual nature of the deposits, and their exact chronological placements.

Op	**List of Lots**	**Context**	**D# (Burial, Cache, Altar)**	**A# (Special Artifacts)**	**Description**	**Phase**	**Chronology (Based on Identifiable Sherds)**
1	B.1, C.1, D.1, E.1, F.1, G.1, H.1, I.1, J.1, K.1, L.1, M.1, N.1, Q.1, U.1, T.1, X.1, V.1, Y.1, MM.1, OO.1, 00.8	Humus 1		1.H1.A2	Humus	1st-a	Boden (6%) Cadle (2%) Burrell (2%) Jalacte (5%) **Pesoro (30%)** **Vieras (3%)** Unknown Preclassic (<1%) Unknown Classic (52%)
1	K.2, M.2, L.2, H.2, I.2	Collapse 1			Collapse of Str. 1	1st-a	Unknown Classic (100%)
1	special artifacts only	Cache	D11	B.1.A1, I.1.A2, A3 H.1.A5, C.9.A6, J.1.A7, J.1.A9, J.1.A10, J.1.A11, L.1.A21,	Ultimate cache on Altar 1/ Surface 2 located on Str. 1	1st-a	Figurine fragments and incensario plugs **Terminal Classic Vieras/ Early Postclassic** (100%)
1	J.6	Surface 2	Altar 1		Altar 1 on Str. 1	1st-b	No ceramics
1	P.1, G.6, J.4, M.4, H.3, I.4, L.4	Fill 6		I.4.A35	Fill of Str. 1, Str. 1 sits above Fill 1- the ultimate phase plaza floor	1st-b	Pesoro (48%) **Vieras (4%)** **Early Postclassic (4%)** Unknown Classic(44%)

1	B.2, B.3, C.2, C.3, N.2, D.2, E.2, F.2, F.3, G.2, G.7, H.5, I.3, I.6, J.2, L.3, M.3, N.2, Q.2, MM.2, MM.4, OO.2, OO.9	Fill 1			Ultimate plaza floor fill.	1st-c	Cunil (3%) Boden (7%) Cadle (4%) Burrell (4%) Jalacte (4%) **Pesoro (27%)** Unknown Preclassic (4%) Unknown Classic (47%)
1	J.5	Fill 7	D3	J.5.A37, J.5.A38	Cache above Altar 2. Altar 2 lies below Altar 1.	1st-c, or 2nd	Potts (20%) **Pesoro (40%)** Unknown Classic (40%)
1	1.J.8	Surface 3	Altar 2, D12		Altar 2 that lies below Altar 1.	1st-c, or 2nd	No ceramics
1	E.3; B.9; H.7; J.3; MM.5; OO.3; G.8	Floor 1			Penultimate plaza floor	2nd	Unknown Classic (100%)
1	F.4, D.4, Z.1, OO.4, OO.10, Z.1	Fill 2		OO.10.A102	Fill of penultimate plaza floor.	2nd	Cunil (5%) Boden (56%) Cadle (15%) Burrell (3%) **Jalacte (3%)** Unknown Preclassic (15%) Unknown Classic (3%)
1	OO.21	Surface 5			Flat stone pavement thought to be contemporary with Floor 1, penultimate plaza floor	2nd	No ceramics
1	OO.5	Fill 13			Fill below Surface 5, thought to be contemporary with Fill 2	2nd	Boden (50%) Unknown Preclassic (50%)
1	1.OO.6, 11; 1.MM.7	Floor 7			Plaza floor below Fill 2	3rd	No ceramics
1	MM.8, OO.7, 12, Z.2	Fill 12			Fill below Plaza Floor 7.	3rd	Cunil (<1%) Boden (75%) **Cadle (11%)** Unknown Preclassic (13%)
1	C.7	Floor 2			Plaza floor below Fill 12.	4th	No ceramics
1	D.7, C.9, NN.7, NN.8, NN.10, LL.1, OO.13, J.13, W.3, GG.1-3	Fill 3		C.9.A6	Fill below Plaza Floor 2.	4th	Cunil (<1%) Boden (76%) **Cadle (6%)** Unknown Preclassic (17%)
1	special artifacts only	Cache	D4	GG.2.A54, GG.2.A56-61	Cache within or dug into Fill 3.	4th or later	Miniature vessels; probable Cadle Complex
1	D.9 -11,	Fill 4			Fill that fills in a depression in bedrock below Fill 3.	5th or earlier	No ceramics
1	B.7, G.5	Surface 1	D1		Compact sascab surface partly capping Cache/ D1.	5th or earlier	No ceramics

1	FF.1, 2; EE.1, 2; N. 5, 6, 7; BB.1; B.8; QQ.1; PP.1	Refuse 1	D1		Uppermost fill of Cache/ D1. This context is misnamed "Refuse 1" - it is fill not refuse.	5th or earlier	**Boden (100%)** Cunil (<1%)
1	AA.2, 3, 4; KK.1-3; RR.1, 3, 5; QQ.2, 3; EE.3-5; PP.2-4; JJ.1-3; FF.3-5, BB.2-5, GG.5-7	Fill 8	D1		Fill of Cache/ D1 below Refuse 1.	5th or earlier	**Boden (100%)** Cunil (<1%)
1	AA.5, 6, BB.6, 7, EE.6, 7, FF.6, JJ.4, KK.4, PP.5, QQ.4, RR.6	Fill 17	D1	EE.6.A75	Fill of Cache/ D1 below Fill 8.	5th or earlier	**Boden (100%)** Cunil (<1%)
1	1.B.11	Surface 4	D2		Capstone of Cache D2.	5th or earlier	No ceramics
1	SS.3, RR.2, 4	Fill 15	D6	RR.2.A105	Fill of Cache D6	5th or earlier	**Boden (100%)**
1	SS.4, 5, 6	Fill 16	D7	SS.6.A120, SS.6.A121, SS.6.A122	Fill of Cache D7	5th or earlier	**Boden (100%)** Cunil (<1%)
1	PP.8, 10, RR.8, 9	Fill 18	D10	PP.8.A124	Fill of Cache D10	5th or earlier	**Boden (100%)**
1	NN.2, OO.15	Fill 14	D8		Burial 1, re-entry 2, fill above Fill 9 also of re-entry 2.	? - later than 5th	**Boden (100%)**
1	1.HH.1, 1.OO.16, 1.NN.4, 1.DD.1	Fill 9	D8		Burial 1, re-entry 2, fill above Fill 10 of re-entry 1.	? - later than 5th	**Boden (100%)**
1	NN.6, OO.17, DD.2, HH.2	Fill 10	D9		Burial 1, re-entry 1, fill above Fill 11 also of re-entry 1.	? - later than 5th	**Boden (100%)**
1	HH.3, 4, NN.9, OO.19, 20	Fill 11	D9	HH.4.A81, 82, 84	Burial 1, re-entry 1, fill immediately above Burial 1/ D5	? - later than 5th	**Boden (100%)**
1	DD.3, DD.4	Fill 11	D5	DD.4.A85	Burial 1	5th or earlier	**Boden (100%)**

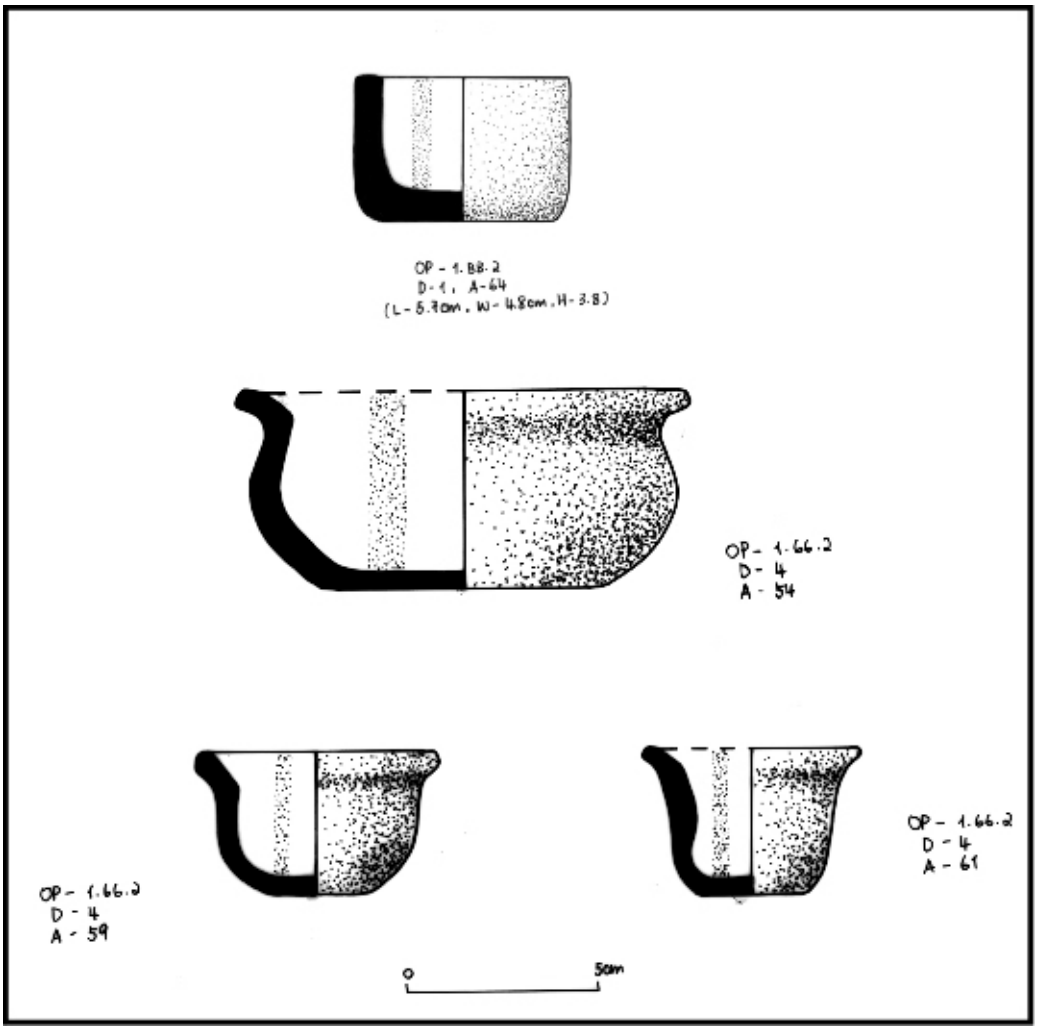

Figure 2: Middle Preclassic Boden Complex (topmost) and Late Preclassic Cadle Complex miniature vessels (illustrated by Carmen Ting).

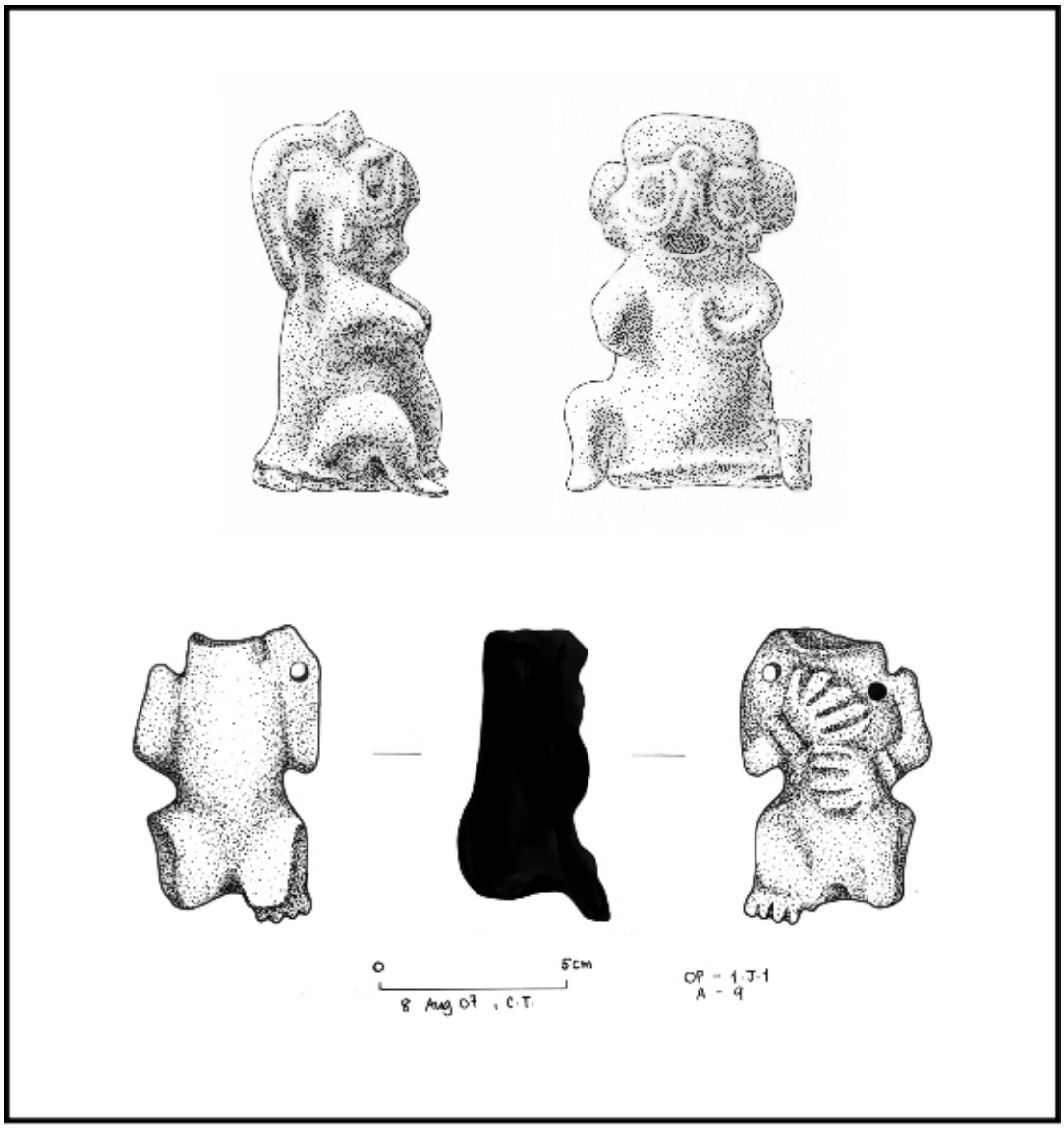

Figure 3: Figurines associated with Altars from Operation 1. Figurine A37 (top) associated with Altar 2, from the Pesoro or Vieras Complex, drawn by "?". Figurine A9 (bottom) associated with Altar 1, from the Vieras Complex, drawn by Carmen Ting.

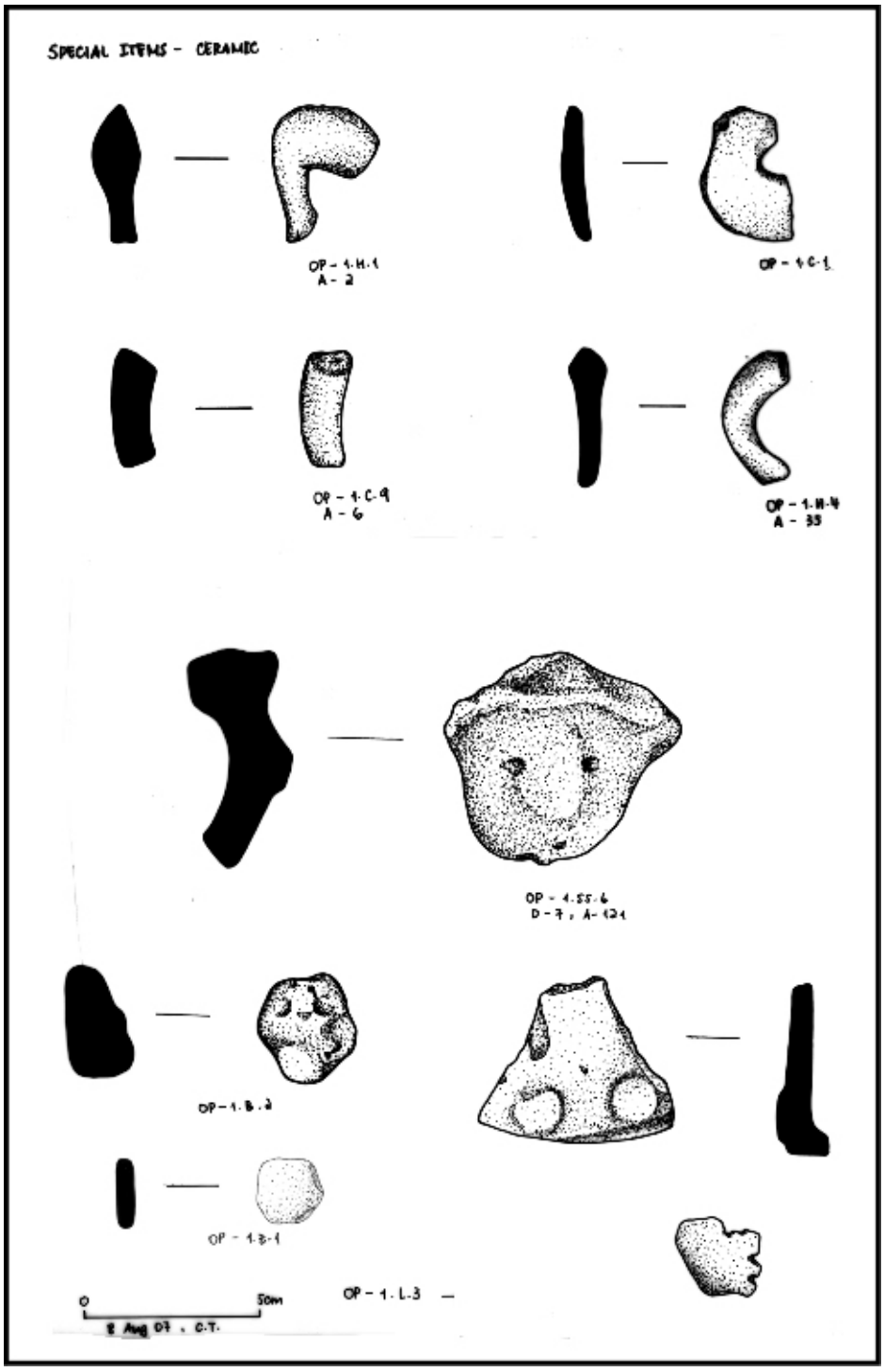

Figure 4: Figurine fragments and worked sherds from Operation 1 (illustrated by Carmen Ting).

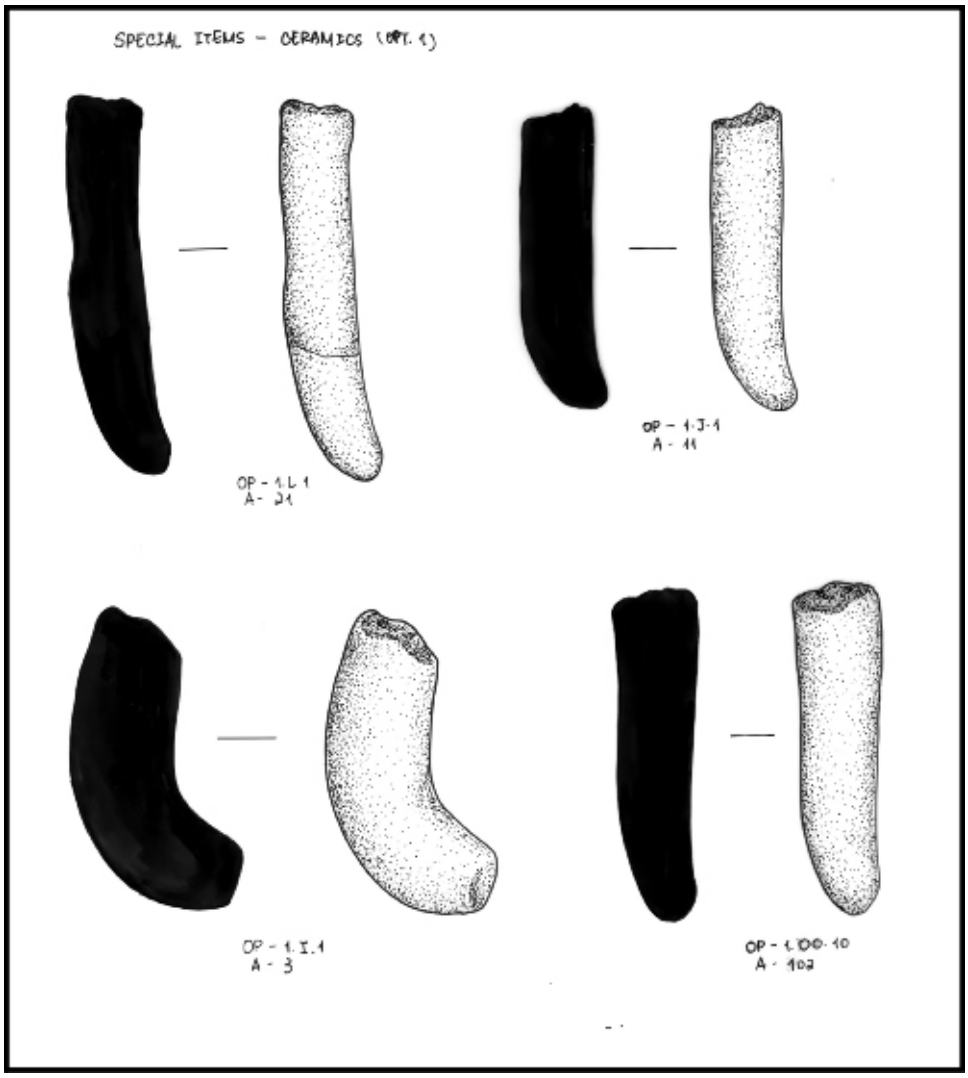

Figure 5: Incensario plugs from Operation 1 (illustrated by Carmen Ting).

CERAMICS FROM OPERATION 3

During the 2004 season research at the Chan site focused in part on the vacant spaces that surround Chan's central architectural group, through a systematic posthole sampling program (Robin et al. 2004) using a grid of postholes (Sub-Operation A) spaced 5m apart and extending 50m in each direction from the edges of the central plaza. As a result of this posthole sampling, three possible refuse areas were located in the supposed "vacant" terrain, and 2m by 2m excavations (Sub-operations B, C, and D) were placed in each.

Suboperation B

Op	Sub-Op	Lot	Count	"Cunil"	Boden	Cadle	Potts	Burrell	Jalacte	Pesoro	Vieras	Postclassic	Unknown Preclassic	Unknown Classic	Unslipped/ Eroded	% Identified	Comments (% of identifiable sherds)
3	B	1	105	0	2	0	0	0	0	1	0	0	1	1	97	5%	Jocote Orange Brown (40%) Dolphin Head Red (20%) Unknown Preclassic (20%) Unknown Classic (20%)
3	B	2	203	0	0	1	0	0	0	19	0	0	0	1	191	10%	Laguna Verde Incised (5%) Dolphin Head Red (14%) Belize Red (29%) Vinaceous Tawny Wares (42%) Mt. Maloney Black (5%) Unknown Classic (5%)
3	B	3	511	0	2	1	0	2	1	9	0	0	3	1	492	4%	Savana Orange (5%) Jocote Orange Brown (5%) Polvero Black (5%) Early Classic Forms (10%) Mt. Pine Red (5%)) Dolphin Head Red (16%) Mt. Maloney Black (16%) Beize Red (12%) Late Classic Incensario (5%) Unknown Preclassic (16%) Unknown Classic (5%)
3	B	4	1502	0	16	25	0	2	0	9	0	0	5	4	1437	4%	Savana Orange (10%) Jocote Orange Brown (16%) Sierra Red (30%) Polvero Black (7%) Lechugal Incised (5%) Early Classic Forms (3%) Belize Red (15%) Unknown Preclassic (8%) Unknown Classic (6%)
3	B	5	1205	2	6	33	1	0	0	0	0	0	37	6	1126	7%	Eroded Cunil (2%) Savana Orange (7%) Sierra Red (33%) Laguna Verde Incised (2%) Polvero Black (1%) Lechugal Incised (2%) San Antonio Golden Brown (1%) Early Classic Forms (1%) Unknown Preclassic (44%)
3	B	6	535	0	1	6	0	0	3	9	0	0	0	14	502	6%	Savana Orange (2%) Sierra Red (18%) Teakettle Bank Black (2%) Sotero Red Brown (6%) Dolphin Head Red (15%) Belize Red (9%) Mt. Maloney Black (9%) Unknown Classic (42%)
3	B	7	250	0	2	2	0	1	1	2	0	0	0	6	236	6%	Savana Orange (14%) Sierra Red (14%) Paradero Fluted (7%) Sotero Red Brown (7%) Belize Red (7%) Cayo Unslipped (7%) Unknown Classic (44%)
3	B	8	148	0	0	2	0	0	1	2	0	0	2	0	141	5%	Sierra Red (14%) Polvero Black (14%) Teakettle Bank Black (14%) Belize Red (29%) Unknown Preclassic (29%)

Supoperation B is an excavation placed in a buried jute midden, comprised of a dense concentration of jute with some artifacts that was located through the posthole testing (Robin et al. 2004: 11). In order to complement the research conducted by Angela Keller (see this volume), the ceramics were analyzed to determine both the chronological placement of the jute midden, as well as to determine whether or not the midden represented a single depositional event or had accumulated over a long time period. The ceramics from Suboperation B include redeposited Middle Preclassic and Late Preclassic sherds in every level, however virtually all lots also contain Late Classic pottery. As shown in the above table, all lots contained a mix of Late Preclassic as well as Late Classic ceramics, although one lot (5) in the middle of the deposit had predominately Preclassic material, and no definitive Late Classic sherds. Though most of the lots were highly weathered, the Lot 5 sherds seemed less so, and contained worked sherds and a penis adorno (not yet illustrated). Angela Keller (this volume) noted more evidence of burning in Lot 5 (blackened and calcined jutes), and it is possible that this part of the trash deposit may

represent a single-component midden that was redeposited with the jutes and rapidly reburied, although the condition of the ceramics in the rest of the lots suggests secondary refuse.

Suboperation C

Sub-operation C represents excavations in a midden located near a small mound south of the main central architectural complex at Chan, and is likely associated with that mound (Robin et al. 2004). Analysis of the ceramics from Suboperation C demonstrates a Late Classic, largely Pesoro (Tepeu II) occupation. The majority of the ceramics are highly eroded, and therefore probably represent redeposited material, or a midden deposit that was not rapidly buried subsequent to deposition. There is a large quantity of Belize Red ceramics, largely eroded but easily identifiable based on paste characteristics, and this creates a problem in categorizing these sherds by time period. In the absence of any identifiable surface (decorative) or formal characteristics, the chronological placement of Belize Red becomes questionable. The type is known to have come into usage at the beginning of the Late Classic Tepeu I (the Jalacte Complex at Chan), then continues in greater frequency in the Pesoro Complex (Tepeu II), and appears in reduced frequencies in the Vieras Complex (Tepeu III). It is therefore possible that some of these Belize Red sherds represent evidence of slightly earlier or slightly later occupation, however, given the predominance of other types common to Tepeu II, I have chosen to place them within the Pesoro Complex counts in the table below.

Op	Sub-Op	Lot	Count	"Cunil"	Boden	Cadle	Potts	Burrell	Jalacte	Pesoro	Vieras	Postclassic	Unknown Preclassic	Unknown Classic	Unslipped/ Eroded	% Identified	Comments (% of identifiable sherds)
3	C	1	581	0	0	0	0	0	0	46	0	0	0	21	514	12%	Unknown Classic (32%) Garbutt Creek Red (6%) Dolphin Head Red(1%) Roaring Creek Red (1%) Belize Red (14%) Mt. Maloney Black (18%) Cayo Unslipped (28%)
3	C	2	822	0	0	0	0	0	0	104	0	0	0	19	699	15%	Cubeta Incised (1%) Dolphin Head Red (2%) Belize Red (41%) Mt. Maloney Black (16%) Cayo Unslipped (24%) Unknown Classic (16%)
3	C	3	576	0	0	1	0	0	0	74	0	0	1	4	496	14%	Laguna Verde Incised (1%) Unknown Preclassic (1%) Unknown Classic (5%) Dolphin Head Red (4%) Belize Red (41%) Mt. Maloney Black (15%) Cayo Unslipped (28%) Chunhuitz Orange (5%)
3	C	4	91	0	0	0	0	0	0	11	0	0	0	0	80	12%	Dolphin Head Red (9%) Belize Red (27%) Mt. Maloney Black (19%) Cayo Unslipped (36%) Chunhuitz Orange (9%)
3	C	6	2	0	0	0	0	0	0	0	0	0	0	0	2	0%	

Suboperation D

Suboperation D represents an excavation in an area of sparse refuse located through the posthole sampling off the southeast edge of the central plaza at Chan (Robin et al. 2004). The ceramics are highly eroded and as in suboperation C probably represent redeposited materials, or a midden that was not rapidly buried. As indicated for suboperation C, the abundant, but eroded Belize Red sherds have been included in the Pesoro Ceramic Complex (Tepeu II) in the table below.

Op	Sub-Op	Lot	Count	"Cunil"	Boden	Cadle	Potts	Burrell	Jalacte	Pesoro	Vieras	Postclassic	Unknown Preclassic	Unknown Classic	Unslipped/ Eroded	% Identified	Comments (% of identifiable sherds)
3	D	1	448	0	0	0	0	0	7	45	0	0	0	5	391	13%	Unknown Jalacte Forms (12%) Unknwon Classic (9%) Dolphin Head Red (7%) Belize Red (35%) Tinaja Red (1%) Mt. Maloney Black (18%) Cayo Unslipped (21%)
3	D	2	552	0	0	0	0	0	5	61	0	0	0	0	486	12%	Unknown Jalacte Forms (7%) Dolphin Head Red (3%) Belize Red (64%) Mt. Maloney Black (16%) Cayo Unslipped (10%)
3	D	3	1349	0	0	1	0	2	1	125	0	0	1	6	1338	10%	Unknown Late Preclassic (<1%) Unknown Early Classic (1%) Mountain Pine Red (<1%) Dolphin Head Red (5%) Belize Red (59%) Mt. Maloney Black (15%) Cayo Unslipped (12%) Chunhuitz Orange (3%) Unknown Classic (4%)
3	D	5	661	0	1	2	0	0	0	0	53	0	0	10	595	10%	Savana Orange (1%) Unknown Late Preclassic (3%) Garbutt Creek Red (1%) Dolphin Head Red (6%) Kaway Impressed (1%) Belize Red (50%) Mt. Maloney Black (14%) Cayo Unslipped (9%) Unknown Classic (15%)

Additionally, two special ceramic artifacts were found in this excavation; a broken "incensario plug" in Lot 2 and an eroded worked sherd disk in Lot 5 (Figure 6 below).

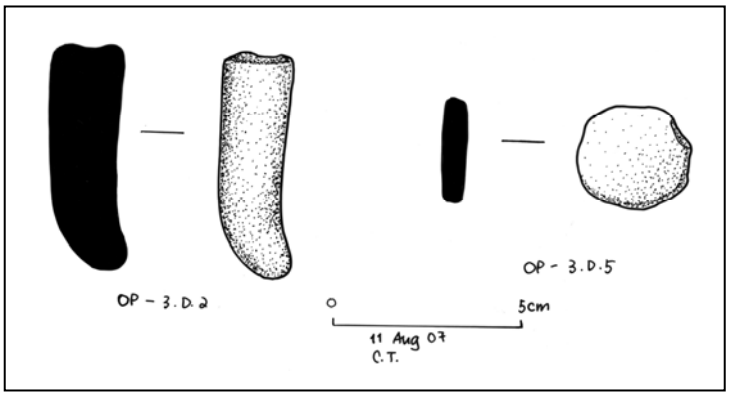

Figure 6: Special ceramic artifacts from Operation 3 (illustrated by Carmen Ting).

CERAMICS FROM OPERATION 29

Operation 29 included posthole sampling and test excavations of mound group C-199 located 970m south of the site core of Chan (Meierhoff 2006). Group C-199 was identified as the location of a probable chert artifact deposit and possible knapping workshop based on survey and surface collection data from the 2002 Chan survey (Robin et al. 2002), and the ceramics were analyzed to assist the beginning analysis of the Chan lithics by Nicholas Hearth (this volume). The ceramics come from 169 posthole tests (Suboperation A), spread across a 60m by 60 m grid in the terrain surrounding the mound group at 5m intervals. The presence of artifacts in a number of the postholes was then utilized to determine the locations for 1m by 1m test pit excavations (Suboperations B – I). For a complete discussion of the sampling procedures and excavations see Meierhoff 2006.

Unfortunately, for the purposes of this ceramic analysis, there was only a small quantity of identifiable material in both the postholes and the test pit excavations, as can be seen in the table below. In the few instances where ceramics were well preserved, the postholes and excavations contained both Middle Preclassic and Late Classic sherds. The presence of Middle Preclassic Savana Orange sherds can be explained by their easy identification even in an eroded condition, however, the analysis suggests a Late Classic Pesoro (Tepeu II) and Late Classic Vieras (Tepeu III) date for the occupation of mound group C-199.

Op	Sub-Op	Lot	Count	"Cunil"	Boden	Cadle	Potts	Burrell	Jalacte	Pesoro	Vieras	Postclassic	Unknown Preclassic	Unknown Classic	Unslipped/ Eroded	% Identified	Comments (% of identifiable sherds)
29	A	85	6							1					5	20%	Cayo Unslipped (100%)
29	A	86	1											1		0%	
29	A	94	3											3		0%	
29	A	100	6											6		0%	
29	A	105	1											1		0%	
29	A	107	4		1						1				2	50%	Savana Orange (50%) Unknown Unslipped Vieras (50%)
29	A	127	8											8		0%	
29	A	134	1											1		0%	
29	A	142	3											3		0%	
29	A	145	1											1		0%	
29	A	146	1								1					100%	Achote Black (100%)
29	A	152	1											1		0%	
29	A	156	2											2		0%	
29	A	159	5							1					4	20%	Cayo Unslipped (100%)
29	A	162	1											1		0%	
29	B	1	9											9		0%	
29	B	2	9											9		0%	
29	C	1	5							1					4	25%	Mt Maloney (100%)
29	C	2	14											14		0%	
29	C	3	8						1	1	1				5	38%	Jalacte/Vieras Forms (possible Teakettle Bank Black) (50%) Vieras Form (50%)
29	C	4	5											5		0%	
29	D	1	57		1					3	3			2	48	2%	Savana Orange (11%) Mt. Maloney (33%) Cayo Unslipped (33%) Late Classic Unknown (22%)
29	D	2	39											1	38	0%	
29	E	1	9											9		0%	
29	E	2	46											2	44	0%	
29	E	3	8											8		0%	
29	G	1	8		1					1				1	5	38%	Savana Orange (33%) Belize Red (33%) Late Classic Unknown (33%)
29	H	1	1												1	0%	
29	H	2	4												4	0%	
29	I	1	1												1	0%	

SURVEY CERAMICS

Survey methodologies and results from the Chan site are described in prior publications (Robin et al. 2002; Wyatt and Kalosky 2003). Ceramic artifacts were collected when visible on the surface, in looters' trenches, or other disturbance areas. However, surveyors picked up only those sherds, which were felt to be diagnostic, resulting in a possible bias towards certain time periods or types. For example, the ease of identification of Mars Orange Ware may lead to an elevated population count for the Boden Complex when based on the presence or absence of ceramic types. Additionally, the continued use of certain types across more than one ceramic complex complicates any interpretation. For example, it is often impossible to determine in which ceramic complex to code Belize Red without vessel form characteristics, as mentioned previously. Belize Red begins in use in the Jalacte Complex and continues throughout the Late Classic in increased frequencies in the Pesoro and Vieras Complexes, and yet a decision must be made in which complex to include those sherds. For the purposes of this analysis, ceramic types are counted within the ceramic complex in which they generally occur in the greatest frequency.

Of the total sherds collected (n=1623), there were no sherds from the Cunil Complex, <1% from the Boden Complex, 2% from the Cadle Complex, 1% from the Potts Complex, 3% from the Burrell Complex, 4% from the Jalacte Complex, 46% from the Pesoro Complex, 6% from the Vieras Complex, <1% from the Postclassic, <1% from Unknown Preclassic, 18% from Unknown Classic, and 20% that are either too eroded or are unslipped body sherds that are not identifiable.

Site #	SC #	Count	"Cunil"	Boden	Cadle	Potts	Burrell	Jalacte	Pesoro	Vieras	Postclassic	Unknown Preclassic	Unknown Classic	Unslipped /Eroded
C-003	SC1	40	0	0	2	1	2	1	32	2	0	0	0	0
C-004	SC1	10	0	0	6	1	1	0	0	0	0	1	1	0
C-005	SC2	2	0	0	0	0	0	0	0	0	0	0	2	0
C-005	SC3	6	0	0	0	0	0	0	4	0	0	0	2	0
C-007	SC1	1	0	0	0	0	0	0	5	0	0	0	0	0
C-007	SC3	7	0	0	1	0	0	0	4	1	0	0	1	0
C-009	SC3	13	0	0	1	0	2	1	1	0	0	0	8	0
C-009	SC2	12	0	0	1	0	0	0	8	0	0	0	3	0
C-009	SC3	4	0	0	0	0	0	0	4	0	0	0	0	0
C-010	SC1	9	0	0	0	0	0	0	4	0	0	0	5	0
C-011	SC1	3	0	1	0	0	0	0	1	0	0	0	0	0
C-012	SC1	6	0	1	0	0	0	0	4	0	0	0	1	0
C-017	SC1	1	0	0	0	0	0	0	1	0	0	0	2	0
C-017	SC2	16	0	1	0	0	2	0	11	0	0	0	2	0
C-018	SC1	2	0	0	1	0	0	0	1	0	0	0	0	0
C-021	SC1	13	0	0	0	0	1	0	8	0	0	0	4	0
C-022	SC1	1	0	0	0	0	0	0	1	0	0	0	0	0
C-027	SC1	2	0	0	0	0	0	0	1	1	0	0	0	0
C-029	SC3	12	0	0	0	0	1	1	7	1	0	0	2	0
C-032	SC1	8	0	0	0	0	0	1	4	0	0	0	1	2
C-035	M2-6	97	0	0	0	0	0	5	15	0	0	0	4	73
C-035	M1; M7	20	0	0	0	0	0	0	3	0	0	0	2	15
C-039	SC1	7	0	0	0	0	0	0	4	0	0	0	2	1
C-040	SC1	1	0	0	0	0	0	0	1	0	0	0	0	0
C-043	CS1	3	0	0	0	0	0	0	2	1	0	0	0	0
C-051	SC1	1	0	0	0	0	0	0	0	0	0	0	1	1
C-051	SC2	2	0	0	0	0	0	0	3	0	0	0	0	0
C-067	SC1	1	0	0	0	0	0	0	0	0	0	0	0	1
C-073	SC1	1	0	0	0	0	0	0	0	0	0	0	0	1
C-075	SC1	1	0	0	0	1	0	0	0	0	0	0	0	0
C-078	SC1	10	0	0	0	0	1	0	6	0	0	0	0	3
C-080	SC1	2	0	0	0	0	0	1	1	0	0	0	0	0
C-083	SC1	1	0	0	0	0	0	0	0	0	0	0	1	0
C-086	SC1	4	0	1	0	0	0	0	1	2	0	0	0	0
C-086	SC2	2	0	0	0	0	0	0	2	0	0	0	0	0
C-087	SC1	1	0	0	0	0	0	1	0	0	0	0	0	0
C-088	SC1	17	0	0	0	0	0	0	15	1	0	0	1	0
C-090		4	0	0	0	0	0	0	2	0	0	0	0	2
C-091		1	0	0	0	0	0	0	1	0	0	0	0	1
C-093	SC1	2	0	0	0	0	0	1	1	0	0	0	0	0
C-093	SC2	7	0	0	0	0	1	0	6	0	0	0	0	0
C-093	SC3	3	0	0	0	0	0	0	3	0	0	0	0	0
C-095	SC1	2	0	0	0	0	0	0	0	0	0	1	0	1

C-095	SC2	2	0	0	0	0	0	0	5	0	0	0	0	0
C-096	SC1	4	0	0	0	0	0	1	2	1	0	0	0	0
C-100	SC2	2	0	0	0	0	0	0	2	0	0	0	0	0
C-101	SC1	1	0	0	0	0	0	0	2	0	0	0	0	1
C-102	SC1	3	0	0	0	0	0	0	2	0	0	0	0	1
C-108	SC1	1	0	0	0	0	0	0	0	0	0	0	0	1
C-116	SC1	1	0	0	0	0	0	0	1	0	0	0	0	0
C-118	SC1	1	0	0	0	0	0	0	1	0	0	0	0	0
C-122		4	0	0	0	0	0	0	1	0	0	0	3	0
C-124	SC1	15	0	0	0	0	0	0	13	2	0	0	0	0
C-129	SC1	1	0	0	0	0	0	1	0	0	0	0	0	0
C-131	SC1	37	0	0	5	0	6	1	21	1	0	0	3	0
C-132	SC1	3	0	0	0	0	0	0	3	0	0	0	0	0
C-133	SC1	4	0	0	0	0	0	0	3	1	0	0	0	0
C-138	SC1	2	0	0	0	0	0	0	1	0	0	0	1	0
C-141		6	0	0	0	0	0	1	0	0	0	0	1	4
C-142	SC1	7	0	0	0	0	0	0	7	0	0	0	0	0
C-150	SC1	15	0	0	0	0	2	1	12	0	0	0	0	0
C-150	SC2	17	0	0	0	0	0	1	9	6	0	0	1	0
C-150	SC3	8	0	0	0	0	1	0	6	0	0	0	1	0
C-151	SC1	1	0	0	0	0	0	0	0	0	0	0	1	0
C-154	SC2	6	0	0	0	0	0	0	6	0	0	0	0	0
C-156	SC1	1	0	0	0	1	0	0	0	0	0	0	0	0
C-158	SC1	3	0	0	0	0	1	0	2	0	0	0	0	0
C-158	SC3	15	0	0	0	0	1	2	10	1	0	0	1	0
C-159		1	0	0	0	0	0	0	0	1	0	0	0	0
C-160	SC1	1	0	0	0	0	0	1	0	0	0	0	0	0
C-168	SC1	9	0	0	0	0	0	0	8	0	0	0	1	0
C-168	SC2	11	0	0	0	0	0	0	11	0	0	0	0	0
C-169	SC1	9	0	0	0	0	1	0	9	0	0	0	0	0
C-171	SC1	6	0	0	0	3	1	0	2	0	0	0	0	0
C-171	SC2	15	0	0	1	4	5	4	1	0	0	0	0	0
C-174	SC1	31	0	0	0	0	2	3	19	6	0	0	1	0
C-175	SC1	1	0	0	0	0	0	0	0	0	0	0	1	0
C-179	SC1	1	0	0	0	0	0	0	1	0	0	0	0	0
C-180	SC1	1	0	1	1	0	1	0	0	2	0	0	1	0
C-181	SC1	20	0	0	1	0	5	0	11	0	0	0	3	0
C-186	SC1	19	0	0	1	0	0	1	15	0	0	0	2	0
C-188	SC1	1	0	1	0	0	0	0	0	0	0	0	0	0
C-193	SC1	10	0	0	0	0	1	4	1	0	0	0	4	0
C-195	SC1	3	0	0	0	0	0	0	3	0	0	0	0	0
C-196	SC1	1	0	0	0	0	0	0	0	0	0	0	0	1
C-200	SC1	1	0	0	0	0	0	0	0	1	0	0	0	0
CT-201	SC1	28	0	0	0	0	0	0	23	3	0	0	0	0
C-295		20	0	0	0	0	0	1	2	0	0	0	2	15
C-296		17	0	0	0	0	0	0	0	0	0	0	3	14
C-297		16	0	0	0	0	0	0	8	0	0	0	2	6
C-298		17	0	0	0	0	1	0	6	2	0	0	3	5
C-299	M1	16	0	0	0	1	1	0	10	0	0	0	0	4
C-299	M2	8	0	0	0	0	0	0	2	0	0	0	0	6
C-299	M3	8	0	0	0	0	0	0	1	0	0	0	1	6

C-300	M1	3	0	0	0	0	0	0	0	0	0	0	1	2
C-300	M2-M4	28	0	0	0	0	0	0	9	0	0	1	1	17
C-300	M5	6	0	0	0	0	0	0	0	0	0	0	2	4
C-301		16	0	0	0	1	1	1	0	6	1	0	1	5
C-303	M1	8	0	0	0	0	0	0	1	0	0	0	2	5
C-303	M2-M4	25	0	0	0	0	0	0	2	1	0	0	0	22
C-304	M1	7	0	0	0	0	0	0	2	0	0	0	1	4
C-305	M1	9	0	0	1	0	0	0	0	0	0	0	4	4
C-306		1	0	0	0	0	0	1	0	0	0	0	0	3
C-307		36	0	0	1	0	0	0	1	2	0	0	2	30
C-308		2	0	0	0	0	0	0	0	1	0	0	1	0
C-312	M1	12	0	0	0	1	0	0	0	0	0	0	1	10
C-312	M2-M4/F1	32	0	0	0	0	0	1	6	0	0	1	1	23
C-313	M1	14	0	0	0	0	0	0	0	1	0	0	3	10
C-313	M2-M4/F1	5	0	1	0	0	0	0	2	0	0	0	0	2
C-314	F1	80	0	0	0	0	2	3	33	7	0	0	34	0
C-314	Hill-side	6	0	0	0	0	0	0	2	0	0	0	4	0
C-314	Hill-top	8	0	0	0	0	0	1	4	0	0	0	3	0
C-314	M2	81	0	0	0	0	1	1	48	5	0	0	26	0
C-314	M3	44	0	0	2	0	1	4	16	4	0	0	17	0
C-314	M4	9	0	0	0	0	0	0	7	1	0	0	1	0
C-314	S1-S3	4	0	0	0	0	0	0	0	2	0	0	2	0
C-314	T1	43	0	0	0	0	0	1	20	11	0	0	11	0
C-314	T2	1	0	0	0	0	0	0	0	1	0	0	0	0
C-314	T3	6	0	1	0	0	0	0	0	0	0	0	3	2
C-314	T4	5	0	0	0	0	0	0	1	0	0	0	4	0
C-315	Far Terr-aces	1	0	0	0	1	0	0	0	0	0	0	0	0
C-315	For-ward Terr-aces	6	0	1	0	0	0	0	0	0	0	0	5	0
C-315	Hill/ Terr-ace	36	0	0	0	1	1	3	22	1	0	0	8	0
C-315	M1	30	0	0	0	0	0	2	22	1	0	0	4	1
C-316		5	0	0	0	0	1	0	0	0	0	0	4	0
C-317	M1; M4	6	0	0	0	0	0	0	3	0	0	0	2	1
C-317	M2; M3; M5	5	0	0	0	0	0	0	4	0	0	0	1	0
C-318	M1	9	0	0	0	0	0	0	9	0	0	0	0	0
C-318	M2	25	0	1	0	0	0	1	0	5	0	0	18	0
C-319	M2-M3	17	0	0	0	0	0	0	16	0	0	0	1	0
C-321		4	0	0	0	0	0	0	4	0	0	0	1	0
C-322	M2	5	0	0	0	0	0	0	1	2	0	0	2	0
C-322	M2	23	0	0	1	0	0	1	12	5	0	0	0	4
C-328	M3	1	0	0	0	0	0	0	0	0	0	0	0	1

C-329		11	0	0	0	0	0	1	7	0	0	0	3	0
C-330		11	0	2	2	0	0	0	0	0	0	0	3	4
C-331	M1-M2	5	0	0	1	0	1	0	0	0	0	1	2	0
C-334		2	0	0	0	0	0	0	0	0	0	0	2	0
C-338	Hill-top	30	0	0	0	0	0	5	16	0	0	0	9	0
C-338	M1	2	0	0	0	0	0	0	0	0	0	0	2	0
C-339		26	0	2	0	0	0	0	20	0	0	0	4	0

When one looks at the distribution of ceramics by complex across the 153 samples from the site (as shown in the following table) it is clear that the vast majority of loci exhibit occupation during the Late Classic, although some areas are occupied beginning in the Middle Preclassic Boden Complex. According to these ceramic data, the Chan site is occupied beginning in the Middle Preclassic Boden Complex with 8.5% of all mounds surveyed demonstrating occupation. The population would appear to grow, as indicated by the 12.1% of loci with Late Preclassic Cadle Complex ceramics. The apparent slight decline in the Terminal Preclassic Potts Complex (7.8%) may be an artifact of the ceramic analysis. Many Late Preclassic ceramic types from the Cadle Complex continue in use in the Terminal Preclassic, and in the absence of formal characteristics, or types that are present only in the Potts Complex (for example, mammiform supports or San Antonio Golden Brown) some material that is included in the Cadle Complex counts may in fact represent slightly later occupation. The number of loci with Early Classic Burrell Complex material (20.6%) and Late Classic Tepeu I Jalacte Complex ceramics (24.8%) continues to rise, until the highest density is reached in the Late Classic Tepeu II Pesoro Complex with 70.2% of all loci occupied. There is an apparent drop off in occupation in the Late Classic Tepeu III Vieras Complex (25.5%) and virtually no Postclassic material in the survey samples (0.7%) although small quantities of Postclassic pottery and lithics have been found in the site center area as well. The preliminary population and settlement survey results have been discussed by Robin and Docster (in prep), and as their GIS analysis is currently ongoing, will incorporate these ceramic data in future reports.

Total Survey Samples	"Cunil"	Boden	Cadle	Potts	Burrell	Jalacte	Pesoro	Vieras	Postclassic	Unknown Preclassic	Unknown Classic	Unslipped /Eroded
141	0	12	17	11	29	35	99	36	1	5	79	44
	0.0%	8.5%	12.1%	7.8%	20.6%	24.8%	70.2%	25.5%	0.7%	3.5%	56.0%	31.2%

RESULTS AND GOALS FOR 2008

In 2006 the ceramic analysis focused on the pottery from the center and north buildings of Structure 5, a tri-partite eastern "E-group" and the largest structure at the Chan site (Kosakowsky 2006). With this focus on site center and ritual ceramic usage, we decided to continue with some site center analysis in 2007 by looking at the material from Operation 1, and to complement the work done on the skeletal material by Anna Novotny (this volume). In 2008, the analysis will begin with the ceramics from the western building of the Structure 5 E-Group, and future publications will focus on the architectural, ceramic, burial, and cache sequences from the site core. Another major focus in the coming years will be the south range structure in the site core, and smaller patio groups outside the site core.

Chan continues to offer a unique set of ceramic data with which to understand a level of prehistoric Maya society that is all too often ignored. Chan is a relatively small agrarian community, and yet it possesses an E-Group, an architectural feature generally associated with larger sites (Aimers and Rice 2006; Aveni and Hartung 1989; Ricketson and Ricketson 1937). The site core sequence, including the central plaza, provides a deep chronological history of the site and will allow us to address questions about the nature of Chan's founding family, the role of ritual at this level of Maya sociopolitical organization, and the role of these mid-level elites in wider networks linking Chan to sites throughout the Belize Valley and the Maya lowlands beginning as early as the Late Preclassic. A major assumption governing much of the research in Belize Valley archaeology has been the primacy of the major site of Xunantunich in its relations with smaller sites (LeCount 2002), and it is hoped that the fine-grained ceramic analysis at Chan will help describe the nature of this relationship during the Late Classic. The settlement survey data from Chan indicate continuing growth from the Early Middle Preclassic through the Early Classic, with a dramatic increase beginning in the Late Classic, and future analyses focusing on occupation outside the site core will hopefully provide some clues as to community organization within the Chan site. The wide range of contexts sampled at Chan, both architectural and spatial, will allow analyses that inform on domestic and ritual sets of behaviors throughout Chan's almost 2,000 year history.

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THE CHAN SHELL COLLECTION: 2000 YEARS OF CRAFT, FOOD, IDENTITY, AND RITUAL

Angela H. Keller

During the 2007 laboratory season the entirety of Chan's shell collection was analyzed. Through this analysis and data entry the four rather disparate-seeming issues in this title (craft, food, identity, and ritual) have coalesced into a single overarching theme: the construction of community identity. Much of the recent archaeological interest in identity, and specifically the use of shell ornaments in the construction of identity (Isaza Aizpurúa 1997, 2004; Isaza Aizpurúa and McAnany 1999; Joyce 2000, 2001; Trachman 2006), has focused on the identities of individuals as shaped by gender, age, and status. The data for these arguments come largely from burial contexts where we have secure associations between individuals and their things. Nevertheless, as I analyzed the shell collection from the Chan Project burials, not as an isolated set but as part of the entire universe of Chan shell use, I was repeatedly struck by how few shell objects seemed to be "about" individual gendered, aged, or statused identities. I have come to believe that most of the shell items in burials, caches, and other contexts at Chan are "about" the construction and negotiation of a shared community identity — Chan-ness — rather than the manipulation of personal identities.

This report describe three processes by which I believe the people of Chan negotiated the social contours of their community with shell objects:
-the consumption and ritual deposition of freshwater snails (jutes)
-the ritual placement of shell items in caches and burials
-the production and distribution of shell ornaments

ANALYZING THE CHAN SHELL COLLECTION

I would like to acknowledge the help of three people who worked tremendously hard to process the freshwater shell items that make up the bulk of the shell materials analyzed this year: Elise Docster from Northwestern University, Joyce Tun from the Belizean Institute of Archaeology, and Sylvia Batty, a Belizean student who worked with us as an intern this summer. Together, we analyzed roughly 29,000 shell items including 559 ornaments, 98 pieces of marine shell-working detritus, and over 27,000 river snails of the genus Pachychilus, also known as jutes in Belize. The remainder are terrestrial species and other unworked freshwater taxa. Our analyzed collection includes all of the worked and unworked shell from the five years of excavation at the Chan's Central Group and surrounding community, with one caveat: we analyzed only a sample of the jutes from a test unit placed in an extraordinarily dense deposit of jutes adjacent to a leading family residence (see below).

To complete the shell analysis, I constructed a relational database with several data-entry screens specially designed for the needs of each analyst (Figure 1). Most of the jute analysis was initially recorded on paper forms due to several technical factors (including rather frequent power outages). We recorded provenience information, taxonomic identifications, shell portion, artifact form and type, metric data, taphonomic data, and the location and description of any cultural modifications (e.g. perforations, incising, grinding). I personally recorded the non-jute items including all of the ornaments and shell-working debris.

We identified three freshwater and six marine genera, as well as a handful of terrestrial taxa (Table 1). The taxonomic diversity at Chan is similar to that of other Belize Valley sites such as Barton Ramie (Willey et al. 1965) and Pacbitun (Hohmann 2002), although notably less than the diversity seen in collections from larger sites such as Tikal (Moholy-Nagy 1963, 1985) and Caracol (Cobos 1994). In addition, the Chan site and other Belize Valley sites tend to have significantly more river snails (Pachychilus) and Caribbean conchs (Strombus), and less spiny oyster (Spondylus) than is typical at larger sites. This differential distribution of shell taxa likely reflects the humbler political position of most Belize Valley sites relative to their larger neighbors. The scarcity of Spondylus in the valley also suggests that the trade in these lovely reddish-orange shells was controlled in some manner by the highest elites, and that the Spondylus trade network was distinct from that for other, more common shell materials like conch and olive shells.

Following the work of previous researchers in the Maya lowlands (e.g., Isaza Aizpurúa and McAnany 1999; Moholy-Nagy 1963, 1987; Taschek 1994; Willey 1965, 1972, 1978), I divided the worked shell artifacts into several sub-types grouped into three traditional generic types: adornos, beads, and pendants (Table 2). To allow for a later reconsideration of the validity of the traditional typology, I also recorded discrete metric, production, and formal characteristics for each worked item. The Chan worked shell collection contains small and large disk beads, rosettes, Oliva tinklers, tiny whole-shell beads, saucers, countersunk disks, and a few anthropomorphic and zoomorphic forms (Figure 3). In addition to traditional ornament types, I created new types for broken bits of marine conch (Strombus, most S. pugilis) with perforations (perforated shell) and without perforations (shell-working detritus), all interpreted as the remains of shell craft production in the Chan community. Before delving into worked shell items, though, let us take a few moments to consider the jute.

THE PROPER CARE AND HANDLING OF JUTES

Although the lowly Pachychilus river snail, or jute, has a long history of being neglected in archaeological analyses, the many documented instances of freshwater snails in caches (Brown 2003; Emery 2002; Moholy-Nagy 1978, 1985) and in cave deposits (Halperin et al. 2003), indicate that we should pay closer attention to these hardy little shells. To that end, we spent a considerable amount of time identifying, counting, and measuring (yes, measuring) jutes.

The centerpiece of this analysis was a rather stupendous collection of jutes from a single test unit placed in a dense deposit consisting almost entirely of jute shells. This deposit, named the Jute Midden during excavation, is located along the western edge of a leading family residence (C-003) adjacent to Chan's Central Group. We could not analyze all of the more than 100,000 jutes collected from the Jute Midden, and so we analyzed slightly more than a 10% sample. Judging from the midden's ceramics, analyzed by Laura Kosakowsky this year, we believe that the jutes were redeposited in the Late Classic period, but they were probably consumed much earlier in the Preclassic period.

The Jute Midden collection is dominated by the smooth, small species of jute, Pachychilus indorium, with a relatively tiny proportion of the larger sculptured species, P. glaphyrus (Figure 2). We also distinguished a third, morphologically distinct variety of jute that I have tentatively identified as P. largillierti based on illustrations in the Barton Ramie report (Willey et al. 1965:Figure 309 s, t) and in Eduard von Martens' treatise on the land and freshwater mollusks of Central America (von Martens 1890:Plate 26). We subsequently

identified specimens of this "third species" in many other contexts beyond the Jute Midden, and from all time periods, although it appears to be more common in the Late Classic period than in earlier periods.

In addition to a new species, we identified a previously undocumented method of jute processing. Researchers have long known that one of the traditional methods of processing jutes for consumption is to cut or lop off the shell's pointed spire, thus releasing the animal from its shell. During the Jute Midden analysis, we were surprised to find that many of the jutes did not have broken spires. Fortunately, Sylvia Batty, our Belizean student intern, was there to tell us about how her grandmother made jute stew. She told us that her grandmother did not cut the spires when she cooked jutes but, instead, broke tiny holes in the sides of the shells to release the animals. Sylvia then picked up a handful of our jute shells and pointed out small holes in the sides of the shells that looked suspiciously regular in placement and form. After looking at several thousand jutes, I can affirmatively say that the holes are intentional, and I suspect that they functioned in the same way as the spire lopping to release the animal's hold on its shell. In the Jute Midden sample, a majority of the jutes have these extraction holes or are spire-lopped, suggesting that they are food remains.

Upon analysis, we found that the average density of the Jute Midden is an astounding 46,000 jutes per cubic meter. Cynthia Robin estimates that the main deposit of the Jute Midden is roughly 10 x 10 m in area with two adjacent lower-density deposits, 5 x 10 m and 5 x 15 m in size. Using those size estimates and extrapolating from our analyzed sample, the entire Jute Midden contains roughly 2.7 million jutes.

The enormous quantity of shells indicates consumption on a grand scale far beyond the needs (or capacity) of even the largest extended family. Using Healy et al.'s (1990) published nutritional data for Pachychilus indiorum, we can estimate that the Jute Midden contains approximately 23,000 meals of 500 calories each.1 The Jute Midden may be the visible remains of repeated communal gatherings —replete with festal foods and beverages— through which Chan's emerging leaders in the Preclassic period asserted their distinctive authority and negotiated the terms of community life (Robin 2008; cf. LeCount 1997). Extending this numbers game even further: if an average of 200 people came to the proposed Chan community gatherings, and each person had one jute "meal" per gathering, the Jute Midden contains the debris from at least 115 gatherings.

In the Late Classic period, the leading families of the Chan community gathered these jutes to create an enormous sea of shell around their elevated platform residence. At the nearby site of Xunantunich, Tom Jamison (Jamison 1992:25) found a similarly dense deposit of jute shells placed in a pit dug into bedrock at the northwest corner of the central Structure A-1. He interpreted the shells as a ritual offering and possibly as the remains of feasting. Beyond the Xunantunich jute pit, the most comparable deposits come from cave contexts where the intentional deposition of (consumed) jutes seems distinctly ritual, and arguably related to the concepts of sacred water, fertility, death, and renewal (Halperin et al. 2003). At Chan, the specific symbolic meaning of the Jute Midden remains uncertain, but the symbolic quality of the vast deposit is undeniable.

SHELL IN SPECIAL PLACES

Middle Preclassic

Social life at Chan began in the Middle Preclassic period. As the earliest levels of the Central Plaza were being constructed, the people of Chan were making shell objects and depositing hand fulls of shell beads in the plaza fills. Shell items in caches from the Middle Preclassic period consist entirely of products that were likely manufactured at the site (such as disk beads and perforated shells) and the debris from marine shell working (e.g., columellas, spires, and body fragments). Although working with an imported shell raw material (Strombus), Chan shell production and use is largely self-sufficient in the Middle Preclassic.

Late and Terminal Preclassic

In the Late and Terminal Preclassic periods, caching and burial practices in Chan's Central Group shifted focus from the plaza floor to the east and west structures built to flank the plaza in an E-group configuration. Caches continued to include shell-working detritus, particularly the attractive spire ends of Strombus. Some Late and Terminal Preclassic burials include shell ornaments while others contain only unmodified river mussels (Nephronaias) and jutes (Pachychilus). One of the more richly equipped burials was Burial 2 from the eastern structure of the E-group, which held an adult male wearing a matched set of disk-shaped shell ornaments, possibly earrings. This is one of the few instances of probable individual identity-marking in the Chan burial collection, suggesting that the man from Burial 2 was a person of some significance.

One important cache (Operation 13 Special Deposit 8) with shell may also date to this time period or later to the Early Classic period (pending Kosakowsky's ceramic analysis in 2008). To place the cache, the people of Chan dug a hole into bedrock underneath the western structure of Chan's E-Group, the western structure of the E-group. Within the hole, they placed two basal-flange bowls stacked lip-to-lip. Inside, excavators found four diminutive anthropomorphic figurines of the "Charlie Chaplin" type (one yellowish Spondylus, one reddish Spondylus, one green jade, and one black slate) and one white shell facial profile, along with an assortment of worked jade and hematite pieces. The hematite pieces may have been part of a mosaic mirror layered in the cache. The four little figurines and one profile were arranged in a quincunx at the base of one of the bowls, apparently creating a tiny model of the universe complete with color associations.

At the site of Caracol, Diane and Arlen Chase have found a similar, albeit more elaborate, dedicatory cache (P8B-1), recently re-assigned from the Early Classic to the Terminal Preclassic period on the basis of new radiocarbon dates (Chase and Chase 2006:51). Like the Chan cache, the Caracol cache was placed in that site's E-group. In the Caracol cache, the Chases found five tiny anthropomorphic figurines of the Charlie Chaplin type (one jade, four shell) arranged in a quincunx. The cache also included a hematite mirror layered under the figurines, and a host of other precious objects. The Chases interpret this cache as a "cosmogram" intended "to center the building and, by extension, the site of Caracol" (Chase and Chase 2006:53). With fewer and less costly materials, the people of Chan seem to have been effecting a similar centering ceremony for their growing site.

Late Classic

In the Late Classic period, the Chan populace had access to significantly more shell ornaments of many more varieties. Some of those ornaments made their way into burials but there are no clear age or sex associations with specific shell objects in burials. Men, women, and children are all associated with some shell objects, and none seems to receive better or more items consistently. Interestingly, the only burials in the site center with significant quantities of shell objects are the two crypt-style multiple interments, one in the eastern structure and one in the western structure of the E-group. In each burial, the most notable shell items are dozens of tiny shell beads made from punch-perforated margin shells in one case, and spire-lopped dwarf olive shells in the other. The grave goods also include finely finished shell ornaments like countersunk disks and saucers. Outside of the main site center, only one burial, Burial C5 from the Northeast Neighborhood excavated by Chelsea Blackmore, contains a similar collection of tiny whole shell beads, as well as a single saucer adorno. Burial C5 appears to be a single interment, but it has yet to be analyzed by Anna Novotny, and it may prove to be a multiple crypt as well. The association of multiple grave goods with multiple interments speaks again to the communal quality of life in the Chan community; where items of value were shared, and value was created through sharing.

Terminal Classic and Early Postclassic

At the end of the Terminal Classic period and the beginning of the Postclassic, the people of Chan began the process of deconsecrating their site, and again shell objects figured in the process. Excavators have documented several apparent termination deposits consisting of quantities of jutes (some burned) in the site core and the leading family residences. The largest of these termination deposits consisted of 548 jutes, and was recovered from a central back room of the two-story administrative structure along the south edge of Chan's Central Plaza. Bernadette Cap identified a similar deposit of 259 jutes atop a broken monument in the West Plaza. Nearby, she also recovered traces of burned resin, possibly incense.

By the Early Postclassic period, very few people remained in the Chan community. Perhaps the last ritual event in Chan's Central Group was the placement of a cache (Operation 1, Special Deposit 11) consisting of shell, jade, and ceramics. Found just centimeters below the present ground surface, the cache contained what appears to be an entire necklace of eleven heavy Spondylus beads and pendants. Considering the paucity of Spondylus ornaments from earlier deposits (n= 10), this Postclassic cache is surprisingly opulent. The necklace seems to be part of an offering to the site itself; an offering which may be contemporaneous with the breaking of the site's largest stela and the redistribution of its pieces to various points around the Central Plaza (Blackmore 2003:43).

SHELL CRAFT PRODUCTION: MAKING COMMUNITY

At Chan, shell craft production was most likely carried out on a small scale by the leading families, in the Central Group, and for distribution across the entire community (cf. Inomata 2001, 2007). During analysis, I was surprised to find a small but significant quantity of broken marine conch shell (Strombus) pieces —including columella bases, spires, lips, and body fragments— interpreted elsewhere as evidence for shell craft production (Hohmann 2002;

Moholy Nagy 1997). We do not have any evidence for the extensive manufacture of shell items from freshwater species, although occasional ornaments were produced (cf. Isaza Aizpurúa and McAnany 1999). The Chan marine shell-working detritus is concentrated in the Central Group, most of it coming from floor fills in the Central Plaza, and from the structure fills of Structures 2, 3, and 7 along the north and west side of the Central Plaza. Interestingly, several of the burials in Structure 7, the western structure in the E-group, contained shell-working detritus as grave goods, whereas none of the burials from the eastern structure, Structure 5, did.

All of the shell-working materials are identifiable as conch of the genus Strombus, and most can be further identified as Strombus pugilis, commonly known as the West Indian fighting conch. In her analysis of shell working at the site of Pacbitun, Bobbi Hohmann (2002) also found a significant quantity of S. pugilis, and noted that most of the shell-working materials were recovered not from use locations, but from secondary deposits in structural and floor fills. Hohmann also identified partially finished items, finished ornaments, and stone drills associated with shell working.

At Chan, we also have partially finished items and finished ornaments from fill contexts, but, as yet, no shell-working tools, since the lithics from the relevant contexts have not been analyzed. Nevertheless, the shell materials suggest that the some individuals, most likely members of Chan's leading families, were working Strombus shell from the Middle Preclassic period forward. The actual shell craft work may have occurred along the western edge of the site, possibly on the unusual L-shaped structure that forms the northern edge of the West Plaza. The shell workers seem to have been producing very simple perforated shell fragments and disk beads. The probable process of disk bead manufacture is reasonably well illustrated by the collected shell materials. The first step was simply to break the shell into manageable pieces and then roughly chip those pieces into desired shapes. Next the chipped pieces were perforated, typically from the interior of the shell. Finally, some of the perforated pieces were shaped and ground into round disk beads, most of them being finished individually (rather than being strung and ground in batches as is typical in California, the US Southwest, Africa, and Melanesia). Apparently, not all perforated shells were considered "blanks" for bead manufacture, as some were distributed "as is" to surrounding households (Robin 1999).

Although the Chan shell-working collection is similar in composition and recovery contexts to Hohmann's Pacbitun collection, the two differ dramatically in scale. From Pacbitun, Hohmann (2002:169) analyzed 1,463 pieces of detritus, whereas we have only 98 pieces of detritus from the Chan community (55 columella pieces, 8 spires, and 35 other fragments). While it is possible that we will find more debris in future excavations, at present, Chan shell working appears to have been a very low-intensity activity, sufficient only to meet the needs of the site itself. This craft work was aimed at the creation of small perforated shell items, of varying degrees of fineness, for the express purpose of distributing them to the surrounding community. Perforated shells and disk beads most likely made in Chan's Central Group, were found at both low-status (Type 1) and high-status (Type 5) households.

Although all of the necessary contexts have not been analyzed and assigned a temporal period, the present data suggest that shell working at the site diminished in the Late Classic period. At that time, Chan's leaders apparently began to distribute worked shell items produced elsewhere. These new distributed items include countersunk disks, rosettes, an unusual toggle-bead type, and plain unperforated saucers, all made of Strombus shell. The leaders may also be distributing the tiny whole shell beads found in large numbers in burials in the site center and in the Northeast Neighborhood. These "ready-made" shell items, like the simpler "homemade"

items of the Preclassic period, speak more to group identity across the Chan community than to discrete personal identities. Most noticeable is the overall sameness of many of the items: the limited repertoire of ornamental forms, and the distribution of similarly fine items across status lines at higher and lower status households.

Through the manufacture, distribution, and use of shell items, the people of Chan demonstrated their group identity, and defined the social landscape of their community. The apparent lack of very-fine shell items exclusive to Chan's leading families suggests something of the material compromises that the Chan leaders must have made as they negotiated their position vis-a-vis the rest of the community. What they had, they gave: first in communal feasts of jutes and in gifts of small perforated shell trinkets, and ultimately in the finest shell goods that they could procure.

Table 1. Taxa Identified in the Chan Shell Collection

Freshwater

Nephronaias (river mussels, pearly mussels)
ortmanni (thin-walled river mussel)

Pachychilus (river snails, *jutes*)
glaphyrus (sculptured or ridged *jute*)
indiorum (smooth small *jute*)
cf. *largillierti* (lightly sculptured *jute*)

Pomacea (apple snails)
flagellata (cf. *arata* form, Moholy-Nagy 1978)

Marine

Dentalium (scaphapods, tusk shells) *eboreum* (ivory tusk)
Marginella (margin shells) *apicina* (common Atlantic margin shell; AKA *Prunum apicinum*)
Oliva (olive shells)
reticularis (netted olive)
sayana (lettered olive)

*Olivell*a (dwarf olive shells)
mutica (variable dwarf olive)
floralia (common rice olive)

Spondylus (thorny oyster)
princeps (Pacific thorny oyster)

Strombus (conchs)
gigas (queen or pink conch)
pugilis (West Indian fighting conch)

Terrestrial

Various (Annulariidae, *Bulimulus*, *Euglandina*, *Neocyclotus*, *Orthalicus*, *Urocoptis*)

Note: **cf.** indicates a preliminary or uncertain identification.

Table 2. Preliminary Typology for the Chan Worked Shell Collection Type Subtype Varieties

Adorno		
	Countersunk Disk	
	Disk	
	Saucer	
	Rosette	countersunk rosette
	Geometric	
	Anthropomorph	Charlie Chaplin, face profile, death's head
	Zoomorph	frog/toad, turtle, crocodile, bird, fish
Bead		
	Small Disk	(maximum diameter < 10 mm)
	Large Disk	(maximum diameter > 10 mm)
	Squared Disk	
	Subrectangular	
	Tube	
	Rosette	
	Toggle	
	Tiny Whole Shell	punched, spire-lopped, drilled, cut & ground
Pendant		
	Whole Shell	whole valve (for bivalves)
	Tinkler	(special type of whole shell pendant)
	Plaque	
	Disk	
	Subrectangular	
	Sequin	
	Geometric	

Perforated Shell
No subtypes

Shell-working Detritus (Strombus only) Columella whole, base, fragment Spire Fragment lip, body

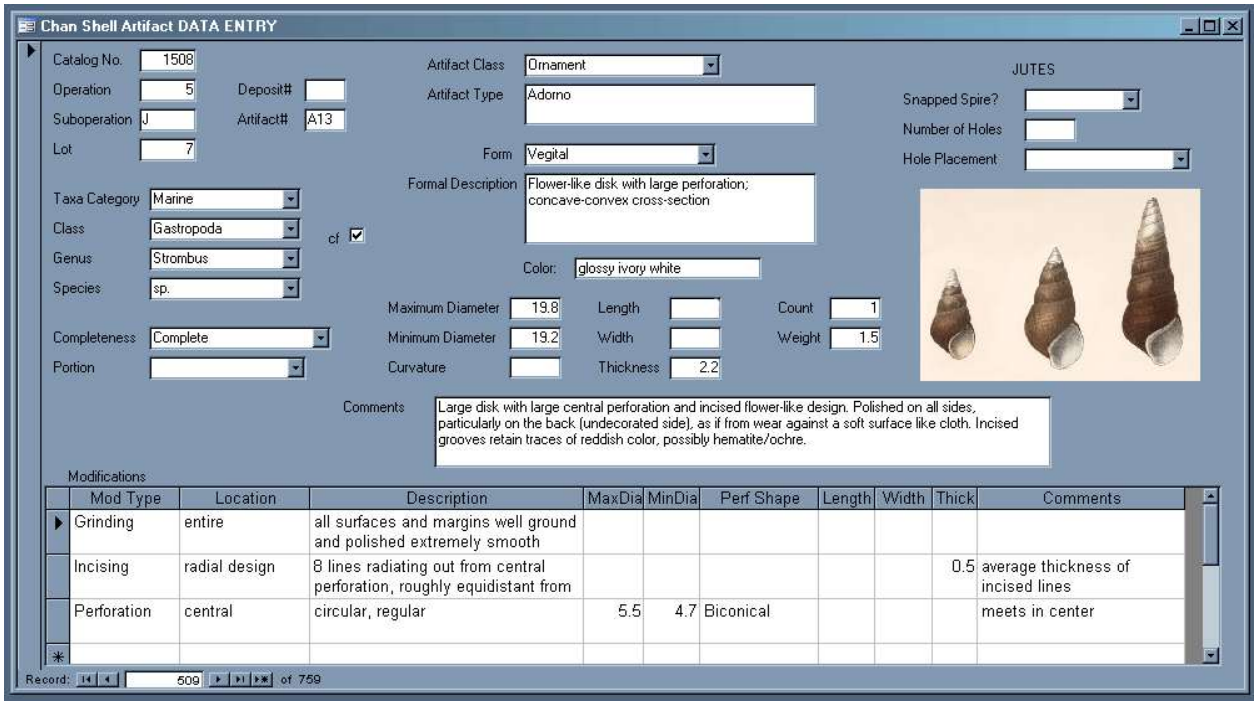


Figure 1. An example of an entry in the shell database. Note that any number of modifications may be discretely recorded with individual measurements.

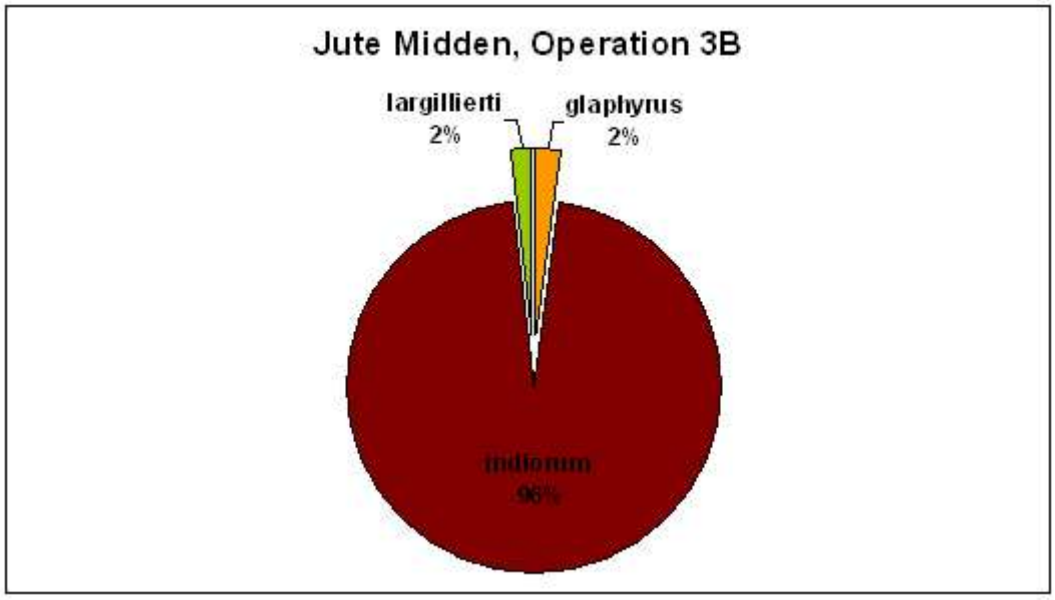
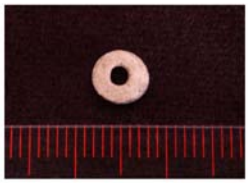


Figure 2. Proportions of *Pachychilus* (*jute*) species in the Jute Midden, all levels.

Perforated *Strombus* columella fragment



Discoidal Bead

Shell-working detritus: columella bases, body and margin fragments (most identifiable as *Stromus pugilis*)

Oliva reticularis "tinkler" *Nephronaias ortmanni* pendant

Spondylus ornament, frog foot

Spondylus pendant

Strombus notched ornament with countersunk design

Figure 3. Examples of shell artifacts from the Chan Project 2007 shell analysis.

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ANALYSIS OF LITHIC ARTIFACTS FROM HOUSEHOLD C-199 AND C-304, CHAN, BELIZE

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PURPOSE

The primary purpose of the 2007 season was to conduct stone tool and debitage analysis from households C-199 and C-304 at Chan, Belize. Previous test excavations in 2006 yielded high densities of lithic artifacts from a midden at household C-199 (Meierhoff 2007). Household C-304 was excavated in 2004 (Wyatt 2004). The analysis was conducted to demonstrate likely differences of lithic economies between two Late Classic households of similar size. Household C-304 is a type 1 household of with one mound, no platforms, less than one meter in height and have no focus. Household C-304 is a type 2 household which has 3 mounds, no platforms, less than one meter in height and have an informal layout (Robin and Morrison 2002). Additionally, the analysis of the debitage could potentially indicate tools having been made in both households.

The secondary purpose was to map household C-199. Test excavation units and posthole samples from the 2006 season were also mapped. The creation of a topographical map of the household and its immediate surroundings was also a goal for this season. Another secondary purpose of this season wasto conduct preliminary analysis and draw a large eccentric chert blade recovered from the Late Preclassic Burial 8 in Str. 5-center, the eastern structure of Chan's E-group.

This research was conducted as preliminary dissertation work of the author, and focuses on the lithic political economy of the Maya in the Belize River valley.

METHODS

Replicative Systems Analysis

I conducted initial stages of replicative systems analysis (RSA) of the lithic artifacts. RSA refers to the placement of lithic artifacts within a specific step of manufacture by reduction strategy (Flenniken et al. 1992; Flenniken 1981, 1989; Hintzman 2000). Replicative systems analysis is also the current debitage analysis protocol used at the Lithic Technology Laboratory at the University of California Riverside where the author studies under Drs. Philip Wilke and Leslie Quintero. Specific kinds of debitage are created at certain generalized stages of reduction. I use this technique because of its heuristic applicability, potential for future replication studies and my knapping experience. RSA requires an analytic base of first-hand knowledge of stone tool production and includes replication studies in which the analyst will replicate the tools and debitage through experimentation.

Technologically different reduction strategies create different debitage types and tools. Potential reduction strategies include biface tool production and biface flake core reduction (Flenniken et al. 1992), various blade and core production (Bordes and Crabtree 1969; Clark 1982; Pelegrin 2003; Potter 1991), bipolar reduction (Flenniken 1981), and tranchet-bit tools

(Shafer 1976, 1983). Alternate reduction strategies were not considered because of lack of documentation within Maya sites.

Lithic flakes potentially have many attributes to record. Non-technological attributes include context, count, and weight. General technological attributes include material type, cortex presence, and reduction strategy. More specific technological attribute analysis of debitage include: platform type, flake margin modification and flake termination type. For example, debitage specific to the biface reduction can include early and late reduction stages of percussion and pressure flakes.

Mapping Methods

Mapping was accomplished by Project Director Cynthia Robin, Northwestern University Undergraduate Elise Docster, and the author. Standard mapping procedures were followed as outlined by C. Robin (2002). The posthole grid stakes from the 2006 season were used to establish *picados* a small path by which construction units and features can be identified. The results of this mapping are discussed below.

Drawing Methods for Large Eccentric Chert Blade

The large eccentric blade was drawn by Project Artist Carmen Ting following the illustration style of Z. Hruby's dissertation (2006). This style was chosen because of the representation of technological information lacking in other drawing conventions.

Database

The attributes were recorded within a Microsoft Access® database created at the onset of the season by project member, Dr. Angela Keller and the author. The data parameters are presented within Figures 1-8. Abbreviations were used in the database to speed entry. Descriptions follow conventions in an attempt to standardize the discussion of the technology of lithic artifacts.

Figures 1-8 define the recorded attributes. Figure 1 is a list of materials expected within the course of this research. Material was visually identified macroscopically. "Chalcedony" was identified following the description of Frondel (1962). "Obsidian" was identified by the distinctive visual qualities (glass-like appearance and translucency) of the material. "Limestone" was more difficult to identify, as both siliceous and nonsiliceous varieties of limestone are local

Figure 1: Material

Obsidian
Chalcedony
Limestone
Slate
Basalt
Granite
Chert T1
Chert T2
Chert T3
Chert T4
Unknown
NR

to Western Belize (Joe Chan, personal communication 2007; Dr. Cynthia Robin, personal communication 2007; and Dr. Geoffrey Braswell, personal communication 2007). My use of the category "Limestone" does not differentiate between these two varieties. "Slate", is a common kind of artifact found at Chan (Cynthia Robin, personal communication 2007). Anticipated varieties of "Basalt" were either the vesicular or finer-grained varieties. This material is volcanic and would represent a likely import from the Guatemalan Highlands. Granite was coded for by the presence of larger crystalline structure and pink or grey in color (Willey et al. 1965: 452). Chert was broken into four categories: "Chert T1", "Chert T2", "Chert T3" and "Chert T4". "Chert T1" is used for the most knappable material with grains invisible to the naked eye. "Chert T2" is courser-grained but still likely highly knappable. "Chert T3" is the most course-grained and could potentially be nearly as coarse as a siliceous limestone. "Chert T4" is for material that has thermal damage by crazing and/or potlids on the surface. The designation "Unknown" was used when material was not known. "NR" was put into the database when the material type of an artifact was not recorded.

Figure 2: Cortex

CompletelyCortical
PartiallyCortical
NonCortical
NR

Figure 2 details the presence or absence of cortex on lithic artifacts. "CompletelyCortical" was used if the dorsal surface of the flake was cortical. "PartiallyCortical" was recorded on flakes that had partial cortex on the dorsal surface of the flake. "NonCortical" indicated a lithic artifact with no cortex on the dorsal surface of the flakes. Other researchers use percentages of cortex remaining on a flake as a useful analytical device (McAnany and Peterson 2004). I chose not to follow this lead as certain percentages of cortex do not clearly indicate a stage of stone reduction. Partially cortical flakes can be removed late in the reduction of Maya

axes, for example, because a cortical surface is likely a desirable technological attribute. Cortex presence and absence was only recorded for the general information that it provides.

Figure 3: Artifact Type

Flake	Complete Flake
ProxFlakeFrag	Proximal Flake Fragment
MedFlakeFrag	Medial Flake Fragment
DistalFlakeFrag	Distal Flake Fragment
EdgePrepFlake	Edge Preperation Flake
Blade	Blade
ProxBladeSeg	Proximal Blade Segment
MedBladeSeg	Medial Blade Segment
DistalBladeSeg	Distal Blade Segment
Tool	Tool
Notching	Notching Flake
Potlid	Potlid/Thermal Spall
Janus	Janus Flake/Popout flake
Languette	Languette
Errailure	Errailure
TestFlake	Quarry Test flake
Core	Blade or flake Core
DistalCoreFrag	Distal Core Fragment
PlatFacetFlake	Platform Faceting flake
PlatRejuvFlake	Platform Rejuvenation Flake
NonDiagDeb	Nondiaganosit debitage
Microdetage	Microdebtage < 1/8" screen
NR	Not Recorded

Figure 3 indicates the type of lithic artifact. "Flake" refers to a complete flake with platform, proximal, medial, distal portions intact with a feather termination. Flakes can have a termination other than a feather termination, but these flakes will be described below. "ProxFlakeFrag" is a proximal flake fragment that is indicated by the platform with a hinge or step distal termination. These terminations are likely kinds of bending breaks. "MedFlakeFrag" is a medial flake fragment which is indicated by the absence of both the distal and proximal ends of the flake. "DistalFlakeFrag" is a distal flake fragment and is indicated by a feather termination and no platform. The preceding flake fragments were recorded to examine the possibility of flake production for tool blanks. "EdgePrepFlake" is an edge preparation flake; they commonly are curved and wider as they are long in biface production. In blade-core technologies, edge preparation flakes straighten arrises to help future blade removals, isolating

the platform and remove overhang on the core. Though not recorded as such this season, they are more correctly termed platform isolation elements in blade-core technologies (Hintzman 2000; Wilke and Quintero 1994). Blade indicates a complete whole blade, similar to Hintzman's (2000:126) category of "Good Blade" except that it denotes either pressure or percussion. "ProxBladeSeg" refers to the proximal segment of a blade with a platform and either a hinge or step termination. "MedBladeSeg" is the medial section of a blade with no platform and either hinge or step termination. "DistBladeSeg" is a distal segment of a blade with no platform and a feather termination. "Tool" indicates a finished tool such as a biface, retouched flake, retouched blade, projectile point, tanged blade, etc. "Notching" indicates a notching flake, with a U-shaped platform, expanding distal termination, and round margin shape. "Potlid" refers to a thermal spall or potlid likely caused by rapid heating that causes shock to the material and forces an ejection of stone. These types of artifacts have no platform because they are not struck or pressed off (Luedtke 1992:106). A "Janus" flake forms when upon contact with the hammer during knapping, a second flake forms at the platform between the intentionally removed flake and the parent stone. The Janus flake is two-faced because it has a bulb on surface. "Languettes", also called "tongue flakes", form when the flake or blade bends and ejects this element. A languette is potentially caused by resistance during blade removal (Clark and Bryant 1997:122; Hintzman 2000: 126). "TestFlake" is a category of debitage that is completely cortical and whose purpose in removal is to examine the interior homogeneity of the nodule or clast. Test Flakes are distinctive because they can only be removed from advantageous angles of natural nodules or clasts. "Core" is an artifact from which flakes or blades are removed. These flakes and blades are used as flake tools and tool blanks. "DistalCoreFragments" are the distal portions of cores are removed because of problematical core configurations or knapping errors (Hintzman 2000:127). "PlatformFacetingFlake" is a flake taken from the platform of a core to maintain the working angle of the blade-core at the specific location of future flake or blade removal (Hintzman 2000:126) or to prepare a platform for a platform spall to be removed. "PlatformRejuvFlake" stands for platform rejuvenation flake. This kind of flake removes the entire platform of a core in an attempt to create suitable angles for future flake or blade removal. "NonDiagDebit" stands for non-diagnostic debitage and is used only when "Flakes and blade fragments are so fragmentary that they do not contain any diagnostic debitage" (Hintzman 2000:127). As before, "NR" indicates not recorded.

Figure 4: Reduction Strategy

Biface	Biface
UnspFlake Core	Unspecified direction flake-core
MDFlakeCore	Multidirectional flake-core
SDFlakeCore	Single-directional flake-core
MDPercBladeCore	Multidirectional percussion blade-core
SDPercBladeCore	Single-directional percussion blade-core
MDPressBlade	Multidirectional pressure blade-core
SDPressBlade	Single-directional pressure blade-core
Bipolar	Bipolar
Unknown	Unknown
NR	Not Recorded

Figure 4, Reduction Strategy, denotes the technological manufacturing process that created the artifact or artifacts. The category "Biface" indicates an artifact with two surfaces, generally lenticular in cross section (exceptions noted below) with flakes removed on both sides. "UnspFlakeCore" refers to unspecified flake core. This indicates an unknown core configuration. This is a broad analytical category used when the reduction strategy was not apparent due to the identifiable features of the debitage (see below). "MDFlakeCore" refers to multi-directional flake core technology and it is indicated by the presence of two or more flake removal directions on either the debitage or core. "SDFlakeCore" refers to single-directional flake core technology. This is the equivalent flake-core technology to horse-hoof cores (Cooper 1943; Hester and Shaffer 1987; Kamminga 1982). "MDPercBladeCore" stands for multi-direction percussion blade-core technology. This is a category of core in which blades were removed in multiple directions (Hester 1985; Hester and Shafer 1984; Hester and Shaffer 1987). "SDPercBladeCore" denotes a single-platform, single-direction percussion blade-core technology. This technology can either be the preliminary stages in configuring a pressure blade core (Hirth and Andrews 2002; Parry 2002), or cores made for percussion blades. "Bipolar" indicates the presence of two platforms for the same flake and a flake scar which tends to show heavy undulation or is completely flat (Flenniken 1981; White 1968). "Unknown" refers to an unknown technological strategy. "NR" stands for not recorded.

Figure 5: Biface Reduction Strategy	
NA	Not applicable
ESPerc	Early-stage percussion flaking
LSPerc	Late-stage percussion flaking
ESPress	Early-stage pressure flaking
LSPress	Late-stage pressure flaking
Unknown	Unknown biface reduction strategy
NR	Not Recorded

Bifacial reduction strategies were further divided into early and late distinctions of work (Flenniken et al. 1992) for a total of four separate categories. "NA" indicates not applicable and indicates non bifacial technology was present. "NA" was entered as a placeholder in the database. "ESPerc" stands for early-stage percussion biface technology. Flakes removed in this stage of reduction are larger and thicker, tend to be more curvilinear in shape when viewed from the flake margins and have fewer arrises on their dorsal surface. Flake scars coming from more than one direction on the dorsal side of the flakes also tend to indicate bifacial technology. "LSPerc" stands for late-stage percussion. These flakes tend to be flatter when viewed from the margins, and have more arrises because more flakes have been removed thereby creating more flake scars and arrises. It should be noted that in some biface technologies the finished biface can have very few flake scars. This is likely indicates highly skilled knapping (Phillip Wilke, personal communication 2007) Again, these late-stage percussion flakes tend to have flake scars from more than one direction. "ESPress" stands for early-stage pressure flaking technology. Early-stage pressure flakes have an arrise down the middle of the flake. The trailing margin of the pressure flake has a scar from the previous pressure flake removal while the leading margin

of the arrise will have multiple and/or overlapping percussion flake scars. "LSPress" stands for late stage pressure flaking. Late-stage pressure flakes are different than early stage pressure flakes because both the proceeding and preceding sides of the flake have pressure flake scars on the dorsal surface.

Figure 6: Platform

Abraded	Abraded
SngleFacet	Single Facet
MultiFacet	Multi Facet
AbrdedSngleFacet	Abraded Single Facet
AbrdedMliFacet	Abraded Multi Facet
Lipped	Lipped
Crushed	Crushed
NotPresent	Not Present
NoPrep	No Preperation
Cortical	Cortical
DorsalCoreFace	Dorsal Core Face
Unknown	Unknown
NR	Not Recorded

Platform characteristics were also recorded (Figure 6). Platform preparation techniques are important because they relate to the reduction strategy, the manipulation of platform angle, the removal of small sharp faces that might interfere with flake or blade removal (Bordes and Crabtree 1969). Abraded refers to a platform that has been worn smooth by another stone, such as sandstone in an attempt to remove weak and sharp edges from previous flake or blade removals. "SngleFacet" stands for Single facet platforms which are a single surface is the point of flake initation. It is characteristic of early reduction because later in reduction platforms tend to become more complex as more flakes are removed. Multi-facet platforms have multiple flakes scars. Combinations of abraded single and multifacet platforms were also possible. Lipped platforms form when the process of removal of the flake the contact area between the hammer or pressure flaker causes the area of the platform to give way. Crushed platforms form when initial attempts at detachment are unsuccessful and initiate multiple Hertzian cones into the material. Eventually this platform collapses and becomes ragged through the exposed negatives of multiple cones of force. "NotPresent" indicates if the platform has been removed during the process of detachment. Cortical platforms are created when the natural surface of the clast or cobble is used as the striking platform. Cortical platforms usually occur early in the reduction process. "DorsalCoreFace" is a kind of platform where it appears that the preferred method of platform preparation was to give it a round edge which curves into the dorsal side of the flake. "Unknown" is a category if a platform was present, but did not posses any of the above characteristics. "NR" stands for not recorded. This was recorded for medial and distal flake fragments because by definition they do not have a platform.

Figure 7: Margin

Alternate	Alternate flake
EdgePrep	Edge preparation flake
MarginRemoval	Margin Removal
NotPresent	Not Present
None	None
NR	Not Recorded

Figure 7 indicates a series of flakes that accomplish a change in margin configuration. "Alternate" flakes are created when a square edge of a piece is transformed into a biface. The flake is removed to expand into the square edge of the piece. "EdgePrep" stands for edge preparation flake. These are removed to move the platform to one side or the other. "NotPresent" again was used if the margin of the flake is not present. "NR" is used if for whatever reason the condition of the margin of the piece was not recorded.

Figure 8: Flake termination

Feather	Feather
Outrepasse	Outrepasse or overshot
Hinge1	Hinge Type 1
Hinge2	Hinge Type 2
Step	Step
Not present	Not present
NR	Not Recorded

Figure 8 records the varieties of flake terminations possible with lithic reduction. "Feather" terminations occur when the flake terminates in a sharp fine edge. This kind of termination is desired in knapping because of the resulting flake negative. "Outrepasse" or overshot terminations are ones that remove a potion or all, of the margin opposite the platform. An overshot is desired when the opposite margin is a square margin and an overshot termination could remove a square edge in a single flake. It is an error if it removes a margin that is already bifacial in configuration. "Hinge1" terminations have a rounded flake termination. "Hinge2" terminations are the same configuration in the distal flake configuration, but likely due to higher removal force involved, reinitiate a removal of the flake past the hinge termination. "Step" indicates a termination in which the flake breaks during removal and shears off perpendicular to direction of force. "Not present" indicates a termination that was not clearly defined. "NR", again is not recorded.

A separate cell at the end of the database entitled Notes was used for extended description of the lithic artifacts of that category.

RESULTS

Following the goals of the season, the Replicative Systems Analysis of the lithic debitage and the mapping of Household C-199, the results will be discussed in two parts. First a general

note needs to be made of the condition of the lithic artifacts. Nearly all flakes were shades of off-white. One a few lithic artifacts that broke during recovery, it was apparent that the white color was a weathering of the flake that occurred after the removal from the parent stone. The center of the flake was surrounded by a white rind developing from all surfaces into the center of the piece. Luedtke (1992:108-109) summarized the formation of this off-white colored weathering in exposure to alkaline solution which either removes silica or by the replacement of lime salts. As a result of the white patination, the visual properties used to identify the heat treatment of lithic material were obscured. Determination of heat treatment of the material is an important step in replicative systems analysis (Flennikin 1989).

Results of RSA

Figure 9: Lithic Artifact Totals

	C-199	C-304
Number of Flakes	83,599	157

The high quantity of flakes within the contexts prohibited a complete analysis. Within the posthole tests of household C-199 (suboperation 29.A) and the midden deposit of household C-304 (suboperation 4.C), 100% of recovered lithic artifacts were analyzed. Due to time constraints, suboperations 29.C, 29.D, 29.E, 29.F, 29.G, 29.H, and 29.I, were simply counted and weighed. Analysis focused on suboperation 29.B.

Figure 10 and 11 demonstrate the quantity of lithic flakes from household C-199 and the midden of household C-304. A clear difference exists in the quantities of flakes from each context. The quantities and weights of lithic artifacts from Household C-199 are divided into lots in Figure 10. Due to density of lithic artifacts within the suboperations B-I field screening was not possible and 100% of all excavated material was floated. Consequently, little to no microdebitage was lost (Meierhoff 2007). Little to no soil was present within these suboperations. They were composed almost entirely of lithic artifacts. The suboperation 29.A was screened through ¼ inch mesh (Meierhoff 2007). Suboperation 4.C was screened through ¼ inch mesh. Following standard excavation procedure, suboperation A is a posthole test excavation. The excavation suboperations 29.B through 29.I were placed around Operation 29 in household C-199 to expand upon the post hole excavation units that recovered lithic concentrations. Wyatt (2004) described the context of artifacts found in Operation 4 of household C-304.

Figure 10: Household C-199 (Op.29)

Figure A.11: Op. 1 (Household C-304 midden) lithic artifacts by lot

Lot	total #	weight (g)	Lot	total #	weight (g)
29.A.1	577	317.50	29.C.1	8,042	3862
29.A.48	11	87.90	29.C.2	17944	4562
29.A.85	74	20.00	29.C.3	14413	1,940.89
29.A.86	46	0.30	29.C.4	6627	616.80
Total	157	736.1		406	993.00
29.A.94	6	7.80	29.C.2	853	1,416.00
29.A.96	3	0.8	29.C.3	659	745.00
29.A.97	1	0.20	29.C.4	150	219.00
29.A.98	4	2.4	29.C.5	379	602.00
29.A.99	15	2,447.00	29.D.1	132	566.2
29.A.100	3	6	29.D.2	242	525
29.A.103	5	557.20	29.E.1	391	319
29.A.104	49	40.30	29.E.2	1040	1015.1
29.A.105	2	6.8	29.E.3	196	179
29.A.106	2	1	29.F.1	14556	4255
29.A.109	1	11.70	29.F.5	8869	345.00
29.A.111	2	1.7	29.F.6	2403	101.00
29.A.142	2	36.1	29.G.1	286	445
29.A.144	2	3.6	29.H.1	20	178.00
29.A.145	14	14.30	29.H.2	23	56.00
29.A.152	1	3.10	29.H.3	2	76.00
29.A.158	1	0.90	29.I.1	21	55.70
29.A.159	36	23.30	29.I.2	15	414.00
29.A.160	1	2.50	*Total*	77,669	23486.69
29.A.160	1	2.50			
29.A.165	2	35.00			
29.A.168	1	5.30			
Total	5930	3,635.50			

Figure 12 details the types of lithic materials recovered in each suboperation. The category of material NR predominates. In future seasons, I will analyze these suboperations with a similar methodology. Count and weight of lithic material were the only data taken in the majority of these suboperations. When I began the analysis I had not realized there were four

grades of chert material, so 29.A was primarily chert but quality of chert was not recorded so NR was entered in this suboperation. I incorporated T1-T4 to further detail the lots analyzed later. When more complete RSA was conducted, in suboperations 29.B and 4.C, chert predominantly was the material for all household. Impressionistically after looking through the lots presented in Figure 12 for tools, the majority of material was chert.

The presence of cortex on the debitage also varied between the two households (see Fig 13). The presence of cortex on debitage is thought to generally indicate reduction stages. Cortical and partially cortical flakes generally tend to come from earlier in the reduction stages than noncortical flakes. The difference between cortical, partially cortical and noncortical flakes between the two households implies that they had access to different lithic resources. Household C-199 had access to material in a different stage of reduction than household C-304. The people of C-199 had access to material either (a) more greatly reduced from the natural cobbles probably available to C-304, or (b) were receiving material with a different technological parameter that a natural cobble like a flake blank as seen elsewhere in the Maya Lowlands (Shafer 1979).

Replicative Systems Analysis is a good technique to see major trends in lithic reduction and tool production. Figures 14 and 15 describe the technological lithic reduction strategies in the middens from households C-304 and C-199. A few generalities are can be made about the midden in each household. First, each midden has flakes from the production of flakes from technologically unspecified flake cores. This kind of technology dominates the C-304 midden composing 63% of all flakes within that context. In the C-199 assemblage, the same kind of technology is evident, but it is not as prevalent. This is likely due, in part, to the artifact recovery technique used in the C-199 midden which collected the microdebitage. If the microdebitage was excluded, then 29.B would be composed by approximately 58% of Single Direction Flake Core technology flakes and flake fragments. This figure is quite similar to the percentage of the flakes and flake fragments in the midden of Household C-304. One clear difference between the two households is the incidence of biface reduction flakes. The midden of Household C-304 has only seven bifacial artifacts or 4.52%, while Household C-199 has 924 or 24.60% of the suboperation with microdebitage excluded. Future research will further illuminate the relationships of different reduction technologies between the households of Chan.

Figure 12: Material types by Suboperation

	29.A*		29.B.		29.C		29.D		29.E	
	quantity	% of subop.	quantity	% of subop.	quantity	% of subop.	quantity	% of subop.	quantity	% of subop.
Obsidian	-	-	-	-	-	-	-	-	-	-
Chalcedony	-	-	-	-	-	-	-	-	-	-
Limestone	9	0.8	-	-	-	-	-	-	-	-
Slate	-	-	-	-	-	-	-	-	-	-
Basalt	-	-	-	-	-	-	-	-	-	-
Granite	-	-	1	0	-	-	-	-	-	-
Chert T1	-	-	2779	5.9	-	-	-	-	2	0.1
Chert T2	-	-	738	1.6	-	-	-	-	2	0.1
Chert T3	-	-	906	1.9	-	-	-	-	-	-
Chert T4	-	-	85	0.2	-	-	-	-	-	-
Unknown	-	-	-	-	-	-	-	-	-	-
NR	1163	99.2	42514	90.4	2447	100	347	100	1623	0.99
total	1172	100	47023	100	2447	100	347	100	1627	1.19

	29.F.		29.G		29.H		29.I		4.C	
	quantity	% of subop.	quantity	% of subop.	quantity	% of subop.	quantity	% of subop.	quantity	% of subop.
Obsidian	-	-	-	-	-	-	-	-	-	-
Chalcedony	-	-	-	-	-	-	-	-	-	-
Limestone	-	-	-	-	-	-	-	-	-	-
Slate	-	-	-	-	-	-	-	-	1	0.6
Basalt	-	-	-	-	-	-	-	-	-	-
Granite	-	-	-	-	-	-	-	-	-	-
Chert T1	-	-	-	-	-	-	-	-	127	80.9
Chert T2	-	-	-	-	-	-	-	-	14	8.9
Chert T3	-	-	-	-	-	-	-	-	8	5.1
Chert T4	-	-	-	-	-	-	-	-	7	4.5
Unknown	-	-	-	-	-	-	-	-	-	-
NR	25828	100	286	100	45	100	36	100	-	-
total	25828	100	286	100	45	100	36	100	157	100

Figure 13 Cortex by Household

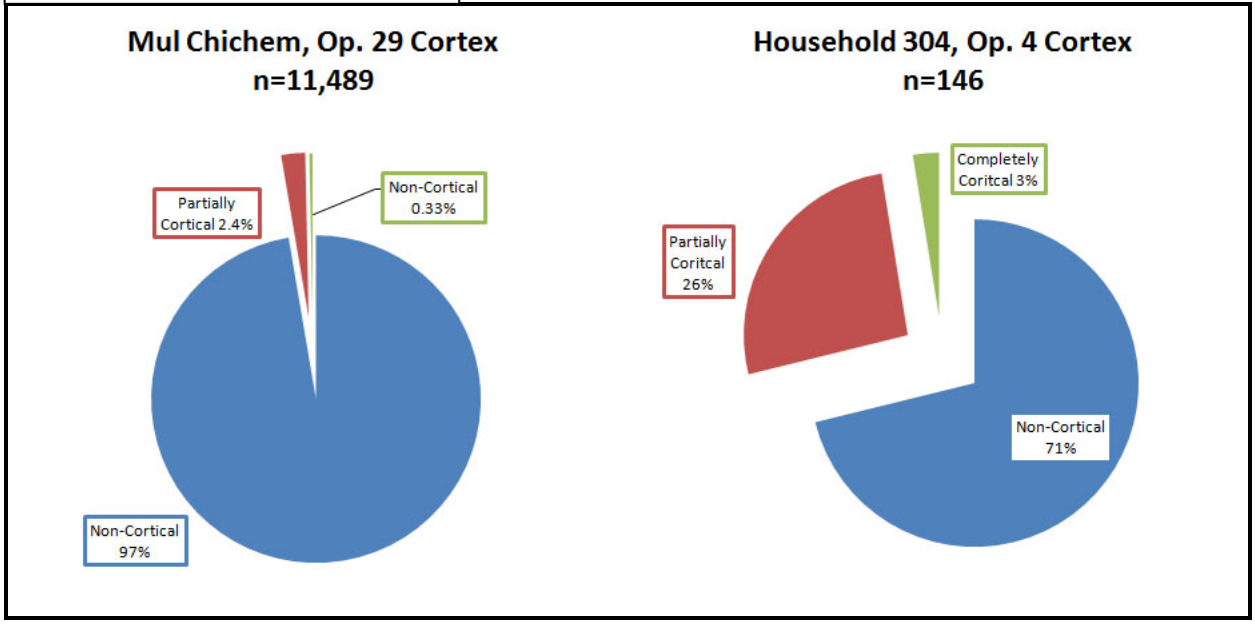


Figure 14: Reduction Strategy of Suboperation 4.C (Household C-304)

TechnologicalStrategy	Cortex	Artifact Type	Count	Percentage of Subop
UnspFlake Core	CompletelyCortical	ProxFlakeFrag	2	1.29%
62.58%	PartiallyCortical	ProxFlakeFrag	7	4.52%
	PartiallyCortical	DistalFlakeFrag	3	1.94%
	PartiallyCortical	Flake	16	10.32%
	PartiallyCortical	MedFlakeFrag	2	1.29%
	PartiallyCortical	Microdebitage	1	0.65%
	NonCortical	Microdebitage	14	9.03%
	NonCortical	ProxFlakeFrag	6	3.87%
	NonCortical	NonDiagDeb	7	4.52%
	NonCortical	MedFlakeFrag	6	3.87%
	NonCortical	Flake	11	7.10%
	NonCortical	EdgePrepFlk	18	11.61%
	NonCortical	DistalFlakeFrag	3	1.94%
	NonCortical	PlatRejuvFlake	1	0.65%
SDFlakeCore	NonCortical	Flake	1	0.65%
1.29%	NonCortical	ProxFlakeFrag	1	0.65%
Biface	PartiallyCortical	Flake	2	1.29%
4.52%	NonCortical	Flake	3	1.94%
	NonCortical	DistalFlakeFrag	2	1.29%
NR	NR	NonDiagDeb	1	0.65%
1.29%	PartiallyCortical	NonDiagDeb	1	0.65%
Unknown	CompletelyCortical	NonDiagDeb	1	0.65%
30.32%	PartiallyCortical	MedFlakeFrag	1	0.65%
	PartiallyCortical	Microdebitage	1	0.65%
	PartiallyCortical	NonDiagDeb	6	3.87%
	PartiallyCortical	Flake	1	0.65%
	NonCortical	Flake	1	0.65%
	NonCortical	Microdebitage	15	9.68%
	NonCortical	NonDiagDeb	19	12.26%
	NonCortical	EdgePrepFlk	1	0.65%
NR	NR	Flake Frag	1	0.65%
		Total	155	

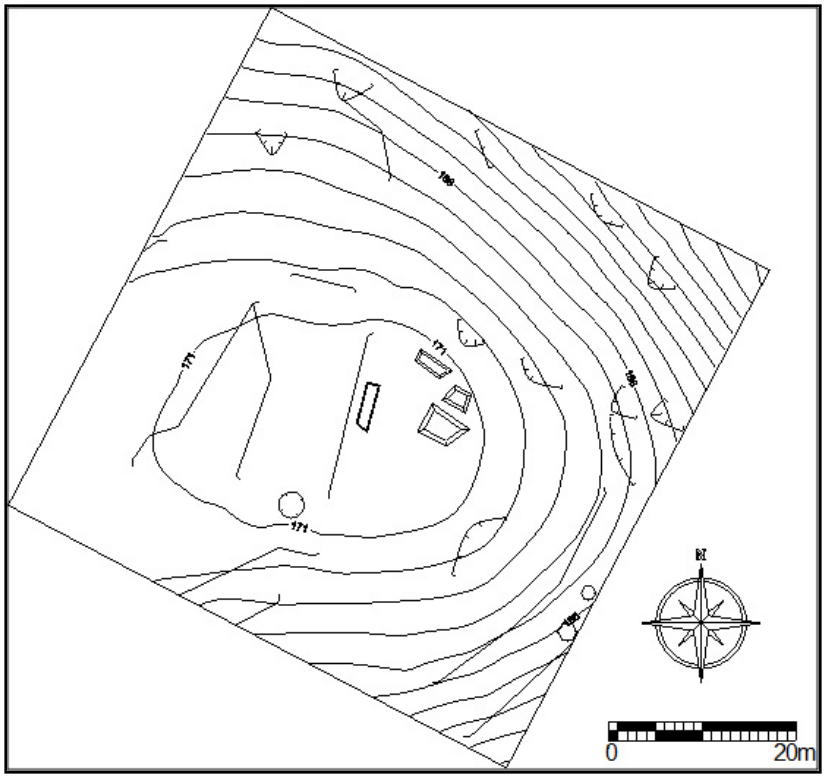
Figure 15: Reduction Strategy of Suboperation 29.B (Household C-199)

TechnologicalStrategy	Cortex	Artifact Type	Count	Percentage of Subop
UnspFlake Core	CompletelyCortical	MedFlakeFrag	22	0.21%
21.19%	CompletelyCortical	ProxFlakeFrag	3	0.03%
	PartiallyCortical	DistalFlakeFrag	31	0.30%
	PartiallyCortical	EdgePrepFlk	4	0.04%
	PartiallyCortical	Flake	26	0.25%
	PartiallyCortical	MedFlakeFrag	43	0.42%
	PartiallyCortical	NonDiagDeb	34	0.33%
	PartiallyCortical	ProxFlakeFrag	35	0.34%
	NonCortical	DistalCoreFrag	1	0.01%
	NonCortical	DistalFlakeFrag	360	3.49%
	NonCortical	EdgePrepFlk	692	6.71%
	NonCortical	Flake	55	0.53%
	NonCortical	MedFlakeFrag	665	6.45%
	NonCortical	PlatFacetFlake	2	0.02%
	NonCortical	ProxBladeSeg	2	0.02%
	NonCortical	ProxFlakeFrag	210	2.04%
SDFlakeCore	NonCortical	EdgePrepFlk	3	0.03%
0.04%	NonCortical	PlatFacetFlake	1	0.01%
	NonCortical	ProxFlakeFrag	2	0.02%
Biface	PartiallyCortical	DistalFlakeFrag	1	0.01%
8.96%	PartiallyCortical	Flake	3	0.03%
	PartiallyCortical	MedFlakeFrag	1	0.01%
	PartiallyCortical	ProxFlakeFrag	4	0.04%
	NonCortical	DistalFlakeFrag	147	1.43%
	NonCortical	Flake	177	1.72%
	NonCortical	MedFlakeFrag	217	2.10%
	NonCortical	ProxFlakeFrag	374	3.63%
NR	PartiallyCortical	NonDiagDeb	1	0.01%
52.15%	NonCortical	Microdebitage	5176	50.19%
	NonCortical	NonDiagDeb	201	1.95%
Unknown	CompletelyCortical	NonDiagDeb	2	0.02%
15.80%	PartiallyCortical	NonDiagDeb	2	0.02%
	NonCortical	EdgePrepFlk	8	0.08%
	NonCortical	Errailure	3	0.03%
	NonCortical	Flake	3	0.03%
	NonCortical	Languette	1	0.01%

Figure 15 (**continued):** Reduction Strategy of Suboperation 29.B (Household C-199)

TechnologicalStrategy	Cortex	Artifact Type	Count	Percentage of Subop
	NonCortical	Microdebitage	1381	13.39%
	NonCortical	Microdebitage	1381	13.39%
	NonCortical	NonDiagDeb	138	1.34%
	NonCortical	Notching	89	0.86%
	NonCortical	ProxFlakeFrag	2	0.02%
NA	NonCortical	NonDiagDeb	174	1.69%
1.84%	NonCortical	Potlid	16	0.16%
		Total (Excluding Unanalyzed Portion)	10312	

Figure 16: Household C-199 Household



Results of the Mapping

Figure 16 shows the household C-199 and it was created using the postholes as topographic coordinates. The four low mounds that compose the household are clearly marked. The household is surrounded by linear terraces and c-shaped concave features which have been

tentatively identified as trench quarries. These quarries are generally shallow and follow probable chert deposits close to the surface. In one of the potential quarries, negative cavities where nodules may have had been removed were observed during mapping.

On a final note, project artist Carmen Ting drew two artifacts recovered in 29.D.1. Figure 17 is of the only biface recovered in Operation 29. It potentially represents a production failure. Though not certain due to the weathering of this piece, it appears to be broken perpendicular to the long axis of the biface. This biface has some of the design characteristics of the bifaces that likely were made at household C-199.

Figure 17: Biface from 29.D.1

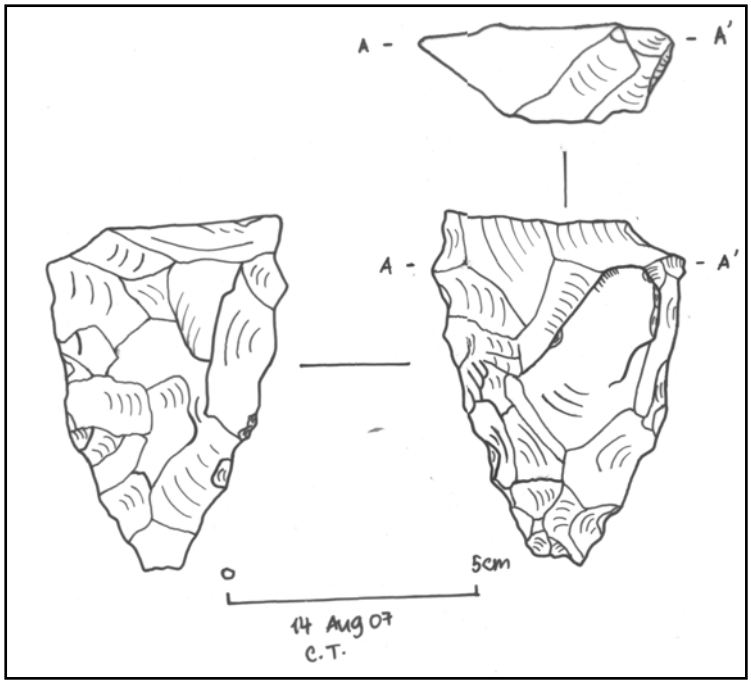
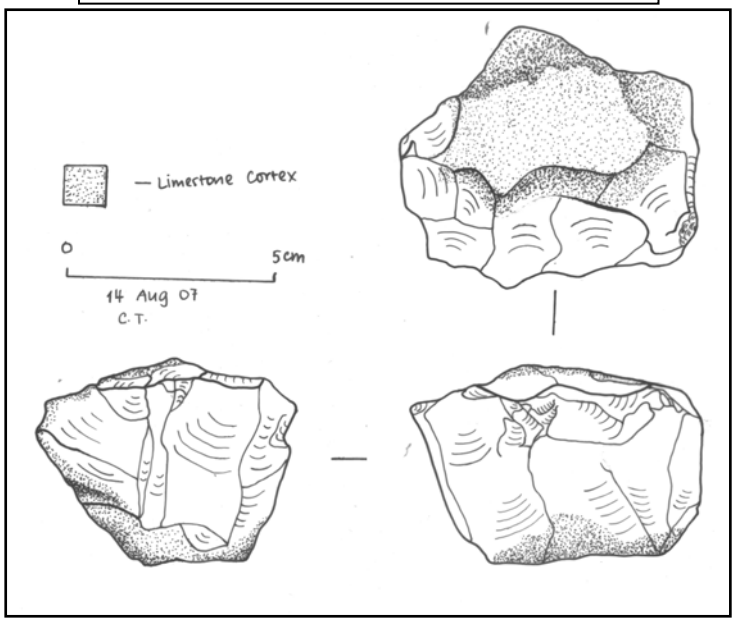


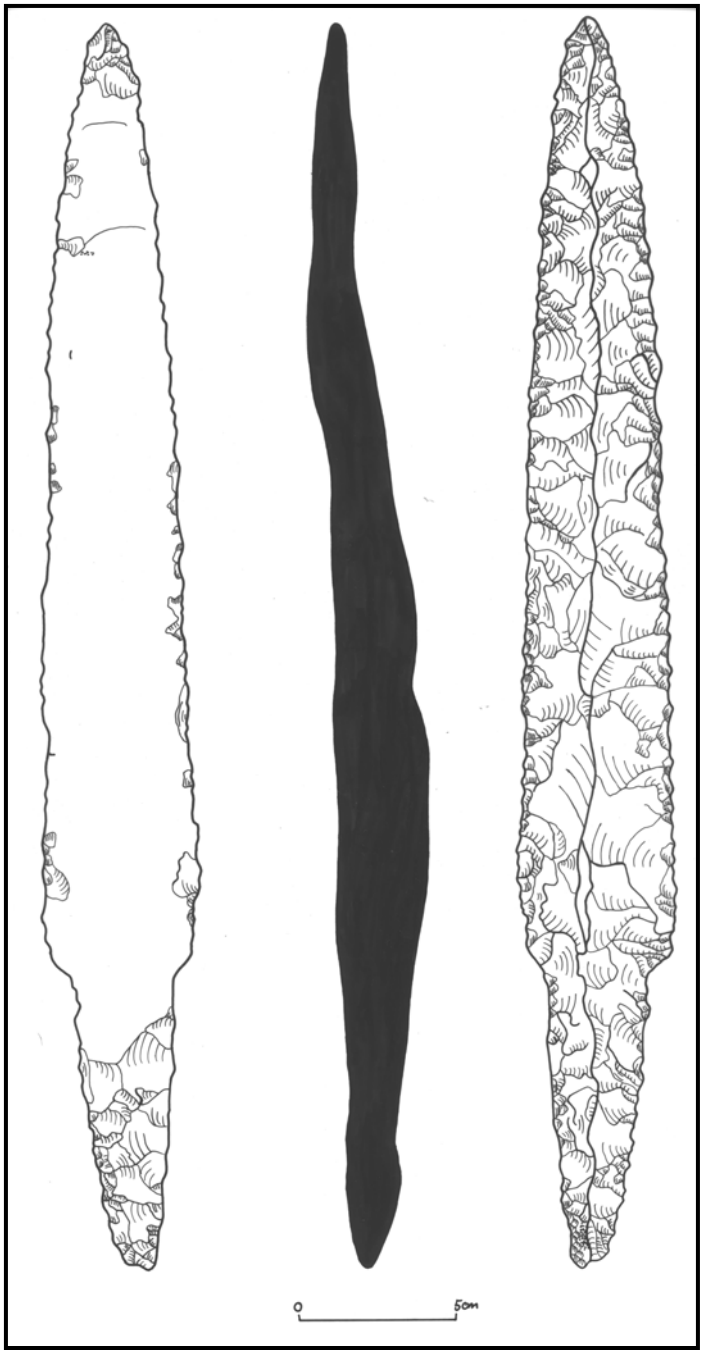
Figure 18 is a multifaceted-platform, single-directional, flake core found on the surface, near 29.A.152. It appears to be an exhausted flake core because of the lack of available striking platform and failed flake removals on the working face of the core.

Figure 18: Single Directional Flake Core



The last lithic artifact drawn this season was identified as a large eccentric blade (see Figure 19). It came from Late Preclassic Burial 8 located in Str. 5-center, the eastern structure of Chan's E-group. To the author's knowledge, this artifact is unique in the Maya Lowlands in terms of size and probable technology. The chert is honey- brown and banded which implies that it is likely of Northern Belize chert. The blade itself is 38 cm long which also means the parent core had to be at least that length. To the author's knowledge, no cores of this size have been recovered from Colha. Its form is similar to large chert pressure blades of the Old World (Pelegrin 2003:62-63 and figures 4.11 and 4.12).

Figure 19: Large Chert Eccentric Blade



CONCLUSION

Replicative systems analysis has elucidated the following preliminary patterns of lithic tool manufacture. The lithic midden at C-199 was a likely lithic production locality. Elsewhere, I have tentatively identified this as a household-level production operating within a village-level economy (Hearth 2008). It is likely that due to the high prevalence of microdebitage and biface production flakes from within Suboperation 29.B, bifaces were produced there. Only one biface production failure has been recovered thus far from this context. The quantity of recovered flakes would imply that other production failures would likely exist within C-199. More analysis is needed of the lithic artifacts from this context to further explore biface manufacture.

The midden from household C-304, the other context analyzed this season appears to be composed primarily of flakes detached from cores of unspecified technology strategy. This would be the case in which members of a household would remove flakes as needed for cutting tools and not as part of a reduction strategy to make formal tools. RSA of the lithic artifacts from other households within Chan will demonstrate larger, site-level patterns of tool and flake production technologies.

The mapping has yielded a topographic map of high relief. During the survey, potential quarries were identified. Future excavation will illuminate the possibility that these features are quarries.

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2007 BIOARCHAEOLOGICAL ANALYSIS

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INTRODUCTION

This report begins the complete osteological analysis of the burials from the Chan site. A total of 25 burials were identified across the 2003 to 2006 field seasons from household and ritual contexts. During the 2007 season a total of 19 burials containing 24 individuals were examined and will be reported on here. Each burial is listed below according to burial number and provenience (Operation, Suboperation, and Lot). Each burial is described beginning with the archaeological context from which the remains were recovered. Details of grave location, time period in which the interment occurred, position and orientation of the skeleton, and any grave goods are recounted in this section. The following section records the osteological analysis of each individual including the approximate percentage of the remains recovered, age, sex, dentition, and skeletal pathologies, if any was observed.

Archaeological contexts were reconstructed from the 2003 and 2004 Chan Project reports, field notes and drawings provided by project director Dr. Cynthia Robin. All skeletal data were collected in accordance with the *Standards for Collection of Data from Human Skeletal Remains* (Buikstra and Ubelaker 1994). *Standards* is a compilation of techniques used in osteological analysis which outlines methods of determining age, sex, pathological conditions, and cultural modification. As much of these data as possible were collected for each individual. Age was estimated for most skeletons by dental wear or dental eruption, although where preservation was adequate epiphyseal closure, cranial suture, and pelvic morphology were also used. Sex was determined by a combination of cranial traits, pelvic morphology, and long bone measurements as preservation allowed. Analysis of the dentition was done according to *Standards* and supplemented by Simon Hillson's text *Dental Anthropology* (1996) and Timothy D. White and Peter Folkiens' text *The Human Bone Manual* (2006). Pathologies were identified with reference to *Identification of Pathological Conditions in Human Skeletal Remains* (Ortner 2003). Age at death for juvenile skeletons was estimated using *The Osteology of Infants and Children* (Baker, Dupras, and Tocheri, 2005). I have refrained from citing the above texts in the report except where it seemed necessary.

Preliminary osteological analysis was undertaken in the 2004 and 2005 field seasons by Margaret Briggs and is reported in the Chan Project reports from those years. Briggs examined seven burials (Burials 1 – 5 from the Chan site center and C1 – 2 from the Northeast group). These burials were re-examined here for consistency.

Burial: 1	**Individual**: 1	**Observer**: A. Novotny
Op: 1	**SubOp**: HH, DD, OO, NN	**Lot**: Multiple

Archaeological Context

Burial 1 was located in Chan's central plaza surrounded by the central platform group of the Chan site, C-001 (Robin 2003) (Figure 1). Excavations in this plaza were designed to investigate the ritual and administrative history of Chan (Robin 2003). Burial 1 was encountered immediately to the east of cache Special Deposits 1, 4, 6, 7, and 10. These caches contained ritual items such as jade, greenstone, whole ceramic vessels, and shell indicating the ritual significance of the location (Blackmore 2003). The grave was a simple cist 2 m long and 0.50 m wide dug into bedrock with the southwestern part of the grave covered with capstones. Upon excavation, the grave appeared to contain a single individual placed in an extended position, face up, with the proximal skeletal elements to the northeast. Three jade fragments and several micaceous ceramic fragments were recovered near the bones of the lower leg. This individual was most likely a primary burial due to the presence of carpals and phalanges of the hands and feet in the grave. Bones of the cranium, torso, and left arm were not present suggesting the grave was re-entered in antiquity and that these skeletal elements were removed (Blackmore 2003). The right humerus was found adjacent to the right femur (Blackmore 2003). Complex stratigraphy overlying the grave suggested multiple re-entry episodes that occurred in antiquity and were not the result of modern looting. Two re-entry events were recognized by the excavator and were identified as Special Deposits 8 and 9. These deposits contained human bone fragments and ceramics (Blackmore 2003). Burial 1 was interred and both re-entry episodes occurred during the Middle Preclassic period (Kosakowsky, this volume).

Osteological Analysis

Burial 1 was moderately preserved but only approximately 25%-50% of the skeleton was available for observation. As described above, this is possibly due to repeated re-entries into the grave in antiquity. Elements from the right arm, the humerus and radius, and both left and right femora, tibiae, and fibulae, were present. Bones of the hands and feet were also present but were too poorly preserved to determine from which side they came. While both left and right femora were present for this individual, close inspection suggested that they may not have been from the same individual. The left femur was generally more robust with a greater anterior-posterior measurement and thicker cortical bone. Both left and right femora appeared similar taphonomically.

Age and Sex

Age was estimated to be young adult, aged 20-29 at death, based on dental wear. No fragments of the cranium or pelvis were available to corroborate this assessment and only two teeth were present. Sex was indeterminate.

Dentition

Only two teeth, LC^1 and LC_1, were present. They showed moderate wear and had no pathologies.

Pathology and Trauma

Only one potential case of trauma or disease was observed. There was a small patch of sclerotic bone on the posterio-medial aspect of the right fibula, most likely a healed fracture callous. The lesion was local and the bone was well-integrated at the edges of the lesion. The surface of the callous was slightly porous and there was no color difference between the callous and the normal bone. There were no gross changes in shape to the fibula as a result of this bone formation.

Conclusion

Burial 1 contains the primary interment of at least one individual, a young adult of unknown sex. There were few teeth but neither showed signs of malnutrition, disease, or modification. The bones present appeared healthy and only one possible incidence of trauma was observed. The cranium, axial skeleton, and left arm were not recovered during excavation and were most likely removed from the grave at some point in history, presumably by residents of the Chan site. The excavator hypothesized that two re-entry events may have occurred and that the residue of these events are represented by the human remains and ceramics in Special Deposits 8 and 9. In addition, it is possible that a second individual was interred in this grave at some point based on comparisons of robusticity between the left and right femora. These bones appeared to be in anatomical position during excavation but the presence of the right humerus adjacent to the right femur suggest that the remains were further manipulated after primary interment. Therefore, it is possible that there were two individuals interred in Burial 1 at some point in time. It is not known in which time period this individual was interred in the central plaza.

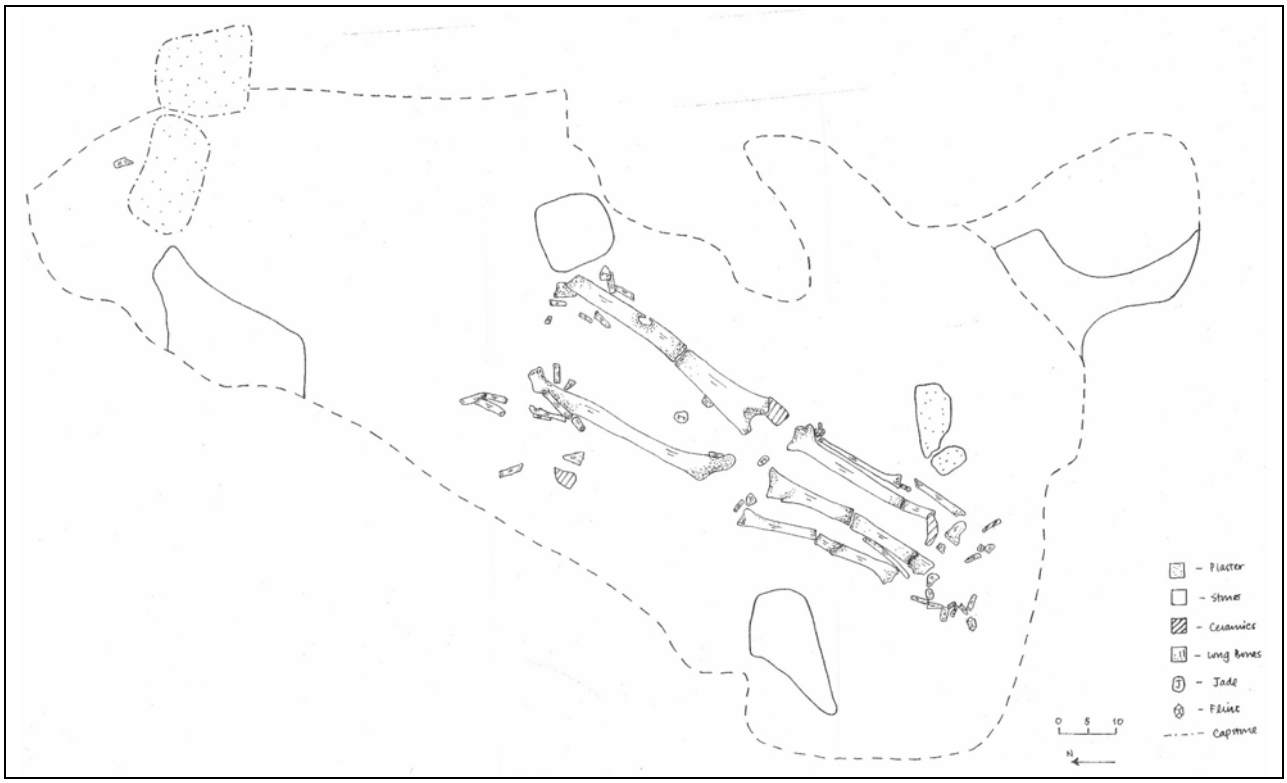

Figure 1: Burial 1. Drawing by Carmen Ting.

Burial: N/A	**Individual**: N/A	**Observer**: A. Novotny
Op: 1	**SubOp**: SS (Special Deposit 6)	**Lot**: 4

Archaeological Context

Special Deposit 6 was small circular pit dug into bedrock north of Special Deposit 1 (Blackmore 2003). Several human bone fragments were recovered from Special Deposit 6 with amber, jade, stone beads, greenstone, and an incensario (Blackmore 2003). Like Burial 1, this cache was deposited during the Middle Preclassic period (Kosakowsky, this report).

Osteological Analysis

A fragment of a possible right humerus and a LM^2 were present as well as several unidentifiable fragments. Wear of the molar was moderate and no pathologies were present. While it is impossible to say from which burial the humerus fragment came the bone surface does match the taphonomic changes visible on the bones from Burial 1. The color, a light grey-brown, and root markings are very similar. Unfortunately, this bone did not re-fit with the right humerus fragments from Burial 1.

Conclusion

The remains from cache Special Deposit 6 were isolated and it is not clear from which burial they came. It is possible that they belong to an individual from Burial 1 although it is impossible to be certain.

Burial: 2	**Individual**: 1	**Observer**: A. Novotny
Op: 6	**SubOp**: U	**Lot**: 1 – 4

Archaeological Context

Burial 2 was located at the base of the steps of the penultimate construction of Structure 5-north. Structure 5 is the largest building at the Chan site and is located on the eastern side of group C-001 and the main plaza (Robin 2004) (Figure 2). Structure 5 is hypothesized to be an "E-group" or eastern ancestral shrine due to its size, location on the eastern side of the plaza, and tripartite construction (Aimers and Rice 2006; Meierhoff et al 2004; Ricketson 1928). Structure 5-north is the northern wing of this E-group. Burial 2 was intrusive into Floor 3 and was a simple stone-lined crypt with capstones. The burial was moderately disturbed by slumping of these capstones and a large root running through the southern end of the grave (Kestle 2004). The burial contained one individual, a primary interment, who was interred in an extended position, face- down, facing west. The body was oriented with head to the south and two beads and red chert flakes were associated with the individual. The interment of Burial 2 dates to the Terminal Preclassic period (Kosakowsky 2006).

Osteological Analysis

Burial 2 was poorly preserved with about 25% of the skeleton available for observation. Fragments of each long bone were present, with the exception of the right ulna. In addition to being fragmented, the surface of the lower limb bones were extensively damaged by the root system that disturbed the grave. Fragments of the cranium, left scapula, vertebrae, left and right os coxae, and metatarsals and hand phalanges were present. The surface of many of these bones was unobservable and the bone consistency was white and chalky.

Age and Sex

Age was determined to be adult, possibly young adult due to moderate wear on the preserved dentition. Sex was estimated to be probable male based on morphology of the pelvis and skull. These elements were distinctly robust.

Dentition

Only six teeth were preserved, RP^1, LI^1, LP^1, RI_1, RC_1, and a sixth tooth that was unusual in shape. The sixth tooth was an abnormal morphology and was unidentifiable. One caries was present on this tooth at the CEJ. The teeth were poorly preserved and wear was moderate. None of the teeth were modified.

Pathology and Trauma

None of the elements observed showed any pathological bone formation or evidence of trauma. Margaret Briggs (2004) observed osteomyelitis in the diaphysis of the right humerus. Osteomyelitis is caused by a bacterial infection of the bone following a soft tissue injury. The medullary (inner) cavity of the bone is often involved if the infection progresses and a cloaca may form to drain pus. Briggs observed a cloaca in the humerus. My analysis disagrees with Briggs on this point. I believe that the bone surface is too damaged by the root system and acidity of the soil to determine whether an infection existed. Briggs also observed striations on the left tibia that she believes are indicative of a systemic infection that may have been secondary to the infection in the right humerus. Again, I disagree due to poor preservation of these bones. Furthermore, I would expect there to be clear involvement of the other long bones if a systemic infection was present and this was not observed. On the other hand, Briggs was able to analyze these remains immediately after their excavation and the pathologies may have been more visible at this time. The present analyses were conducted three years after excavation of the remains.

Conclusion

Burial 2 contained the primary interment of an adult male, possibly young in age, interred within a simple stone-lined crypt in Structure 5. This individual was buried face-down and facing west with head oriented to the south. Two beads and red chert flakes were associated with this burial. Preservation of the remains, both of the bones and the teeth, were poor.

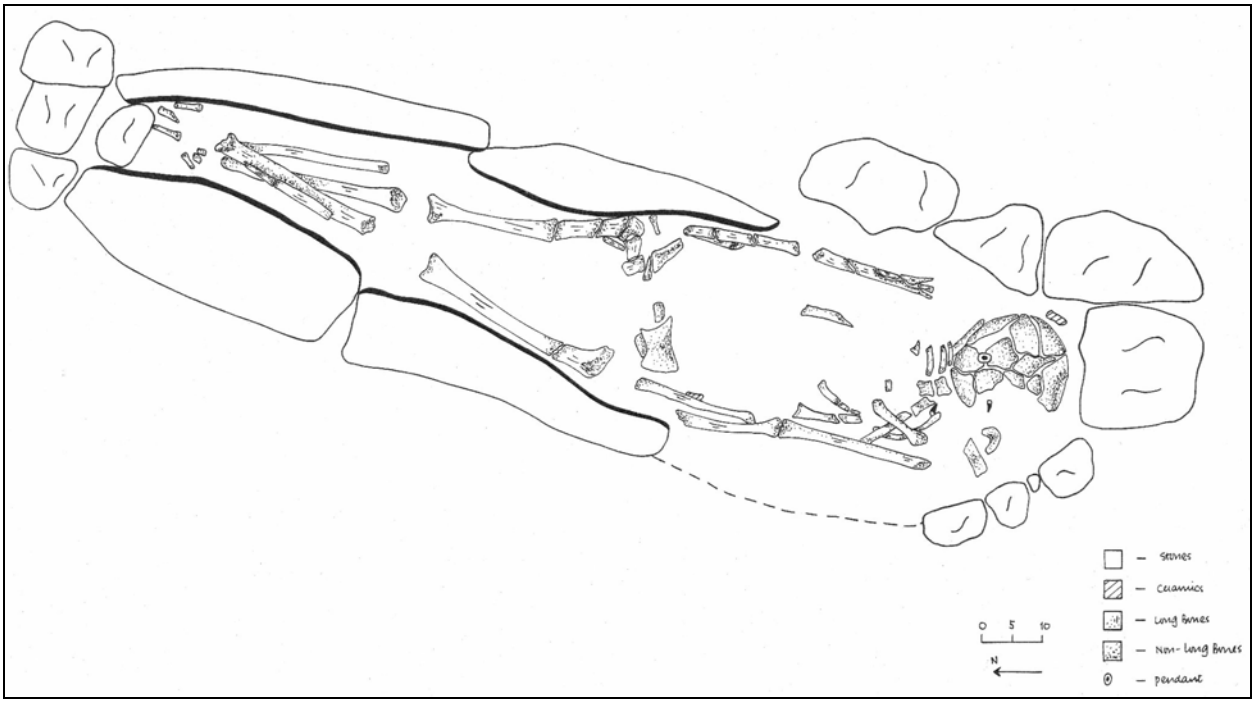

Figure 2: Burial 2. Drawing by Carmen Ting.

Burial: 3	**Individual**: 1	**Observer**: A. Novotny
Op: 6	**SubOp**: FFF	**Lot**: Multiple

Archaeological Context

Burial 3 was interred in Structure 5-center during the Early Late Classic (Kosakowsky 2006; Meierhoff et al 2004) (Figure 3). Structure 5-center is the central construction of Chan's E-Group and the tallest edifice at the site. Burial 3 contained at least 4 individuals with a fifth individual represented by dentition only. The grave type was an informal cist grave that was not lined with stones. Burial 3.1 was a secondary interment that consisted of long bones only oriented with proximal ends to the south (Meirehoff et al 2004). No grave goods were associated with individual 3.1.

Osteological Analysis

Burial 3 consisted of left tibia and fibula and right femur and second metatarsal fragments.

Age and Sex

These elements were moderately well preserved and were the remains of an adult. Sex was indeterminate.

Dentition

Although there were extra teeth in the Burial 3 grave context they could not be associated with individual 3.1

Pathology and Trauma

The left tibia and fibula showed abnormal bone formation, periostitis, at the middle third of their diaphyses. Periostitis is evidence of an infection of the outer, periosteal, layer of bone. It is a general indicator of stress or trauma and can be the result of s minor injury or a more serious systemic infection. The lesions appeared to be healing at death and occurred circumferentially around each long bone. The femur and second metatarsal were normal.

Conclusion

Individual 3.1 was the last in a series of interments made into an informal cyst grave in Structure 5-center during the Early Late Classic period (Kosakowsky 2006). It was a secondary burial although care was taken in its interment so that the proximal ends of the long bones faced south in agreement with the orientation of the other individuals in the grave. No grave goods could be assigned with certainty to Individual 3.1.

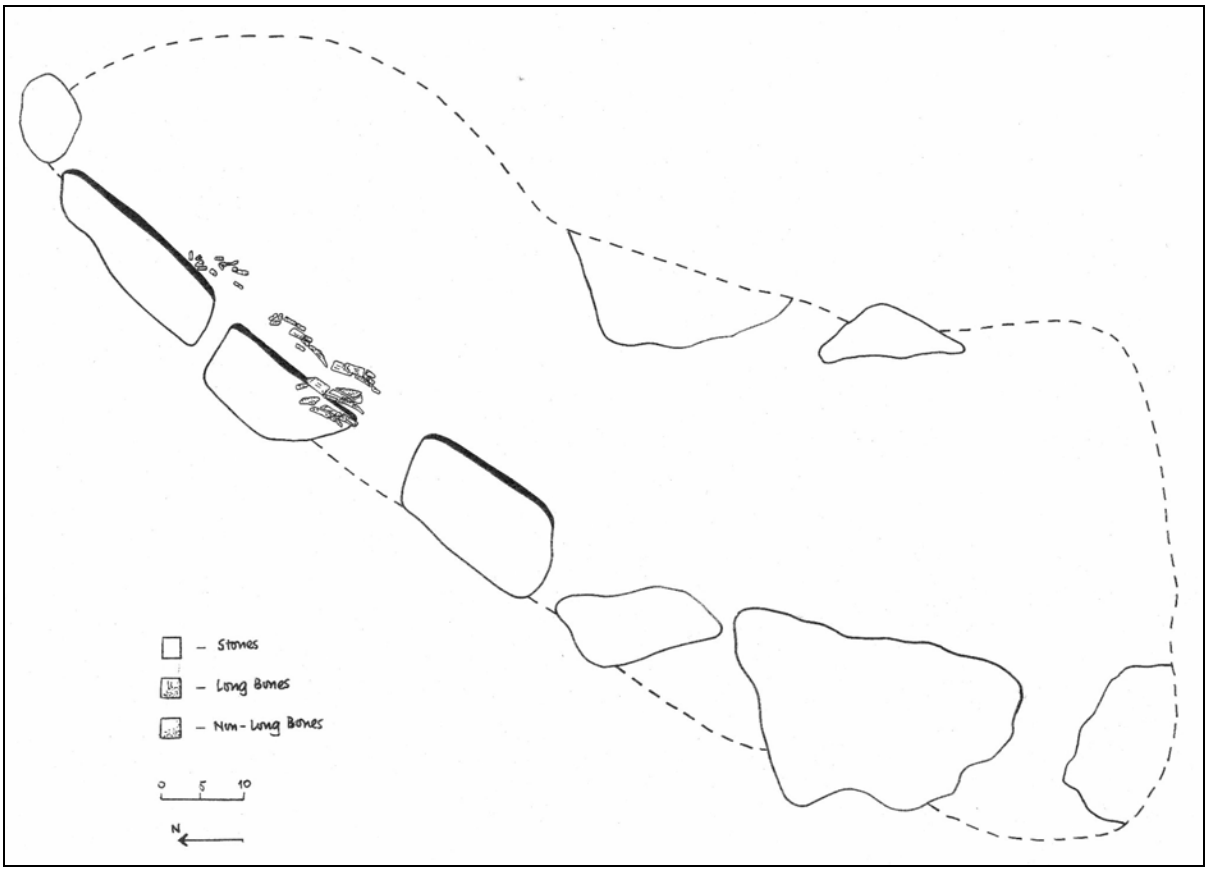

Figure 3: Burial 3, Individual 1. Drawing by Carmen Ting.

Burial: 3	**Individual**: 2	**Observer**: A. Novotny
Op: 6	**SubOp**: FFF	**Lot**: Multiple

Burial 3 consisted of 5 individuals interred in Structure 5-center during the Early Late Classic period (Kosakowsky 2006; Meierhoff et al 2004) (Figure 4). The grave type was an informal cyst grave that was not lined with stones. Burial 3.2 was a primary burial that was laid in an extended position with arms flexed towards the chest and face down. The head was oriented to the south. A cluster of small shells near the mandible of individual 3.2 may have made up a necklace.

Osteological Analysis

Individual 3.2 was not well preserved with about 25% of the skeleton available for observation. These remains were considerably mixed with those of 3.3 but I tried to keep the original provenience in my analyses where possible. While the individuals from Burial 3 were intermingled I did my best to match bone size, shape, and taphonomy of extremely fragmented pieces to more diagnostic elements. This helped to estimate which bones went with each individual. Elements present include left and right long bones of the arms and legs, vertebral, os coxae, and cranial fragments. Nearly a full set of teeth were present for this individual as well.

Age and Sex

Age was estimated to be young adult based on dental wear. Sex was determined to be female based on cranial morphological characteristics and os coxae morphology.

Dentition

Teeth were difficult to group by individual for Burial 3, in general. To do so I relied on the wear, size, shape, and taphonomy of teeth that were still in alveolar bone as a comparison to the loose teeth. I also relied on the excavators assignment of teeth to each individual and tried to maintain the provenience for each tooth even although I had to mix them up to match them to the correct individual. The teeth from 3.2 showed minor wear and minor amounts of calculus on maxillary and mandibular anterior teeth. Caries were present on the RM^3, LM_1, and RM_2 on interproximal CEJ and occlusal surfaces. Interestingly, the LC^1 and RC^1 were both modified into type III7. The mesial and distal corners had been filed to form a point.

Pathology and Trauma

No skeletal pathologies or evidence of trauma were observed.

Conclusion

Burial 3.2 was the a young adult female. Of those individuals in Structure-5-center for whom sex could be determined, 3.2 is the only female. She is also one of only three people of the 19 Chan burials analyzed to date who have dental modification. The other two instances, Burial 8 and Burial 10, have a different type of modification from individual 3.2 and both have type I1. Numerous small shell beads were found near her mandible suggesting that she was wearing a necklace.

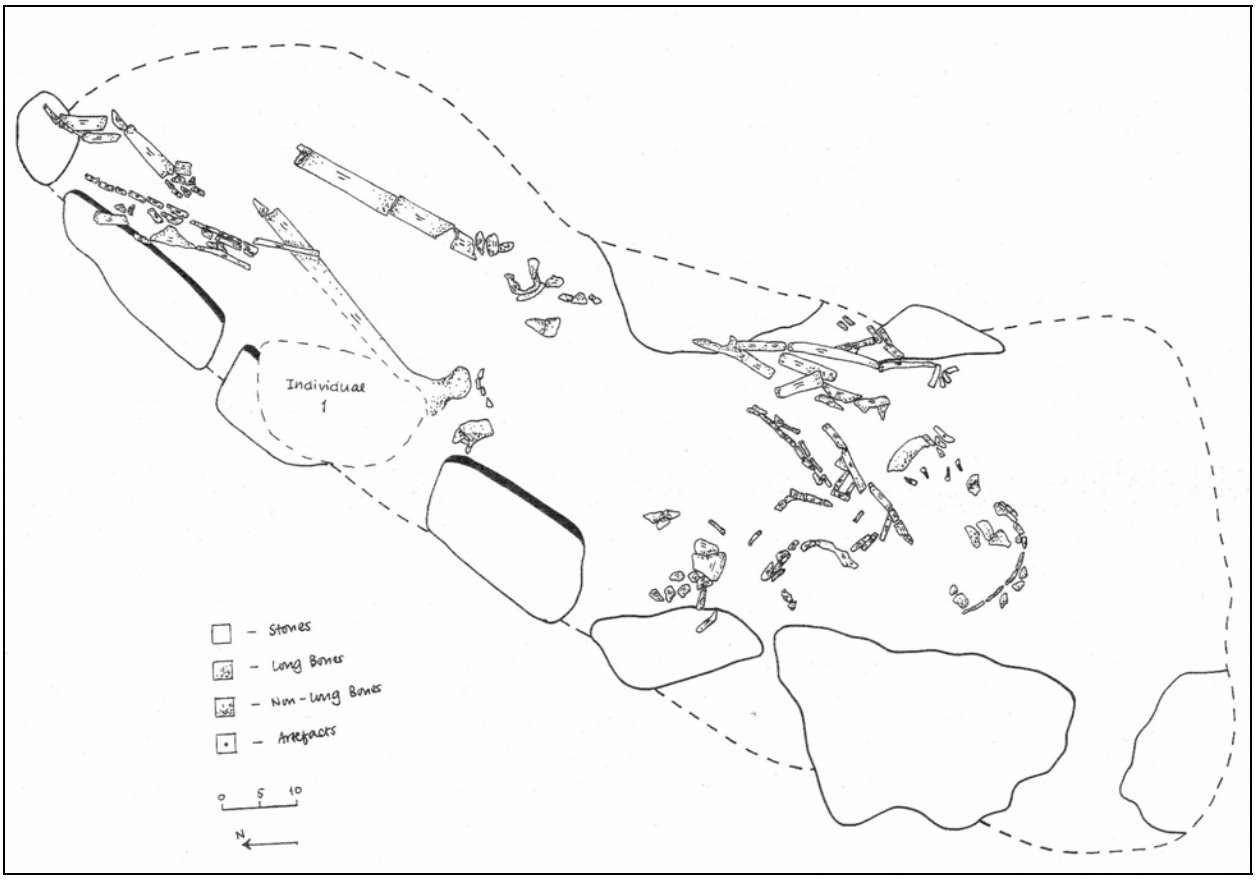

Figure 4: Burial 3 Individual 2. Drawing by Carmen Ting.

Burial: 3	**Individual**: 3	**Observer**: A. Novotny
Op: 6	**SubOp**: FFF	**Lot**: Multiple

Archaeological Context

Burial 3 was interred in Structure 5-center during the Early Late Classic period (Kosakowsky 2006). The grave type was an informal cist grave that was not lined with stones. Burial 3 contained at least 4 individuals with a possible fifth individual represented by dentition only. Individual 3.3 was a primary interment that was laid with its head oriented to the south and face down. The arms were extended at its sides. There were numerous special artifacts associated with 3.3 including marine conch and spondylus shell, a bivalve, and several small shell discs (Meierhoff et al 2004). Two feline teeth and several obsidian flakes were also found associated with these shell objects positioned around and under the cranium.

Osteological Analysis

Individual 3.3 was not well preserved with less than 25% of the skeletal remains present for observation. Elements present include left and right humerii, ulnae, radii, femora, fibulae, and tibiae. Vertebral, os coxae, and rib fragments were also present although largely unidentifiable beyond bone type due to the small size of the fragments.

Age and Sex

Age was estimated to be adult based on dental wear. Sex was estimated to be male.

Dentition

The teeth from individual 3.3 were extensively mixed with those from 3.4. Two sets of teeth were separated out based on dental wear, size, shape, and taphonomy. None of the teeth were in alveolar bone so it is difficult to assign a particular set of teeth to a set of skeletal remains representing one individual. The teeth associated with 3.3 did not show any dental pathologies. The RM^1 and LM^1's had large Carabelli's cusps.

Pathology and Trauma

No pathological bone formation or trauma was observed in the skeletal remains.

Conclusion

Individual 3.3 was extremely fragmented set of remains belonging to an adult male individual. This individual was interred with the most ornaments of any individual from Burial 3. Most likely these objects decorated a garment in which he was buried, although the feline canines and obsidian may have been intentionally placed grave goods. He also had Carabelli's cusps on his upper first molars, a trait shared by other individuals in the Chan sample – burials 7, 9, 10 and 12. He was interred in the typical fashion for individuals from Structure 5-center – face down with head oriented to the south.

Burial: 3	**Individual**: 4	**Observer**: A. Novotny
Op: 6	**SubOp**: FFF	**Lot**: Multiple

Archaeological Context

Burial 3 was interred in Structure 5-center during the Early Late Classic (Kosakowsky 2006). Burial 3 contained at least 4 individuals with a possible fifth individual represented by dentition only. The grave type was an informal cist grave that was not lined with stones. Individual 3.4 was the first in a series of interments in Burial 3. This individual, like the others, was laid in an extended, prone, position with head to the south. Two pieces of obsidian were found with this individual along with several pieces of red plaster that may be remains of a plaster lining to the grave.

Osteological Analysis

Burial 3.4 was also extremely fragmented and less than 25% of the skeleton was preserved. Elements present include cranial and long bone fragments. Nearly a complete set of dentition was present, although it was extensively mixed with teeth from individual 3.3.

Age and Sex

Age was estimated to be adult based on dental wear. Sex was estimated to be male based on morphological characteristics of the cranium.

Dentition

The dentition of individual 3.4 had several caries, on the RM^2, LM^3, RM^3 and RI^2. There was a moderate amount of calculus on the anterior mandibular teeth.

Pathology and Trauma

No evidence of pathological bone formation or trauma was found on the skeletal remains of individual 3.4.

Conclusion

Individual 3.4, an adult male, was the first interment in Burial 3. Individual 3.4 was followed by the remains of three other individuals, one male, one female, and a secondary burial consisting only of long bones. This burial could have been made sequentially, with re-entry into the cyst occurring repeatedly. If this were the case, the poor preservation of 3.3 and 3.4 would be easily explained. It is impossible to say how much time elapsed between re-entry episodes. In addition, it seems likely that there was a fifth re-entry into the cyst at which time either remains of a fifth individual were interred or only extraneous teeth. A surplus of teeth was found during analysis; the extra dentition did not make a complete set. At this time, osteological analysis did not reveal a fifth set of remains. Regardless, burial 3 is a unique mortuary event, or series of events, in the history of the ritual use of Structure 5-center.

Burial: 4	**Individual**: 1	**Observer**: A. Novotny
Op: 6	**SubOp**: HHH	**Lot**: Multiple

Archaeological Context

Burial 4 was interred in Structure 5-center during the Early Late Classic period (Kosakowsky 2006; Meierhoff et al 2004) (Figure 5). The grave was a stone-lined crypt with capstones constructed so that the individual was lying directly on Floor 11. Burial 4 was a primary interment of one individual. This individual was placed in an extended prone position with the head to the south and with the face to the west (Meierhoff et al 2004). Two jade beads were found within the grave.

Osteological Analysis

Burial 4 consisted of skull fragments, long bone fragments, and many small unidentifiable bone fragments. The medial diaphyses of the left and right femora were present as

were fragments of the left tibia and right ulna, although side for these bones is given tentatively since preservation was poor.

Age and Sex

Age was estimated to be adult and sex was indeterminate.

Dentition

No teeth were recovered from Burial 4.

Pathology and Trauma

No bones showed any pathological bone formations or evidence of trauma.

Conclusion

Burial 4 consisted of the remains of an adult of unknown sex interred face down with head to the south. There were no formal grave goods with the exception of a few jade beads. The burial location, in Structure 5-center, suggests that they may have been important during life or were born to an important family residing in group C-001. The paucity of skeletal elements is most likely due to poor preservation of small, delicate bones due to placement of the individual directly on a plaster floor as opposed to intentional exhumation. The cranium and robust long bones like the femora are often the bones chosen for exhumation by the ancient Maya. Their presence in Burial 4 suggests the missing elements were most likely not preserved.

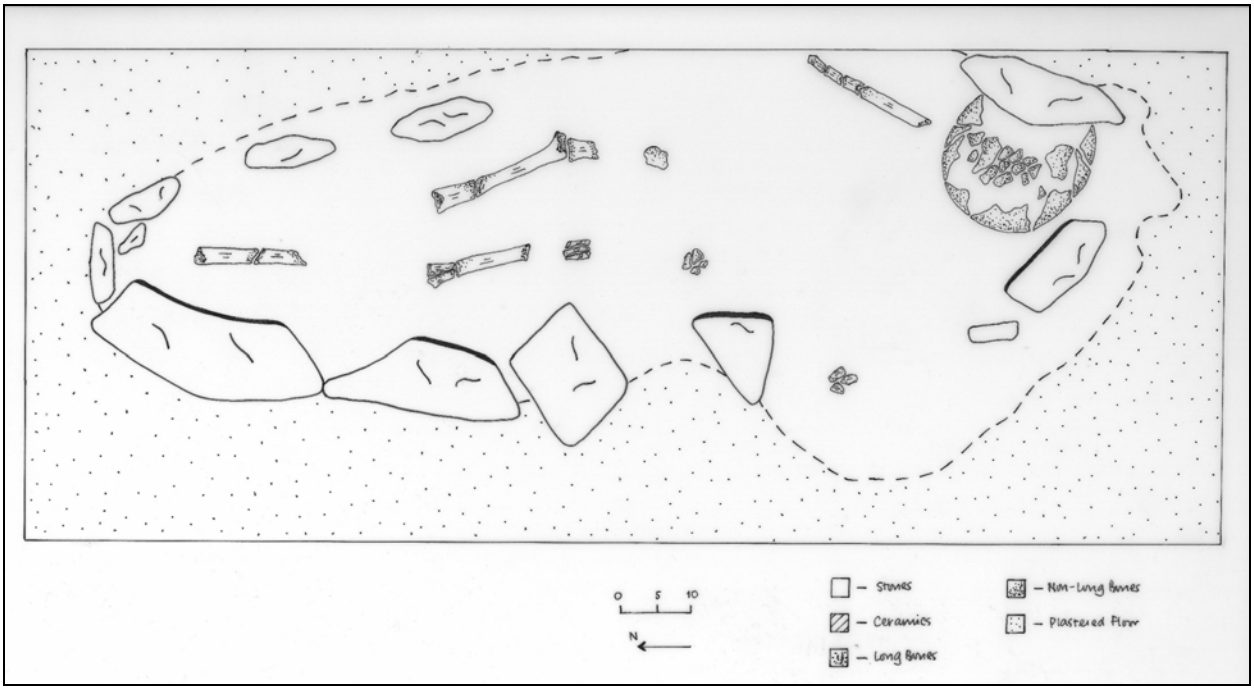

Figure 5: Burial 4. Drawing by Carmen Ting.

Burial: 5	**Individual**: 1	**Observer**: A. Novotny
Op: 6	**SubOp**: KKK	**Lot**: 13

Archaeological Context

Burial 5 was interred in Structure 5-center during the Early Late Classic period (Kosakowsky 2006; Meierhoff et al 2004) (Figure 6). Burial 5 was interred with a stone-lined crypt covered with capstones. Several of the wall and capstones had collapsed into the pit causing the bones to be moderately disturbed. The excavator observed that two individuals may have been interred in this grave and the osteological analysis confirms this observation. It is not immediately clear which individual was the primary individual or if these interments occurred at the same time. The more complete and better-preserved individual is referred to here as individual 5.1. The additional individual is described below as individual 5.2.

Individual 5.1 was interred in an extended position, face-down, with head oriented to the south. This burial is interpreted as a primary interment due to completeness of the remains. One obsidian blade was associated with this individual.

Osteological Analysis

Individual 5.1 was approximately 25%-50% complete. Bones present included cranial and mandible fragments, right clavicle, right humerus and ulna, right femur and tibia, left ulna and radius, and left fibula. Several carpals, metacarpals, and hand phalanges and a number of teeth were also present.

Age and Sex

Age was estimated based on tooth wear to be young adult, approximately 20-24. Sex was estimated to be female based on morphological characteristics of the skull. There were no elements from the ox coxae present to corroborate this sex estimate.

Dentition

In total, 33 teeth were recovered from the Burial 5 context. Two incomplete sets of dentition were matched based on tooth size, wear, and shape. None of the teeth fit into either mandible so it is not possible to definitively associate either set of dentition with a set of skeletal remains. The teeth were kept together as they were excavated.

Teeth were well preserved but the dentition was incomplete. Although there were several mandible fragments no teeth were in occlusion. Wear was moderate and there were only a few instances of dental pathology. The LP^2 showed a large cervical caries on the medial side at the CEJ. The LP^1 was not present for observation and it is not known whether this tooth was affected as well. Additionally, LC_1, LI_2, and RI_1 showed a very small amount of calculus on their lingual aspects. None of the teeth were modified and they had no unusual non-metric traits.

Pathology and Trauma

Several cranial fragments showed evidence of porotic hyperostosis. Porotic hyperostosis is a result of nutritional deficiencies that lead to iron-deficiency anemia and is manifest in the skeleton as porosity and thickening of the cranial vault and porosity in the roof of the eye orbits. Porosity was observed on the occipital fragments near the lambdoid suture and on the left parietal at the sagittal suture. Lesions were mostly healed at the time of death, indicating that the individual had survived the stress of nutritional deficiency. There was a partially active locus of porosity on the glabella region of the frontal.

The right fibula also showed abnormal bone formation on the proximal 1/3 and middle 1/3 of the diaphysis at the antero-medial aspect. The lesions are discrete but are similar in color and form. They both show sclerotic bone formation, indicating that they were healing at death, with some more porous, newer bone laid on the surface. This new bone was not well integrated. The shape of the bone was rendered abnormal by these lesions and the remodeling produced raised lumps off the surface of the normal bone. The corresponding left tibia was not observable but an abnormal bone formation was visible on the right tibia. The shape was odd and looked slightly like a saber-shin shape. This shape is indicative of a treponemal infection.

A locus of sclerotic bone was also present on the postero-lateral aspect of the right femur. This lesion is best interpreted as the result of muscular stress produced by a particular movement rather than as a disease process or trauma. Although, if this individual did have a treponemal infection this sclerotic bone could be further evidence.

Conclusion

Individual 5.1 was a young adult female interred in a stone-lined cyst within Structure 5-center. The burial of individual 5.1 lacked grave goods. Osteological analysis showed several pathologies including dental caries and calculus, possible treponemal infection, and significant musculo-skeletal stress on the right femur. Furthermore, it appears that more than one individual was interred in this crypt. Two incomplete sets of teeth were found and several “extra” long bones. Two scenarios are possible. Individual 5.1 may be the last of a series of interments that were made over the use-life of this crypt and Structure 5-center. This would explain why it is more complete than the other burials. On the other hand, the other burials may have been interred as secondary burials at the time of or sometime after 5.1’s interment. Either scenario is plausible as Structure 5-center was an important focus of community ritual for the residents of Chan from the Middle Preclassic to the Terminal Classic (Kosakowsky 2006).

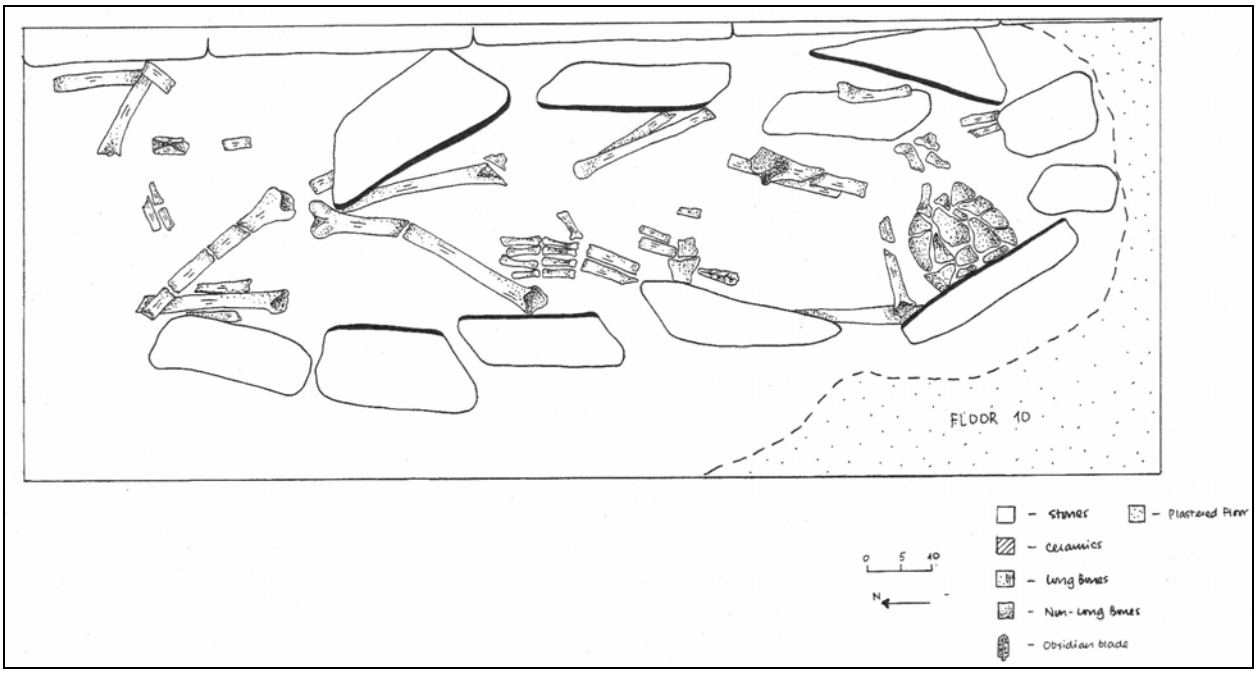

Figure 6: Burial 5. Drawing by Carmen Ting.

Burial: 5	**Individual**: 2	**Observer**: A. Novotny
Op: 6	**SubOp**: KKK	**Lot**: 13

Archaeological Context

Individual 5.2 was interred in the same crypt as individual 5.1 in Structure 5-center during the Early Late Classic period (Kosakowsky 2006; Meierhoff et al 2004) (Figure 7). Burial 5 was interred within a stone-lined crypt with capstones. Due to poor preservation the position of the body was indeterminate. Several of the long bones associated with individual 5.2 were recovered from the northeast corner of the crypt.

Osteological Analysis

Individual 5.2 was not well preserved and less than 25% of the body was available for observation. Remains include a partial set of dentition, right humerus, clavicle, and ulna, and left humerus and femur. Unsideable radius and ulna fragments were also present.

Age and Sex

Based on dental wear, age at death is estimated to be middle adult, approximately 30-35. These remains were more robust than individual 5.1 suggesting that the individual was male.

Dentition

A partial set of dentition was present with moderate to heavy wear. One caries was present on RP_2 on its medial aspect and on RM_3 on its occlusal surface. Calculus was present on the lingual aspect of the LI_1 and RI_1. No teeth were modified.

Pathology and Trauma

The skeletal remains showed no pathological bone formation or evidence of trauma.

Conclusion

Individual 5.2 are the remains of a male older adult, approximately 30-35. No modification was made to the teeth and there were no instances of pathological bone or evidence of trauma. No grave goods were present. As described above, individual 5.2 was interred in the same grave as individual 5.1. It is unclear as to who was the principle interment. Due to the absence of small bones of the hands and feet it is possible that 5.2 was a secondary burial that was interred at the same time as or after the interment of 5.1. There were several other long bones interred in this crypt – two left femurs, humerus fragments, and two tibia fragments – that could not assigned to individual 5.1 or 5.2. These could also have been from other secondary burials. Alternatively, individual 5.2, or the individuals to whom the extra long bones belong, could have been the first in a series of interments in this crypt. Over time the constant re-opening of the crypt and manipulation of the body may have contributed to the deterioration of the more fragile skeletal elements.

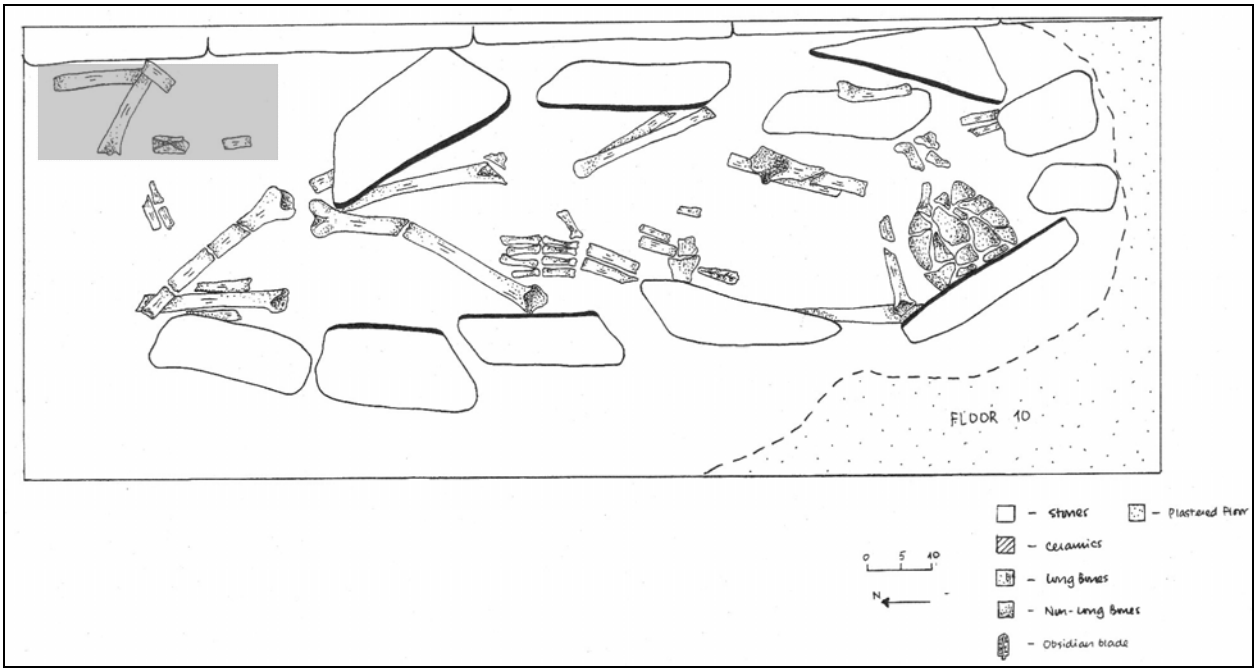

Figure 7: Burial 5. Individual 5.2 indicated by the shaded box. Drawing by Carmen Ting.

Burial: 6	**Individual**: 1	**Observer**: A. Novotny
Op: 6	**SubOp**: YY	**Lot**: Multiple

Archaeological Context

Burial 6 was interred in a simple cist within Structure 5-center during the Terminal Preclassic period (Kosakowsky 2006; Meierhoff et al 2004) (Figure 8). Burial 6 appears to have been a primary interment based on the construction of the cist but very few human remains were found. The excavators observe that due to the size and shape of the crypt and location of artifacts in the grave the individual may have been oriented with its head to the south. Four special artifacts were recovered from the cist – a tubular jade bead, a piece of crystal, and two ceramic vessels (Meierhoff et al 2004).

Osteological Analysis

Less than 25% of the skeleton was available for observation. Only a fragment of mandible, the proximal diaphysis of the left humerus, and several teeth were recovered. Several other unidentifiable long bone fragments were also present.

Age and Sex

Age is estimated to be young adult, aged 20-29, based on very minor dental wear. Sex was indeterminate.

Dentition

Dental wear was very minor for the teeth from Burial 6. Interproximal caries were present on the LC_1, RI_1, and RI_2. The RI_1 and RI_2 also had moderate amounts of dental calculus. The RC^1, RI^1, RI^2, and LC^1 all showed pronounced linear enamel hypolasias. The lesions were in the form of linear grooves and were severe. LEH's indicate that the individual survived a disease episode or nutritional deficiency in childhood. This type of pathology can occasionally be caused by traumatic events, as well.

Pathology and Trauma

No pathologies or trauma was evident on the skeletal remains of Burial 6.

Conclusion

Very little can be said about the individual in Burial 6. The individual interred there was possibly afforded secondary burial treatment of exhumation. Their burial seems consistent with other burials in Structure 5. This individual suffered from severe episode of stress early in life as evidence by the pronounced LEH's on several teeth. Structure 5 may have been the location of a series of burials commemorating a founding lineage which suggests that even privileged members of the Chan community were at risk for disease or nutritional deficiency.

Burial: 7	**Individual**: 1	**Observer**: A. Novotny
Op: 6	**SubOp**: KKK	**Lot**: Multiple

Archaeological Context

Burial 7 was interred in Structure 5-center during the Early Late Classic period (Kosakowsky 2006; Meierhoff et al 2004) (Figure 8). The grave was a cist cut into Fill 158 to the level of Floor 11 so that the remains were resting on this earlier floor. There were no stones lining the cist but the grave was covered with several capstones that collapsed over time and disturbed the burial. A single individual was placed in this cist but poor preservation makes the exact position unknown. The excavator suggests that they were placed on their left side, due to the position of the skull, but the rest of the body was very poorly preserved and so it is not clear whether it was in this position as well. The head was oriented to the south and was facing west. The excavator suggested that this individual was wrapped in a textile whose print could possibly be seen in the soil matrix surrounding the bones. There were no grave goods in this burial.

Osteological Analysis

Burial 7 was extremely poorly preserved with the exception of the cranium and dentition. Less than 25% of the skeleton was present for observation. Fragments of the right humerus, ulna, and radius were present as well as the left humerus, tibia, and fibula. Several smaller bones were present including the dens of cervical vertebra 2, two carpals, one hand phalange, and rib fragments. The femora fragments show a different taphonomic signature than the other long bone fragments. Their surface is very uneven and irregularly pitted. The other long bones show root-like damage and minor pitting but have mostly smooth and normal bone surfaces. The taphonomy of the femora fragments look more like the taphonomy of the bones from Burials 4 and 5. The fragments from Burial 7 did not refit with long bone fragments from either of these Burials.

Age and Sex

Age was estimated you be young adult, aged 20-29, based on dental wear. Sex was determined from morphological characteristics of the skull to be female. This estimate could not be corroborated by the os coxa as it was not preserved, but the long bone fragments are gracile and lacked strong muscle markings.

Dentition

The dentition was well preserved and wear was light to moderate. Several dental pathologies were recorded. RM^1 and RM^2 had both occlusal and interproximal caries. RI^2, LI^2, LC^1, LC_1, LI_2, RI_1, and RI_2 had interproximal caries. The lower left molars were lost premortem and the alveolar bone had been resorbed completely at death. The mandible is damaged at the LP_1 and LP_2 so it is not possible to see whether they were lost premortem as well. RM^1 had a small amount of calculus on the buccal surface. All upper and lower incisors were shoveled and the upper incisors were slightly double shoveled but the lower incisors were not. The RM^1 had a

large Carabelli's cusp and both $LM^1$and RM^1 had large hypocones. None of the teeth were modified.

Pathology and Trauma

No skeletal elements showed pathological bone formation or evidence of trauma.

Conclusion

Burial 7 was a single individual interment that was most likely primary due to the presence of the smaller bones of the hands, ribs, and vertebra. There were no grave goods associated with Burial 7 although this individual was buried within a structure that held important ritual significance for the residents of Chan, evidenced by the large number of burials and caches that were placed there. The significant lack of skeletal elements and the different taphonomic signature of the bones from Burials 4 and 5 suggest that re-entry events may have occurred in Burial 7 as well. Again, the burial environment overlaying a plaster floor is not conducive to good skeletal preservation and this could also explain the lack of skeletal elements.

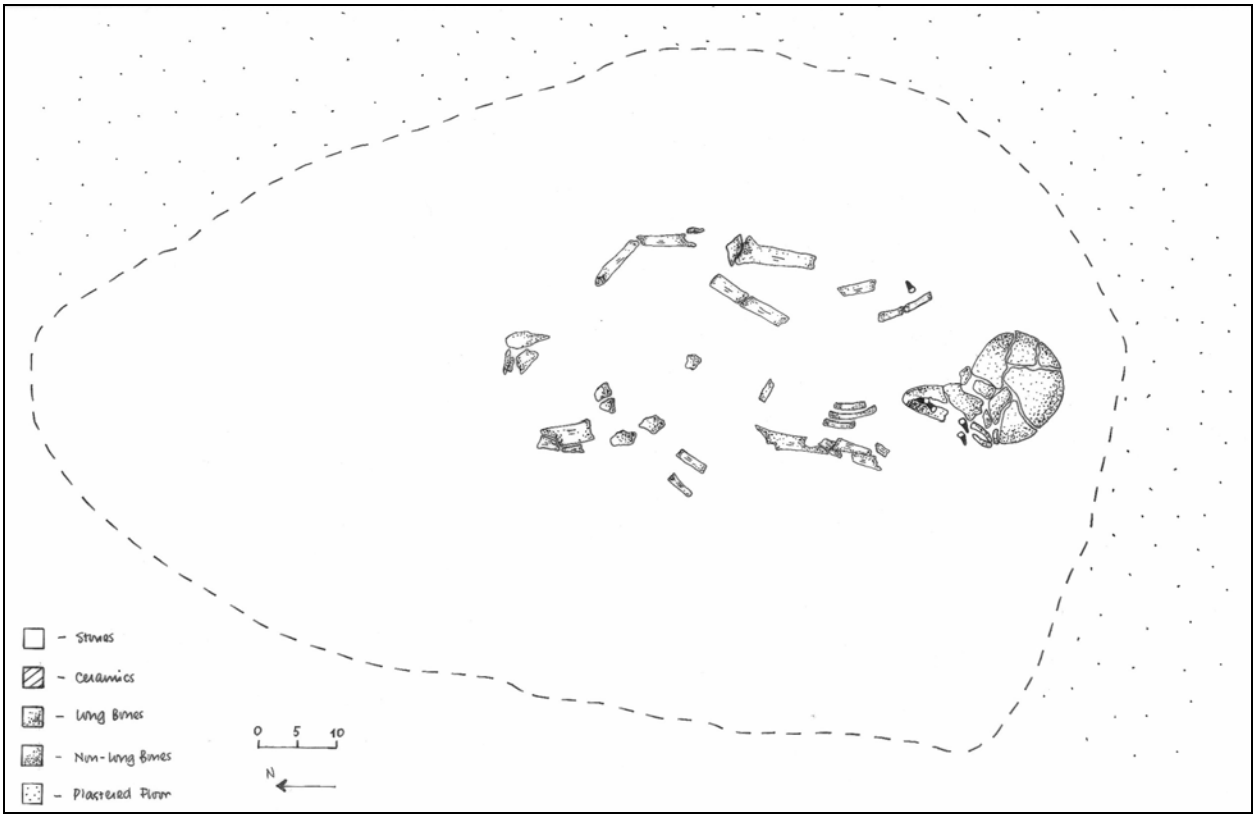

Figure 8: Burial 7. Drawing by Carmen Ting.

Burial: 8	**Individual**: 1	**Observer**: A. Novotny
Op: 6	**SubOp**: YY	**Lot**: Multiple

Archaeological Context

Burial 8 was interred in Structure 5-center during the Late Preclassic period making this the earliest interment in Structure 5-center and at the Chan site generally (Kosakowsky 2006; Meierhoff et al 2004) (Figure 9). The grave was a stone lined crypt that was built on top of the Floor 22 so that the floor created the bottom of the crypt. Burial 8 contained a single individual, primary interment, laid in an extended position, face down. The cranium had been removed and placed in a bowl at the proximal end of the body. The body was oriented with the proximal end (where the head should have been) to the south. There were eight grave goods in Burial 8, a square jade bead, a 40 cm long chert blade, and six whole ceramic vessels. Bird bones were recovered in the screen during excavation of the Burial 8 context. The square jade bead was located in the pot that contained the cranium and the chert blade was laid alongside the left tibia.

Osteological Analysis

Burial 8 appeared moderately well preserved in the crypt but was not so well preserved after excavation. Approximately 25% of the skeleton was present for analysis. The burial suffered moderate root damage to several bones. Although fragmented, every long bone except for the right ulna and right fibula were present. Fragments of hand and foot phalanges, carpals, metacarpals, tarsals, metatarsals, ribs and vertebrae were also preserved. The cranium was approximately 50%-75% preserved and several teeth were also present.

Age and Sex

Age was estimated to be an adolescent, aged 16 – 20, based on dental wear. Sex was estimated to be male from a frontal fragment. No ox coxae were present to confirm this sex assessment.

Dentition

Field notes indicate that the excavator collected the dentition according to their location in the grave. In order to preserve this provenience information all dentition was recorded separately to ensure that there was only one individual in Burial 8. Analysis showed that there were three extra teeth interred with Burial 8 – a LC_1, LI^1, and a RP_1. These three teeth all had extremely pronounced hypoplasias and very little occlusal wear.

The teeth that were collected with the mandible and other bones of the skull are presumed to be those of the primary individual in Burial 8. Occlusal wear was light. Several of these teeth showed trace amounts of calculus buildup on their lingual aspect, LI^1, LC_1, RI_2, and RC_1. The RM_3 appears to have been lost premortem because the alveolar bone of the left mandible was resorbed at death.

One tooth, the LI^1 was modified in type I1, according to the Romero dental modification classificatory system. This modification is a notch filed into the center of the occlusal surface of the incisor. The RI^1 was not recovered and whether it was modified as well is unknown,

although ancient Maya dental modification was most often bilateral. The other incisors recovered were not modified. There was also no discernible cranial modification.

Pathology and Trauma

A fragment of frontal bone shows a locus of porosity near the coronal suture. The porosity is dense but not coalesced. The bone appears to have healed at the time of death. The newer, sclerotic bone is a lighter color than the rest of the frontal fragment. The locus of porosity stops abruptly suggesting the porosity was the result of an infection and not a nutritional deficiency like anemia, which can also appear as porosity on the cranial vault. The parietal and occipital fragments do not show any porosity or pathological changes. The shape of the frontal bone was not affected by the pathological changes.

Conclusion

Burial 8, an adolescent male, was the first burial to be interred in Structure 5-center. It was interred with multiple whole vessels and is one of two individuals to show body modification in the form of modified teeth. These indicators suggest that this individual was an extremely important member of the Chan community. While the presence of many small bones in Burial 8 suggests that the interment is a primary one, the grave seems to have been re-opened at least once to place the head in the bowl. No cut marks were observed on the cranial fragments, mandible or cervical vertebrae suggesting that some decomposition must have occurred before it was removed from the rest of the body. The inclusion of three extra teeth is also interesting. This addition could have occurred with primary interment or when the grave was re-opened. Isolated human teeth have been found in other mortuary and cache contexts at Caracol, Lubaantun, Yakalche in Belize and Holmul, Guatemala (Chase 1994; Novotny n.d.; Pendergast et al 1968). Several other bone fragments were associated with the ceramic vessels placed at the abdominal region. It is not clear from the burial drawing where these bones were from but if they were inside the vessels they may have been placed there after a significant amount of decomposition had occurred.

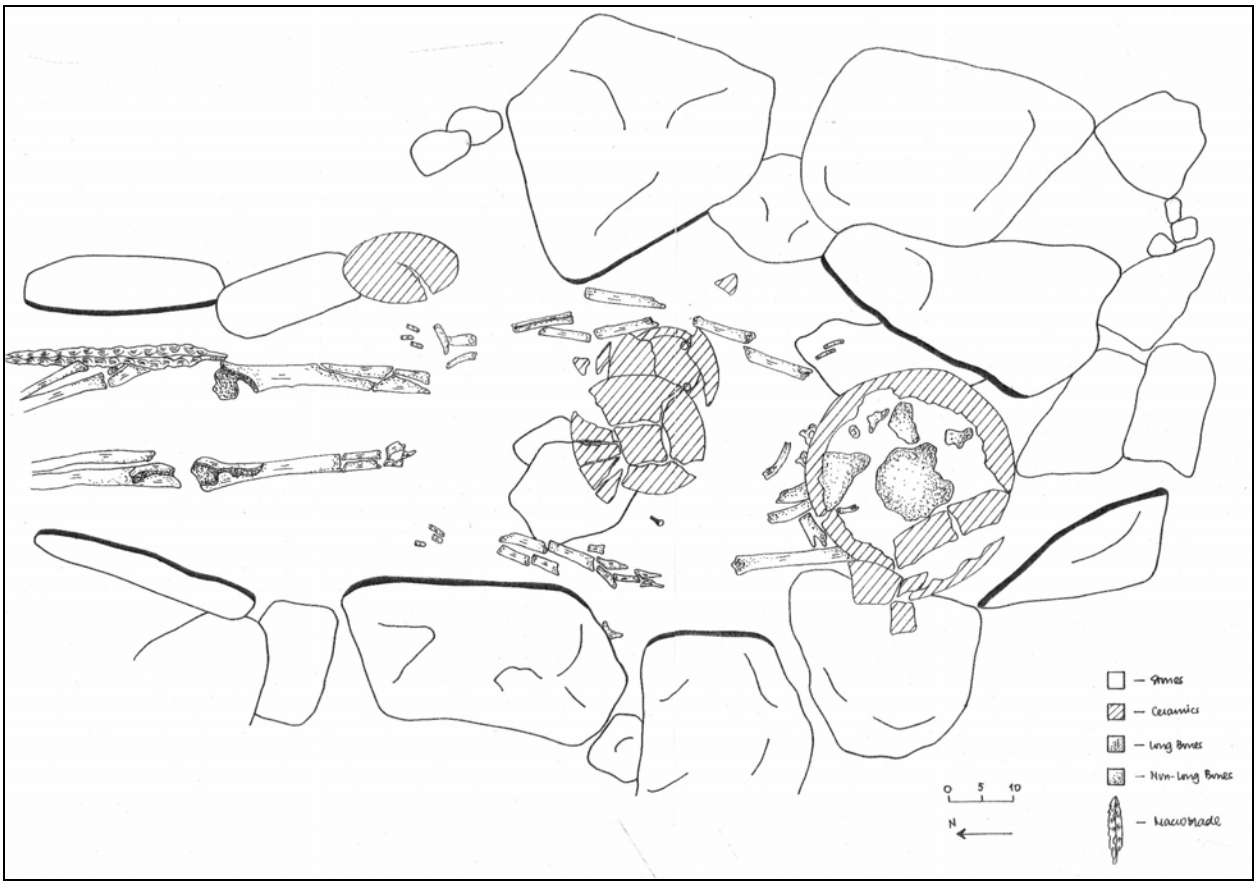

Figure 9: Burial 8. Drawing by Carmen Ting.

Burial: 9	**Individual**: 1	**Observer**: A. Novotny
Op: 6	**SubOp**: OOO	**Lot**: Multiple

Archaeological Context

Burial 9 was interred within Structure 5-center during the Late Preclassic period (Kosakowsky 2006; Meierhoff et al 2004) (Figure 10). The grave was a stone-lined crypt with capstones that had been partially disturbed by a looters trench. Burial 9 was a single individual interment placed in an extended position, face down, with head to the south. The hands and feet were crossed and a bowl had been placed over the head (Meierhoff et al 2004). This is unusual for burials at Chan where most burials were placed with their legs extended straight and their hands at their sides. There are also not other cases of an individual interred with a ceramic vessel over the cranium, although this is common in other parts of Mesoamerica. There were only the two Sierra Red vessels as grave goods.

Osteological Analysis

Burial 9 was an extremely well preserved burial, possibly due to the light, dry grave fill. Approximately 75% of the skeletal elements were present for observation. While the ribs and

vertebrae are not particularly well preserved there were many fragments present. Many small bones of the hands and feet were also present. The dentition was also perfectly preserved.

Age and Sex

Age was estimated to be young adult, aged 23 – 25, based on incomplete fusion of the medial aspect of the clavicles. The left clavicle was completely unfused and no epiphysis was found. The right clavicle was partially fused. Tooth wear supported this age assessment. Sex was estimated from both cranial and ox coxae morphology and was determined to be male. The head of the femur was slightly gracile for a male individual at 43.26 cm in diameter.

Dentition

A full set of dentition was present and most were completely developed and in occlusion. Dental wear was minor. The RM^3 showed two caries – one on the occlusal surface and one smooth surface. Nearly all anterior teeth, both maxillary and mandibular, had a small amount of dental calculus. The incisors were shoveled. The maxillary first and second molars showed pronounced hypocones and the LM^1 had a small Carabelli's cusp. The lower molars also had large cusp 5's.

Pathology and Trauma

Burial 9 showed several very interesting pathologies. Right ribs 10, 11, and 12 were broken perimortem and had partially healed at the time of death (Figure 11). They were each fractured at the neck, between the tubercle and the head. The fracture type is greenstick or incomplete; the ribs buckled anteriorly but did not fracture completely. All three have developing fracture callouses that are partially healed but are mostly made up of woven bone. The callouses are fully formed anteriorly but the fracture line is still visible on the posterior aspect of each rib although with a slight cover of sclerotic bone. The fracture callouses are a dark brown color in contrast to the unaffected bone which was a creamy-off white. Rib 11 has a cloaca at the neck on its inferior aspect. The margins of the cloaca are rounded and healed. There is a small amount of reactive bone on the lateral edge of the cloaca.

Nearly every other rib on both sides, with the exception of the most cranial ribs, had some amount woven bone on their ventral and anterior aspects. This woven bone was unhealed indicating that the infection was active at the time of death. The new woven bone on these ribs was a dull grey color while the normal, unaffected bone is a creamy-off white. The woven bone did not change the gross shape of the ribs, it had only recently been laid over the unaffected bone.

The 12^{th} thoracic vertebrae showed a compression fracture on its right side (Figure 12). A fracture line is visible on the anterior aspect of the vertebral body. The left side of the body is fractured superiorly. A poorly preserved lumbar vertebrae also showed woven bone and abnormal bone formation on a transverse process. This process was isolated and so could not be identified as to side or vertebra.

Porosity was apparent on bones of the skull – the frontal, parietals, and occipital. All porosity on all elements was small, healed at death, with rounded smooth borders to the pores, and was located on the ectocranial surface. Minor porosity was observed on the endocranial

surface but this may have been normal. Areas of porosity were smooth but thicker than unaffected portions of the bone and obviously lay over normal bone. The affected areas were lighter in color than the unaffected bone as well.

Both right and left femora had active, woven bone circumferentially at the middle third of the diaphysis. These lesions were active at death but did not cause gross shape or color changes to the bones.

The right humerus showed abnormality in shape. No gross pathological changes were observed but the proximal epiphysis and proximal third of the diaphysis were larger than the left humerus. No abnormal bone formation was observed. No abnormally robust muscle markings were observed on either bone or bones of the forearm. Both scapulae also appeared normal.

The bones from Burial 9, in general, were rather gracile. They were long and narrow in shape and very light-weight and brittle. It is most likely that the individual in Burial 9 suffered from a metabolic disorder or a vitamin or mineral deficiency that caused his bones to become extremely brittle. Thus, the fractures in the vertebrae and ribs were secondary to this disorder.

Conclusion

Burial 9 has several features that are unique to the Chan mortuary record. First, the grave fill was different from other graves, at least in Structure 5. Second, the crossing of the hands and feet and the placement of a bowl over the crania is not seen in other burials. Finally, this individual suffered from a distinct pathological processes that caused his bones to become very brittle and light-weight. Despite the severity of this man's injuries, or possibly because of them, he was interred in particularly important ritual location during the Late Preclassic suggesting that he or his family were important individuals in the Chan community.

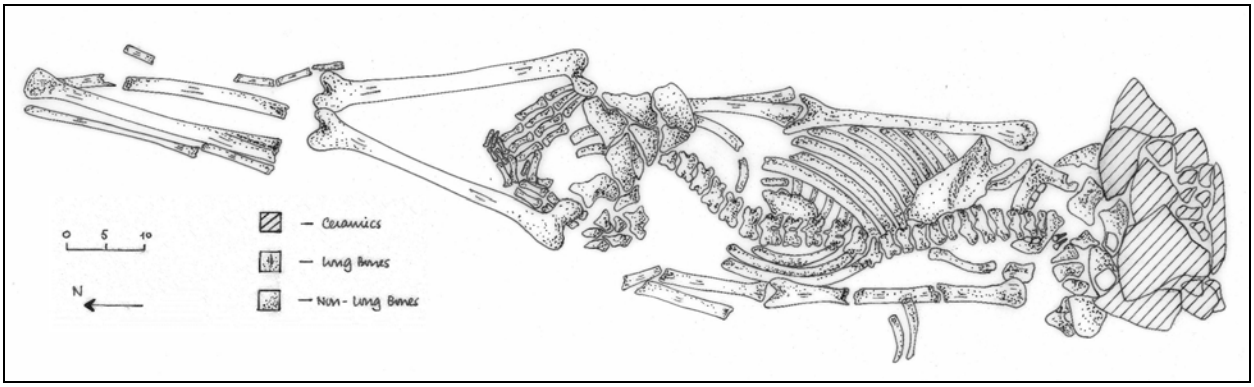

Figure 10: Burial 9. Drawing by Carmen Ting.

Figure 11: Burial 9. Right ribs, supero-ventral aspect. Healed fractures. Photo by Anna Novotny.

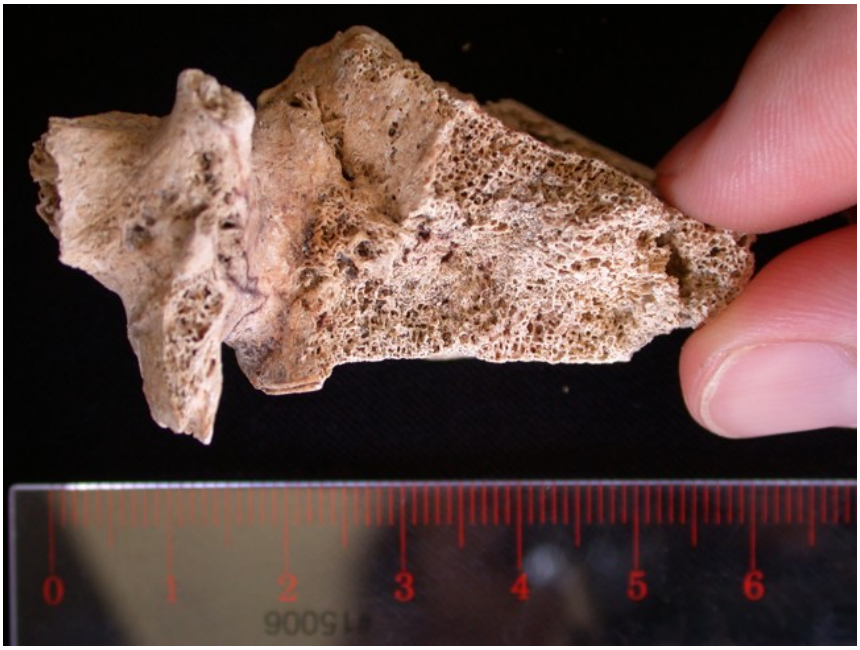

Figure 12: Burial 9. Thoracic vertebrae 12, posterior aspect. Compression fracture on the right side. Photo by Anna Novotny

Burial: 10	**Individual**: 1	**Observer**: A. Novotny
Op: 6	**SubOp**: MMM	**Lot**: Multiple

Archaeological Context

Burial 10 was interred in Structure 5-center during the Late Preclassic period (Kosakwosky 2006; Meierhoff 2004) (Figure 13). The grave itself was a simple pit that was unlined besides the construction fill and soil matrix. No capstones were found. The body, although poorly preserved, was oriented with head to the south in an extended position. Due to poor preservation it was not possible to discern if the body was face down. The burial appears to have been a primary interment. There were nine grave goods – a carved face, an obsidian blade, a hematite fragment, an incensario plug, a jade bead, a Sierra Red bucket, a marine shell, a stingray spine, and a bone fragment with a drilled hole (Meierhoff et al 2004). Other faunal bone was recovered during excavation of Burial 10 including pieces of a turtle carapace.

Osteological Analysis

Burial 10 was extremely poorly preserved with less than 25% of the skeleton available for observation. Fragments include cranium, vertebrae, right humerus, ulna, radius, and patella and left radius, fibula, and tibia. All fragments were very small and difficult to side and identify. Small bones of the hands and feet including carpals and hand phalanges were present. A Wormian bone, an extra ossicle sometimes found in cranial sutures, was among the cranial fragments. These bones are recorded as non-metric morphological traits of the skull. This is the only example of this trait at Chan.

Age and Sex

Age was estimated to be young adult, aged 20-29, based on dental wear. Sex was determined to be male based on morphological characteristics of the cranium. The os coxae were not preserved and so could not provide supporting evidence for this sex or age assessment.

Dentition

The dentition was reasonably well preserved and wear on the teeth was moderate. There were several cases of dental pathology. A moderate amount of dental calculus was observed on the right and left M^1's on the buccal aspect. The maxillary and mandibular anterior teeth also showed moderate amounts of calculus. Interproximal caries were present on the RM^2, LP^2, LM_1, and LP_1. The LM_1 also displayed a caries each on the occlusal surface. Oddly, there were several teeth from the lower left mandible but the associated mandibular fragment, which was present, had fully resorbed alveolar sockets. This could suggest placement of another individual's teeth in grave contexts.

The RM^1 had a very large Carabelli's cusp and both left and right M^1's and the RM^2 had pronounced hypocones. The upper incisors were double shoveled. LI^2 is extremely shoveled, almost to the point that it was barrel shaped.

The $RI^1$and $LI^!$ showed Romero type I1 dental modification. This type of modification is consistent with the type found in Burial 8, the earliest Burial in Structure 5-center and at the

Chan site in general. Type I1 has a notch in center of the incisal edge of the upper central incisors. In addition, there was wear in the form of grooving or pitting on the medial edge of the upper central incisors as well as on the distal edge of the LI^2. The RI^2 was not present for comparison. The medial wear could be the result of using the teeth as tools.

Pathology and Trauma

There were several minor pathologies observed. First, several unidentifiable vertebral fragments had osteophyte development on the anterior aspect of the vertebral body. Osteophyte development is a product of early stages of osteoarthritis. Second, there was a small amount of porosity on the glabella of the frontal bone and around the sagittal suture of an unsided parietal fragment. Porous loci were lighter in color than the surrounding unaffected bone and also slightly thicker too. Finally, a significant amount of sclerotic reaction was present within a fragment of the maxillary sinus. The surface of the sinus cavity was very smooth and healed with only some slight porosity. The surface is shiny and is laid over unaffected cortical bone evidenced by the lighter colored sclerotic bone. The exterior of the maxilla is normal.

Conclusion

Burial 10 contained the fragmented, primary remains of an adult male. Grave goods with distinct ritual connotations, such as jade, a turtle carapace, and a stingray spine, accompanied Burial 10. This individual is further distinguished by its early date of burial in Structure 5-center, the Late Preclassic, its unlined, simple grave, and the fact that the individual interred there had dental modification. The dental modification of Burial 10 was the same type as found in Burial 8, also a Late Preclassic burial (Kosakowsky 2006). These factors set Burial 10 apart from the other burials in Structure 5-center and suggest that he may have been the primary interment of the building, anchoring the social memory of the Chan community in Structure 5.

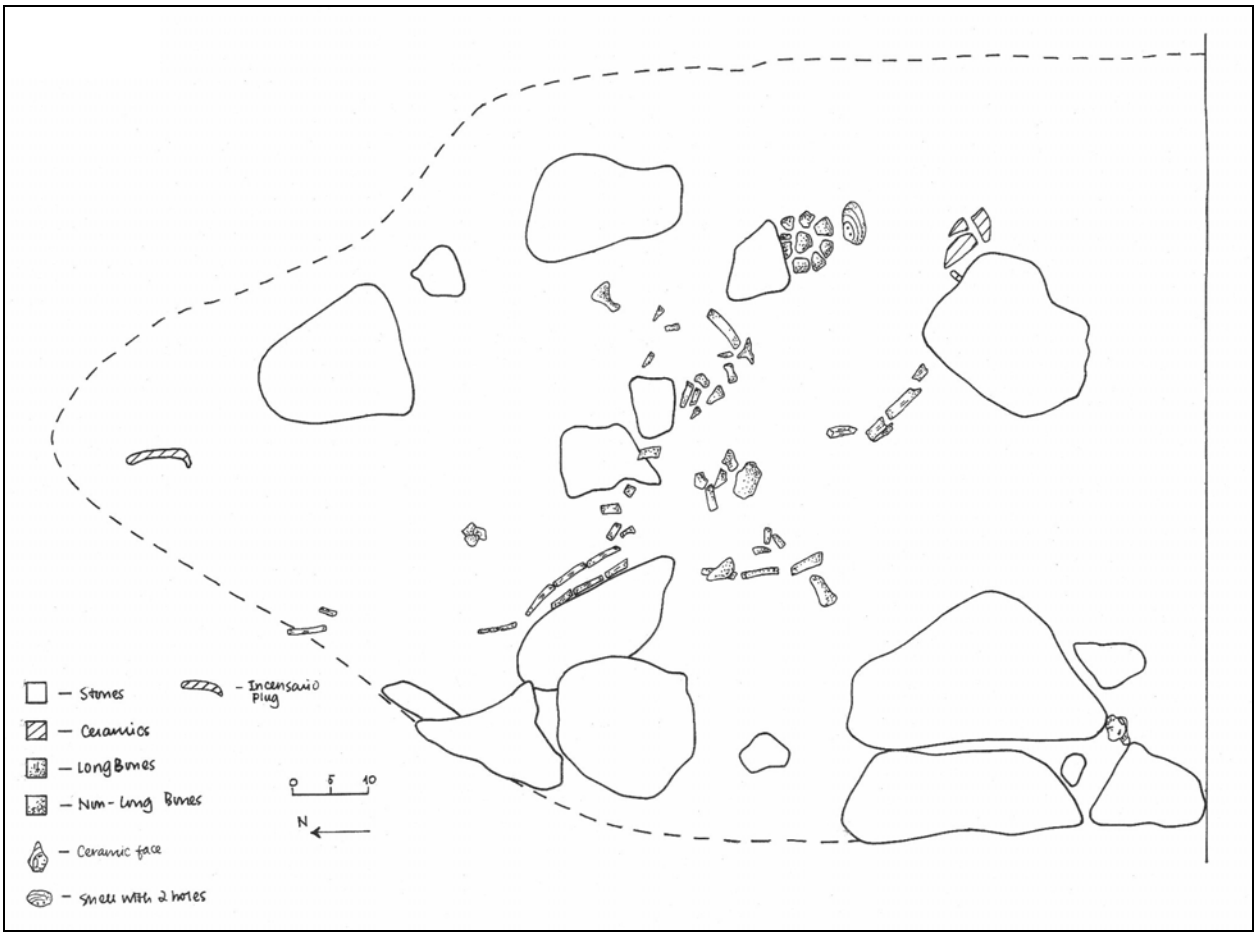

Figure 13: Burial 10. Drawing by Carmen Ting.

Burial: 11	**Individual**: 1	**Observer**: A. Novotny
Op: 10	**SubOp**: N	**Lot**: Multiple

Archaeological Context

Burial 11 was recovered from the base of the western retaining wall, Wall 3, of Structure 9 (Latsch 2005) (Figure 14). The interment consisted of a single individual placed within a stone-lined crypt sealed with capstones. Wall 3 ran over the capstones of Burial 11 indicating that the interment pre-dated the construction of Wall 3. The bottom of the crypt was rubble construction fill of Structure 9. Only the southern half of Burial 11 was preserved, the northern section was heavily disturbed by looting and the cranium was missing. The excavators suggested that the burial was primary due to the position of the remaining skeletal elements. The body was in an extended, prone position. There was a partial ceramic vessel included in the burial.

Osteological Analysis

Burial 11 was extremely fragmented. Preserved elements include a right femur and numerous unsideable long bone fragments. Only two teeth were recovered.

Age and Death

Age at death was estimated to be adult based on dental development and wear. Sex was indeterminate.

Dentition

Wear was light on the two teeth recovered – RI^2 and RI_2. Both had minor shoveling and the RI_2 had a minor amount of calculus on its labial and medial surfaces.

Pathology and Trauma

No pathologies or trauma was observed on the skeletal remains of Burial 11.

Conclusion

Burial 11 did not provide much osteological or archaeological data. The heavy disturbance by looters and collapsing of the crypt walls resulted in extremely poor preservation of most skeletal elements. The grave features and body position of Burial 11 were consistent with the overall mortuary pattern of the Chan site.

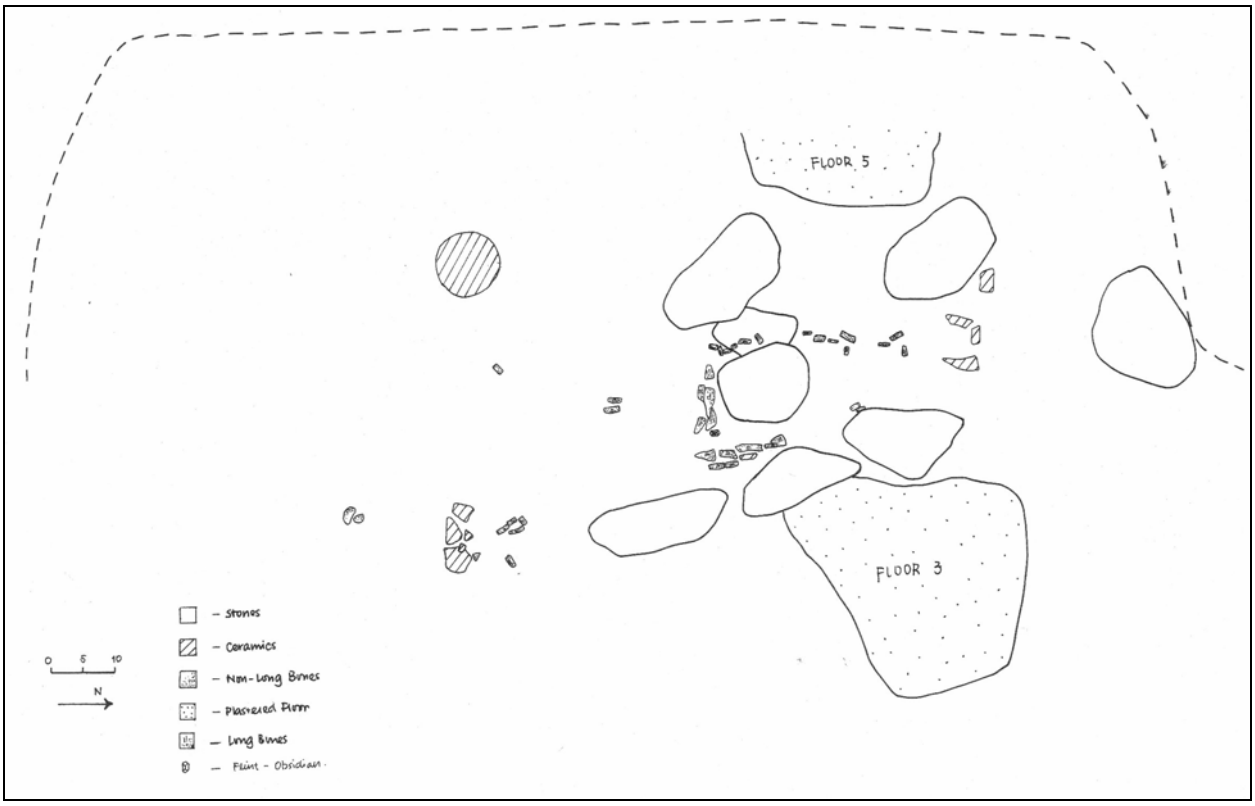

Figure 14: Burial 11. Drawing by Carmen Ting.

Burial: 12	**Individual**: 1	**Observer**: A. Novotny
Op: 13	**SubOp**: T	**Lot**: Multiple

Archaeological Context

Burial 12 was discovered within construction fill of the penultimate steps of the Western structure of the Chan E-group (Robin 2005) (Figure 15). The burial consisted of a single individual interred in a simple pit with several stones placed around the cranium. The body was laid in an extended, face down position with head oriented to the south. The head may have been turned to face the east, according to excavation notes. The date of burial is pending ceramic analysis to be conducted during the 2008 field season.

Osteological Analysis

The excavators observed that bone preservation in the grave was excellent. For the remains of a juvenile preservation was good, nevertheless, only about 25% of the skeleton was present for observation. Remains consisted predominantly of cranial and pelvis fragments which several moderately preserved long bones.

Age and Sex

Age was estimated to be 8 – 9 years old at death based on dental development. No epiphyses of the long bones or intact suture fragments were available to support this age estimate. Sex was indeterminate due to the young age of the individual.

Dentition

Full sets of permanent and deciduous dentition were recovered. The enamel of the adult maxillary incisors and premolars was incompletely formed. The surface was a purple/gray color. The adult incisors were shoveled and double shoveled. The adult left and right M^1 and M^2 had large hypocone cusps. Both M^1's also showed small metaconule cusps. The LM^1 and RM^1 had moderately developed Carabelli's cusps, as well.

Pathology and Trauma

No pathological bone formation or trauma was observed on these remains.

Conclusion

Burial 12 was an 8 year old child interred within the steps of the Western structure of the Chan E-Group. The child was buried in a similar fashion to the other adult burials from the main group at Chan, in an extended position, face down, with head to the south. A piece of greenstone and two shells were included in the interment. Burial 12 is one of only two children to have been interred in the main group. Furthermore, the adult dentition show distinct Carabelli's cusps, a trait seen on Burial 7 (RM^2) Burial 9 (LM^1 and RM^1) and Burial 10 (RM^1) all from Structure 5-center. This dental non-metric trait could indicate a genetic relationship between these individuals (Hillson 1996; Scott and Turner 1997).

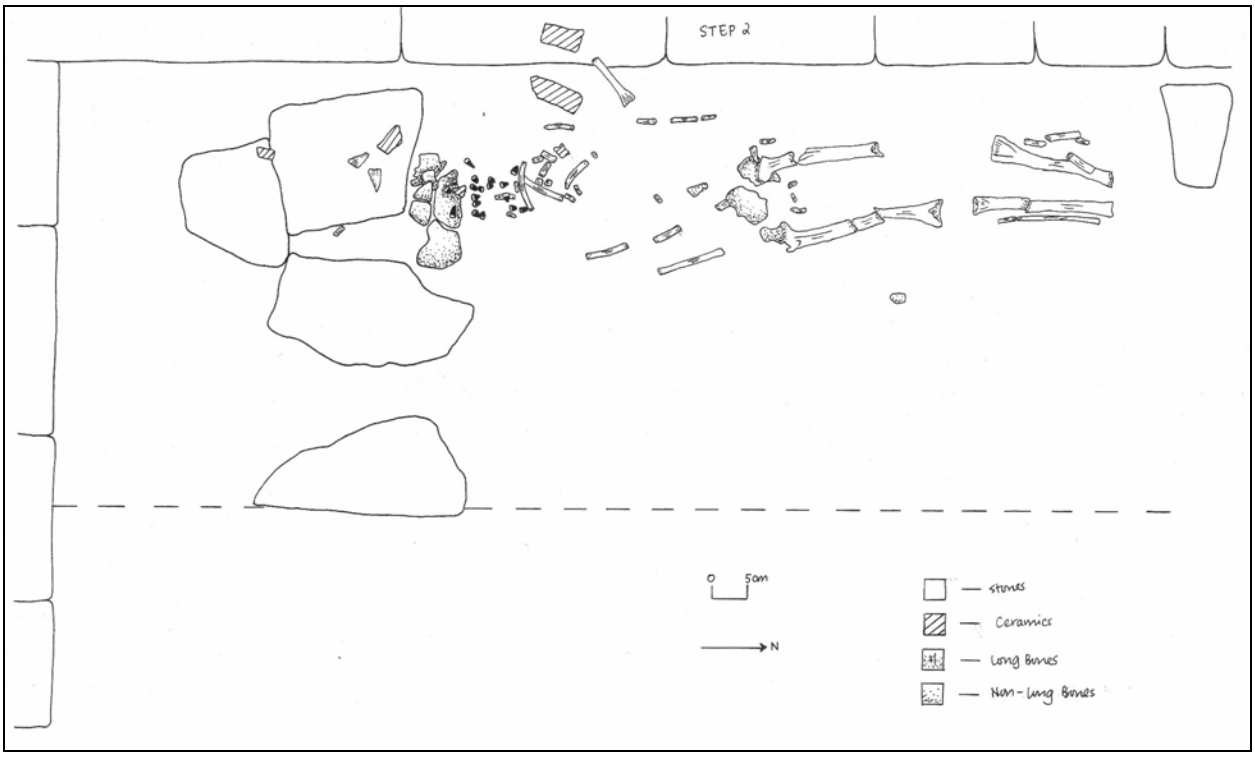

Figure 15: Burial 12. Drawing by Carmen Ting.

Burial: 14	**Individual**: 1	**Observer**: A. Novotny
Op: 13	**SubOp**: U	**Lot**: 2

Archaeological Context

Burial 14 was interred within construction fill of the central stair block of the Western structure of the Chan E-group (Figure 16). It was a primary, single individual interment within a simple pit. There were no formal, cut stones lining the grave or functioning as capstones. The burial was flexed and laid on its right side with head oriented to the north. The cranium was facing west and lay within a ceramic vessel. There were several grave goods within the pit, a black pebble, several small jade beads, crystal, shell, conch fragments, a ceramic vessel, and a figurine. Burial 14 was located in close proximity to Burials 15 and 16. The base of the pit containing Burial 14 was the capstone of Burial 16.

Osteological Analysis

Burial 14 was extremely poorly preserved. Less than 25% of the skeleton was available for observation, although several teeth were preserved. Skeletal elements present included cranial and long bone fragments, many of which were not sideable.

Age and Sex

Age was estimated to be adult based on dental wear and development. Sex was indeterminate.

Dentition

Several of the teeth were too badly eroded for analysis or to identify pathologies or abnormalities.

Pathology and Trauma

No pathological bone formation or trauma was observed.

Conclusion

Burial 14 may have been part of a series of interments in the Chan E-group's Western structure that included Burial 15 and 16 beneath it. Very little osteological information could be drawn from Burial 14. It is an interesting interment as the burial position and orientation are abnormal for the Belize Valley mortuary patterns and the Chan site, in particular.

Figure 16: Burial 14. Drawing by Carmen Ting.

Burial: 15	**Individual**: 1	**Observer**: A. Novotny
Op: 13	**SubOp**: V	**Lot**: 2

Archaeological Context

Burial 15 was located directly west of Burial 14 in the Western structure of the Chan E-group (Figure 17). The burial was interred in a small stone-lined crypt with capstones. The remains were extremely fragmented and the crypt seems to have been built to accommodate only a small amount of human remains suggesting that the burial was secondary. The position of the body was not observable as the remains included only cranial and long bone fragments. The cranium was located in the northern section of the crypt. Two conch spirals and a bead were the grave goods associated with Burial 15.

Osteological Analysis

Burial 15 was poorly preserved and less than 25% of the skeleton was available for observation. Remains included cranial and unsidable long bone fragments. One tooth was recovered but its enamel was heavily eroded. Most bone fragments were heavily eroded by root action and so the surface of the bone was not observable.

The tooth recovered was a deciduous molar (m_2) based on the curve of the roots and the size of the tooth crown. Features of the occlusal surface and the side of the dental arcade from which the tooth came were not observable because the enamel was very eroded.

Conclusion

Burial 15 was most likely a secondary interment of a child. The excavators suggested that the remains may have been part of Burial 14 but the presence of capstones and the separate grave spaces created by the crypt of Burial 15 suggest otherwise. It is possible that the crypt was built to house secondary remains or remains that were expected to be small in size like those of a child.

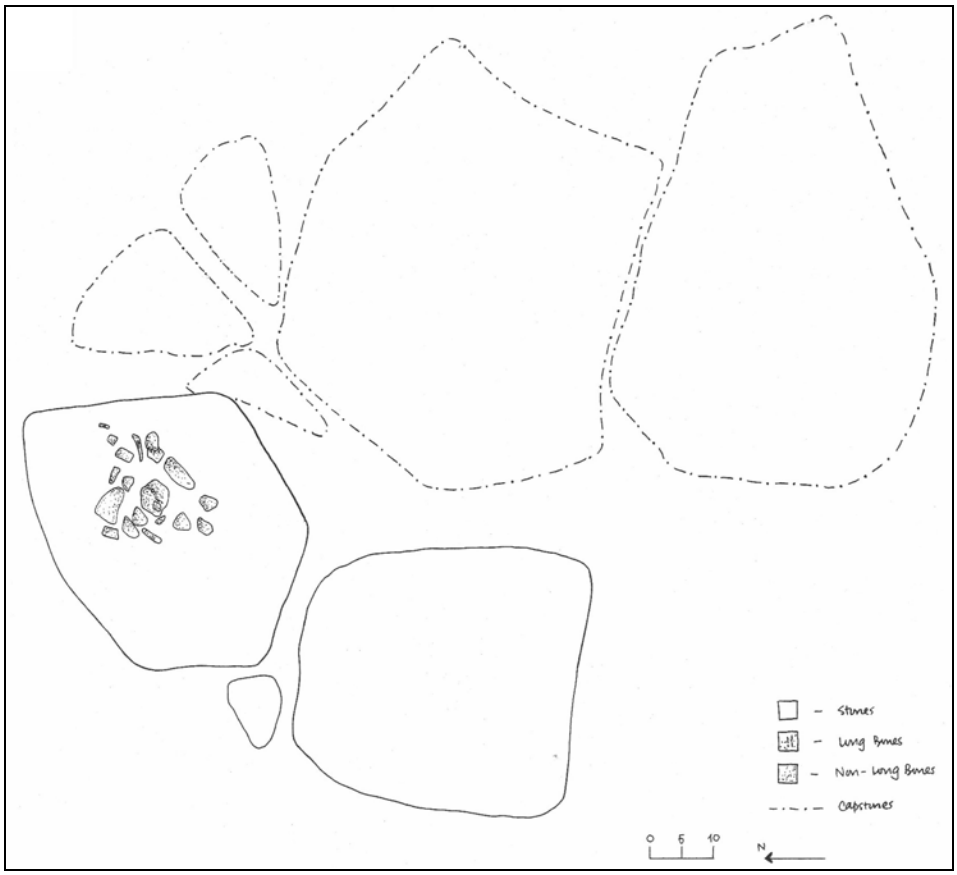

Figure 17: Burial 15. Drawing by Carmen Ting.

Burial: 16	**Individual**: 1	**Observer**: A. Novotny
Op: 13	**SubOp**: W	**Lot**: Multiple

Archaeological Context

Burial 16 was interred in a stone-lined crypt with capstones the Western structure of the Chan E-group immediately below Burial 14 (Figure 18). This burial contained the remains of two individuals, an adult male (individual 16.1) and a child (individual 16.2), with the first individual encountered immediately beneath the capstones. Small bones of the hands and feet, and vertebrae suggest that 16.1, the adult individual, was a primary interment. Cut jute was the only grave good associated with individual 16.1.

Osteological Analysis

Approximately 25% of the remains of individual 16.1 were present for study. The remains of the consisted of cranial, dental, long bone, vertebral, hand and foot elements.

Age and Sex

Individual 16.1 was estimated to be an adult male based on cranial morphology and dental wear.

Dentition

The dentition of individual 16.1 showed moderate wear where it was observable. The burial environment had eroded the surface of the teeth to a large extent rendering the actual tooth surface unobservable. In addition, many of the roots and crowns were broken. The LP_1 had a double lingual cusp and the LI^2 was so shoveled as to be almost barrel shaped. No caries was observed.

Pathology and Trauma

No pathological bone formation or trauma was observed.

Conclusion

Burial 16 consisted of two individuals – an adult male and a child aged 5 – 6 years. Bones were not well preserved. They were interred in a stone-lined crypt and seem to be the first in a series of burials in the Western structure of the Chan E-group. Interestingly, there was a noticeable difference in bone and tooth preservation throughout the crypt. The remains of the adult were very chalky and brittle while the long bones of the child were smooth and had only minor damage on the surface from root action. There were only a small amount of grave goods – several shell and jade beads.

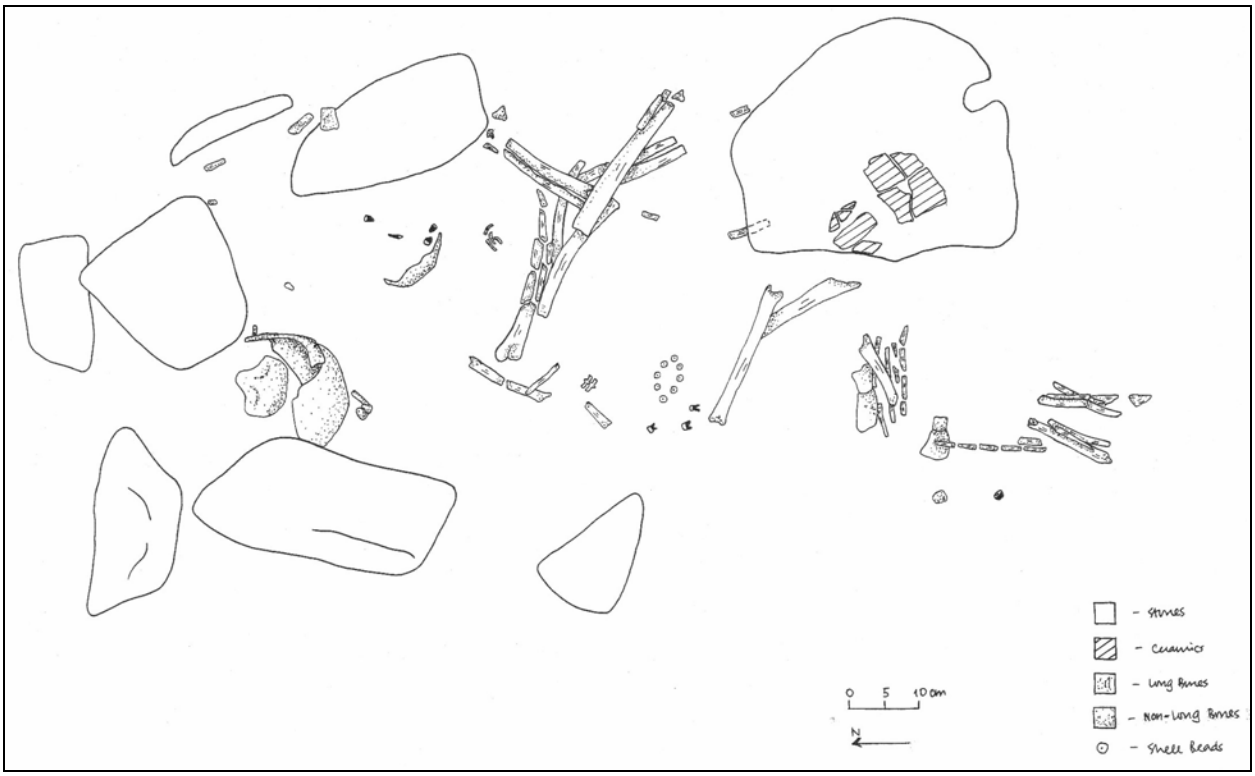

Figure 18: Burial 16, Individual 1. Drawing by Carmen Ting.

Burial: 16	**Individual**: 2	**Observer**: A. Novotny
Op: 13	**SubOp**: W	**Lot**: Multiple

Archaeological Context

Individual 16.2 was interred within a stone-lined crypt with capstones in the Western structure of the Chan E-group immediately below Burial 14 (Figure 19). The crypt also contained the remains of an adult male, individual 16.1. Individual 16.2 was a child whose skeletal remains were very fragmented. Thus, whether the burial was secondary or primary is inconclusive. Copal residue, a jade bead, an unmodified jade nodule, shell beads, and a conch spiral were the grave goods associated with individual 16.2.

Osteological Analysis

Less than 25% of the skeleton of individual 16.2 was present for study. The remains consisted of cranial and long bone fragments and dentition.

Age and Sex

Individual 16.2 consisted of a child aged 5 – 6 years old, according to dental development. Sex was indeterminate.

Dentition

Only a few juvenile teeth were recovered along with several crowns that had not fully developed at the time of death. Minor calculus was present on the lingual aspect of the $LI_{2,}$, which was not fully developed. No caries or linear enamel hypoplasias were observed.

Pathology and Trauma

No pathological bone formation or trauma was observed.

Conclusion

Burial 16 consisted of two individuals – an adult male and a child aged 5 – 6 years. Skeletal remains from both individuals were not well preserved. They were interred in a stone-lined crypt and seem to be the first in a series of burials in the Western structure of the Chan E-group. Interestingly, there was a noticeable difference in bone and tooth preservation throughout the crypt. The remains of the adult were very chalky and brittle while the long bones of the child were smooth and had only minor damage on the surface from root action.

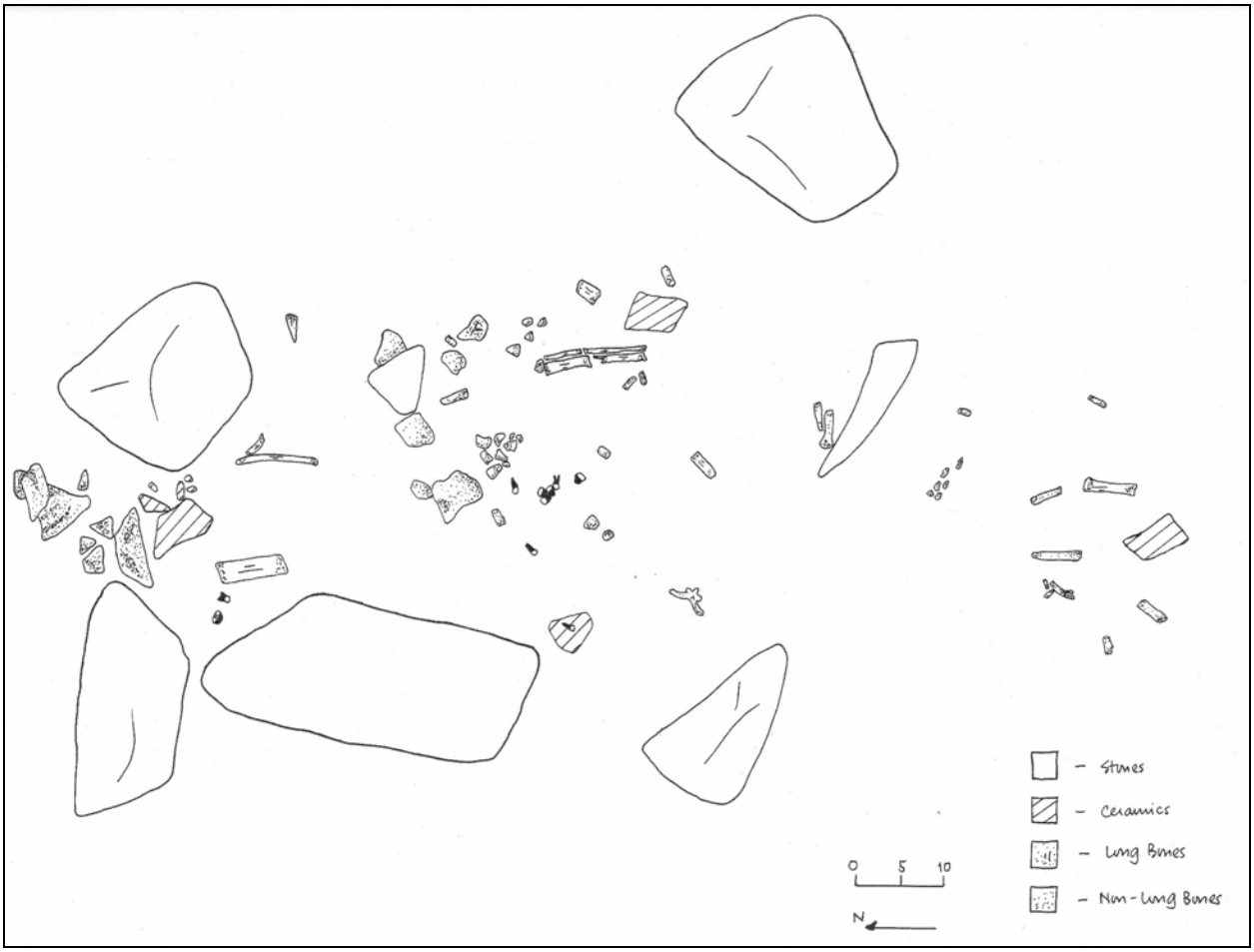

Figure 19: Burial 16 Individual 2. Drawing by Carmen Ting.

Burial: 18	**Individual**: 1	**Observer**: A. Novotny
Op: 10	**SubOp**: VV	**Lot**: Multiple

Archaeological Context

Burial 18 was recovered from Structure 9, a low-lying L-shaped structure in the Western plaza of the Chan site (Latsch 2005) (Figure 20). The remains were a primary interment of a single individual laid within a cist and capped with three capstones. The body was in an extended, prone position with head oriented to the south. The face was towards the west. Grave goods included a mano and a biface.

Osteological Analysis

Burial 18 was not well preserved and less than 25% of the skeleton was available for observation. Remains included elements from the cranium, right clavicle, humerus, ulna, femur, tibia, and fibula and left humerus, femur, tibia, and fibula. Only one tooth was recovered, possibly an incisor or canine judging by the root. The crown was worn to the CEJ with only a very small amount of enamel present on the labial corner. No mandible was found so it is impossible to say whether the other teeth were lost premortem.

Age and Sex

Age was estimated to be old adult, 40-55 based on the extreme wear of the single tooth. Sex was estimated to be probably female based on cranial morphology and general gracility of the long bones. No ox coxa fragments were present to corroborate this sex assessment.

Dentition

Only one, extremely worn tooth was present. No further data with the exception of wear could be collected.

Pathology and Trauma

Abnormal bone formation was observed on the left and right fibulae fragments. These fragments were too small to identify as to side or affected aspect. The reaction was sclerotic and was healing at death; the new bone was not completely integrated. Other long bones did not appear to be affected on the fragments observed. As these fragments were so small it is not possible to say with any certainty whether the cause of the formation was an isolated traumatic event or the result of a larger, systemic problem. It would certainly not be unusual for an elderly individual to have such bone formation.

Conclusion

Burial 18 was that of an elderly, female individual. She was interred in a crypt in the customary burial style of this region – extended, face down, with head to the south. Her fibulae had a minor amount of new bone formation that was becoming integrated at death. This is not an

unusual phenomenon and would be expected in an older individual. Poor preservation precludes a discussion of potential causes.

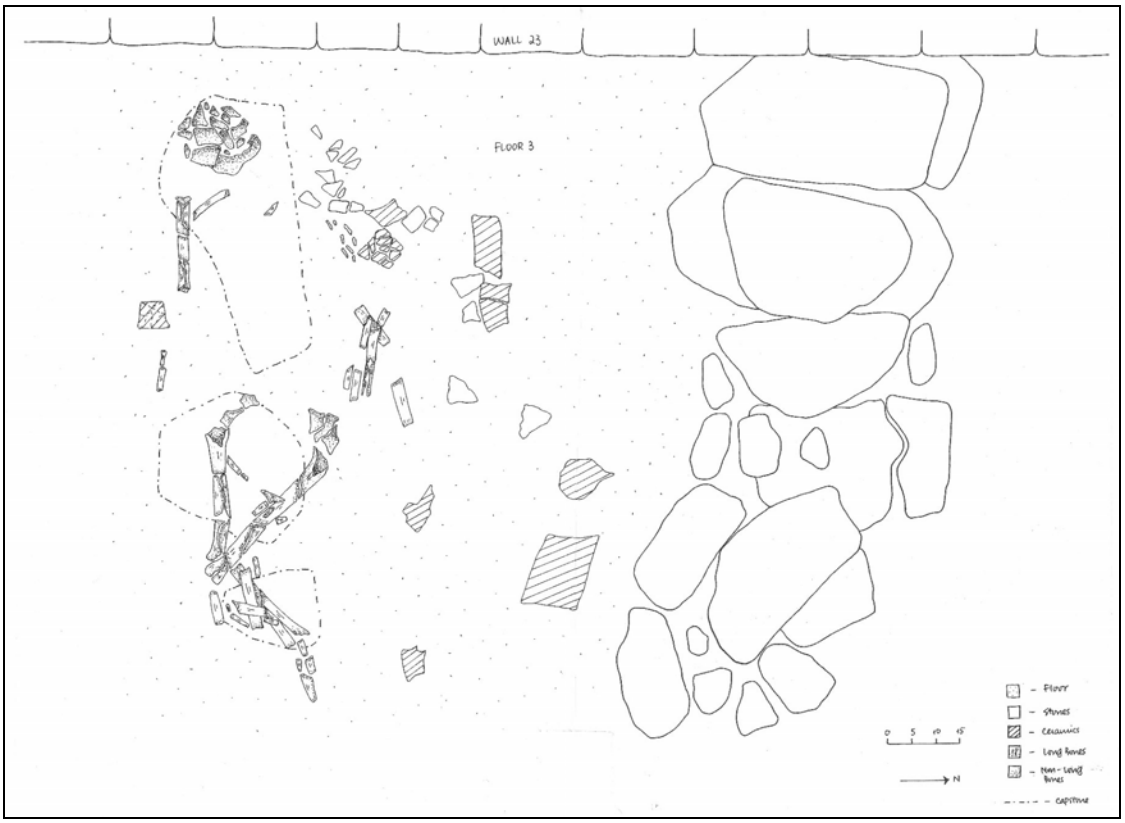

Figure 20: Burial 18. Drawing by Carmen Ting.

Burial: 19	**Individual**: 1	**Observer**: A. Novotny
Op: 10	**SubOp**: WW	**Lot**: 3

Archaeological Context

Burial 19 was interred in a crypt in Structure 9 (Figure 21). The individual was interred in a stone-lined crypt capped with five capstones. The body was laid in an extended position with head to the south and face down. Most burials from this region who are buried in this position are interred with arms at their sides. Burial 19 was interred with the left arm flexed at the elbow. The burial was a primary interment, judging by the presence of smaller bones of the hands and feet. There were no grave goods.

Osteological Analysis

Approximately 25% of the skeletal elements from Burial 19 were present for observation. These bones were slightly better preserved than other burials where only 25% of the bones were present. Bone surface was well preserved. Elements present include bones of the cranium, left

and right clavicle, left scapula, right humerus, left and right radii and ulnae, left and right femora, and several small bones of the hands and feet.

Age and Sex

Age was estimated to be young adult, aged 20-29, based on tooth wear. Sex was estimated to be male based on morphological characteristics of the crania. No os coxa fragments were present to corroborate this assessment.

Dentition

Nearly a full set of teeth was present and occlusal wear was very minor. The RM^1, LM^2, LM^2, RM^2, and RM^3 had cervical caries. Nearly every tooth had calculus buildup, although the amount was minor on each tooth. The lower anterior teeth were the worst affected. The upper incisors were slightly shoveled and double shoveled. The left and right M^1 had moderately developed metaconule cusps.

Pathology and Trauma

In addition, abnormal bone formation was present on a left fourth metatarsal. The bone formation appears to be a well-healed fracture callous located on the medial aspect of the diaphysis. The callous is sclerotic and well-integrated leaving a smooth mound of bone that is the same color and texture as the surrounding, unaffected bone. A similar pattern is observed on the left third and fifth metatarsals. They both show sclerotic bone formation but on their dorsal aspects. The rest of the metatarsal diaphyses were normal. This suggests some sort of trauma occurred involving the left foot, most likely fractures, that were sustained early in life and had healed well by the time of death. An absence of bone formation surrounding the callouses suggests that they healed well and they did not become infected. There were no tarsals present so it is unknown whether they were involved in the incident. No other pathological bone formation or trauma was present.

Conclusion

Burial 19 was the moderately well preserved skeleton of a young adult male. He sustained an injury to his left foot sometime early in life that healed well. His dentition was starting to show signs of degeneration despite his young age – several caries and a substantial amount of calculus were recorded. No grave goods were recovered from the crypt and his burial was consistent with other interments from Chan in terms of position and orientation.

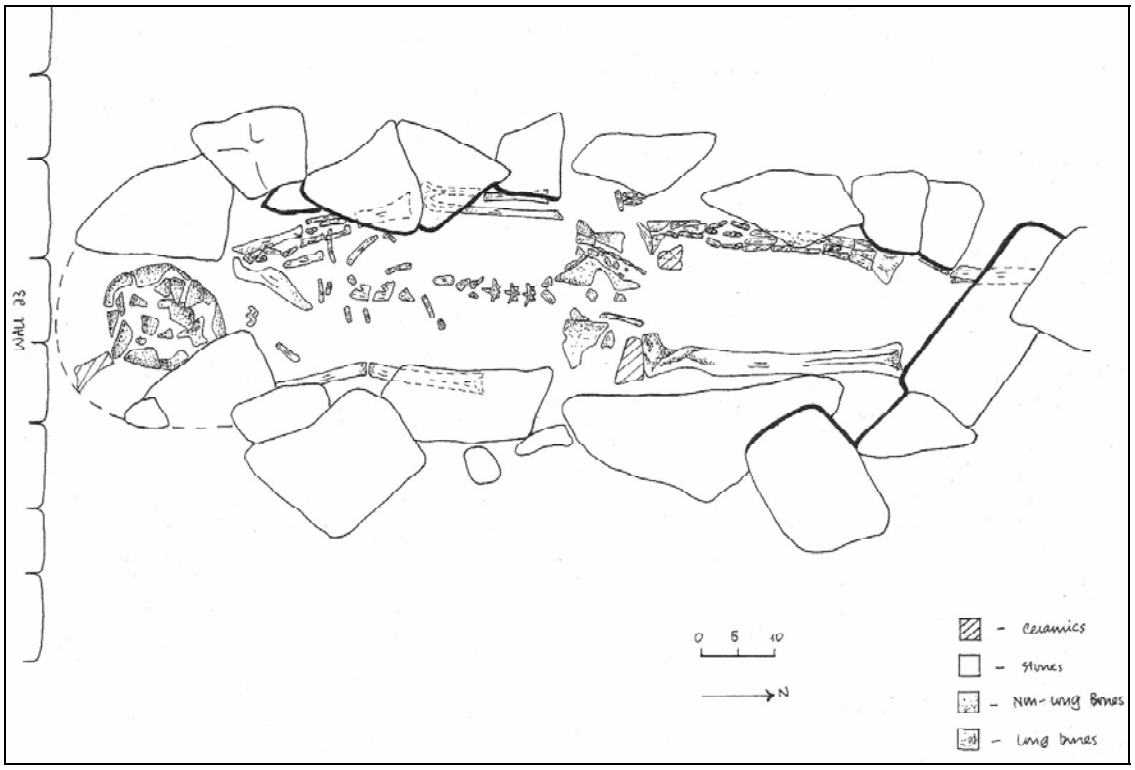

Figure 21: Burial 19. Drawing by Carmen Ting.

Burial: 20	**Individual**: 1	**Observer**: A. Novotny
Op: 10	**SubOp**: XX	**Lot**: Multiple

Archaeological Context

Burial 20 was interred in Structure 9 in a stone-lined crypt with seven capstones (Figure 22). Several other capstones were present and the excavators suggest that these capstones were placed to either mark the burial or were the result of disturbance after an episode of re-entry into the crypt. The crypt contained one individual laid in an extended, supine position, the only supine individual at the Chan site. Head was oriented to the south. No grave goods were associated with Burial 20.

Osteological Analysis

Less than 25% of the skeleton was observable for Burial 20. The bone surface was heavily eroded so side could not be determined for several elements. Fragments consist of cranial and long bone elements. Fortunately, nearly an entire set of teeth were present. The entire lower limbs were missing and may have been removed from the crypt as part of a re-entry episode.

Age and Sex

Age was adult based on dental development. Sex was indeterminate.

Dentition

The dentition showed several pathologies. Interproximal caries were present on the RI^1, RI^2, and LI^1. Minor amounts of calculus buildup was present on the left and right upper central incisors. The LM^1 had a linear enamel hypoplasia indicating that this individual sustained a disease episode or nutritional deficiency during childhood. All of the upper incisors were shovel shaped with moderate double shoveling of the labial surface, the most pronounced of any individual at Chan. LM^1, LM^3, and RM^1 had moderately developed Carabelli's cusps.

Pathology and Trauma

No pathology or trauma was observed on the skeletal remains for Burial 20.

Conclusion

While Burial 20 was extremely poorly preserved the grave context and dentition are interesting. The presence of Carabelli's cusps and double shoveling are shared by several other individuals interred at the Chan site – burials 7, 9, 10, and 12 from Structure 5-center. This is possibly indicative of genetic relatedness between the individuals in these burials (Hillson 1996; Scott and Turner 1997). Also, it seems that the grave of Burial 20 was marked by a number of capstones and parts of the skeleton were exhumed in antiquity. Further analyses and comparison with mortuary treatment of other burials at Chan may help to establish the reason Burial 20 was afforded this treatment. It is possible that his membership in a certain lineage afforded this individual special burial treatment.

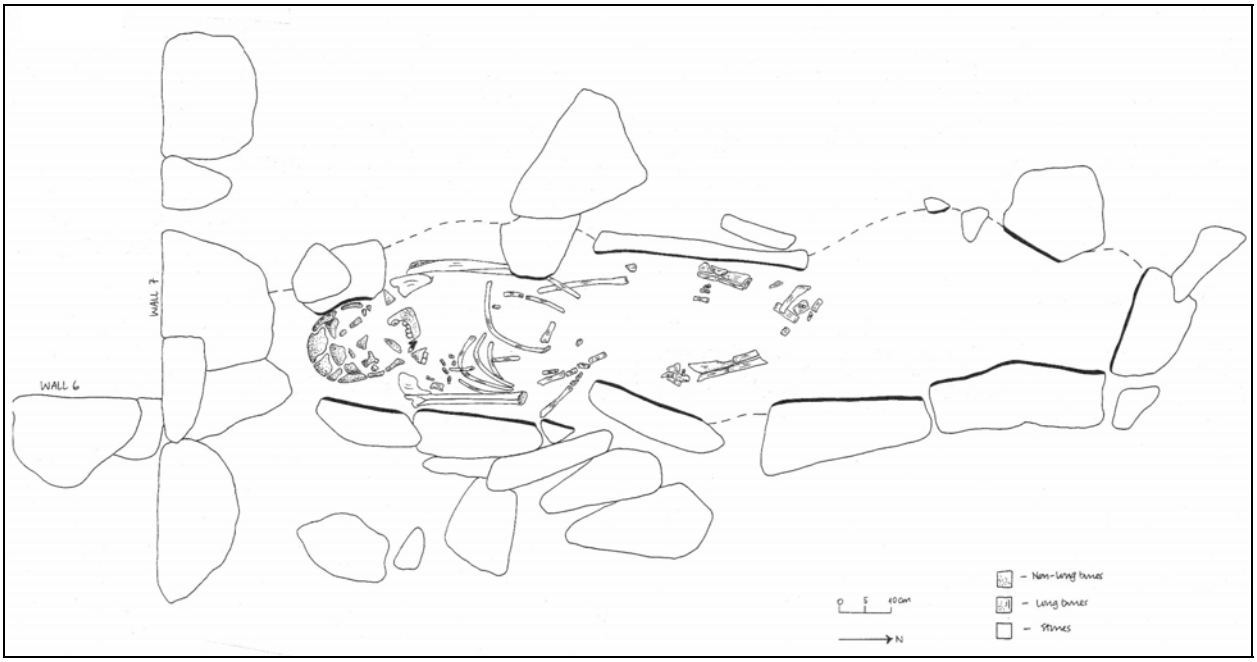

Figure 22: Burial 20. Drawing by Carmen Ting.

SUMMARY

A total of 24 individuals were analyzed during the 2007 season of the Chan Project. These burials span the Late Preclassic to the Terminal Classic periods (Kosakowsky 2006) and came from a variety of contexts – the residential and ceremonial center of the site, the plaza of the central group, and the Western plaza. The majority of burials were primary burials interred face-down with head oriented to the south. Where it was observable, most individuals had the cranium placed so that the face was to the west. Most were placed in stone-lined crypts with capstones. There were only a few exceptions to this general pattern. Burial 1, interred in the C-001 plaza, was oriented to the northeast and the right humerus was found parallel to the right femur. This placement may have occurred in the process of removing the other bones. Burial 8 was extended and prone but the cranium had been removed and placed in a bowl. Burial 9 was also in an extended, prone position but the hands and feet had been crossed and a bowl placed over the cranium. This is the only instance of this mortuary pattern and the differential treatment may have had something to do with the severe injuries this individual suffered during life. Burial 14 was in a flexed position, oriented to the north, with the cranium placed in a vessel.

Figures 1 and 2 summarize the demographics of the sample to date. There were not strong patterns as to age or sex with respect to grave type, burial location, or grave goods. With the exception of Burials 8 and 10, materials included in the Chan graves were limited to small objects such as ornaments that would have decorated clothing or shrouds and jewelry. Burials 8 and 10 had numerous grave goods that had high status and ritual connotations. This suggests their importance as possible founders or ancestors to Chan's ruling lineage. Three women were buried in Structure 5-center. The only other female in the sample was interred in the structure on the western side of plaza C-001. Two children, Burials 12 and 16 were interred in this structure as well while none were found in Structure 5-center or the West plaza. One was buried with an older adult, a pattern common in the Maya area, and one was buried alone. They did not have grave goods or other markers that distinguished them from the other burials in the Chan sample, although Burial 12 was the only burial oriented with face to the east.

Figure 3 summarizes dental and skeletal pathologies of the Chan sample. Burial 9 showed three fractured ribs and a fractured vertebrae that most likely occurred secondary to a metabolic or vitamin deficiency disorder. He survived the trauma long enough for healing to begin but an infection spread throughout his chest cavity. This infection could easily have been the cause of death. Two individuals showed signs of healed fractures in their lower limbs, the right fibula of Burial 1 and the 3rd, 4th and 5th metatarsals of Burial 19.

Several individuals also had non-specific indicators of stress – periostitis and linear enamel hypoplasias. Periostitis is recognizable as new bone formation that forms in response to minor injuries or to wide-spread systemic infections. The reaction can be active, healing, or healed at death. Burial 5.1, 3.1, 9, and 18 had periostitis on their lower limb bones. The reaction in the tibia of 5.1 was severe enough to affect a change in bone-shape often indicative of a treponemal infection. Treponemal infections are indicative of syphilis, which has congenital and venereal forms and can be passed through bodily contact. Two individuals, Burials 6 and 20 had linear enamel hypoplasis. LEH are growth interruption lines that occur in the teeth and they form after a severe disease episode or as the result of severe nutritional deficiencies. LEH can also be the result of trauma.

Burial 10, one of the earliest burials in Structure 5-center had extensive bone reaction inside the maxillary sinus indicative of a severe sinus infection. The insult had healed well at the

time of death. This individual also had osteoarthritis, in the form of small osteophytes, on a single vertebrae fragment. This was the only instance of osteoarthritis in the sample.

Four individuals, Burials 5.1, 8, 9, and 10 showed porosity of the cranial vault. This pattern is possibly evidence of porotic hyperostosis, or anemia caused by nutritional deficiency. A few cases could not be differentiated from basic scalp infections due to poor preservation.

Dental pathologies were common, as they are in many ancient Maya skeletal remains. The most common were interproximal caries and minor dental calculus. There was no pathological involvement of the bone such as abscesses or other infections.

Interestingly, five male individuals, four from Structure 10 and one from the Western structure of the Chan E-group had moderately sized Carabelli's cusps on their upper first or second molars. This is a dental non-metric trait that is genetically inherited. It seems that at least these individuals may have been biologically related, although a larger sample from a variety of burial contexts would be necessary to say for certain.

Three individuals showed dental modification – two males with type I1 and one female with type III7. All of these individuals were interred within Structure 5-center. The two males were some of the earliest interments in the structure while the female was one of the latest. Dental modification does not show many consistent patterns throughout the Maya area and trends are site or region-specific (Tiesler Blos 2001; Williams and White 2006). It appears that the elite segment of the Chan community, those who had access to bury their dead in Structure 5-center were the only individuals, thus far, with modified teeth.

Male	8
Female	3
Unknown	13
Total	24

Figure 23: Demography

Life Stage	**Age Range in Years**	**Chan Sample**
Prenatal	3 – 9 months	0
Perinatal/Neonatal	9 mo – 1.5 yr	0
Infant	1.6 - 3	0
Child	4 – 11	2
Adolescent	12 – 19	1
Young Adult	20 – 29	7
Middle Adult	30 – 49	1
Old Adult	50+	1
Adult (Unknown range)		12

Figure 24: Age at death

Pathology	Individuals Affected
Dental Calculus	9
Dental Caries	9
Linear Enamel Hypoplasias	2
Periostitis	4
Cranial Porosity	4
Fractures	2
Osteoarthritis	1

Figure 25: Paleopathology Summary

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2007 CHAN FAUNAL ANALYSIS

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Faunal analysis was conducted to determine the animal species exploited and utilized by Chan residents. Overall, fauna is a small percentage of materials recovered from excavations as high soil acidity makes for poor preservation. For the most part, faunal material from Chan is found in three primary contexts: disturbed contexts as a result of commensal intrusions (like that of armadillos or rodents), fragmentary remnants found in architectural fill, and those found as part of deposits and burials. Analytical categories included count, weight, taxonomic categories (Order, Class, Family, Genus, and Species), element, side, modification (butchering, burning, worked), identification of commensal species, and MNI (minimum number of individuals). MNI is a method of assessing species frequency based on a calculation of the smallest number of animals in an assemblage. It is determined by counting the most abundant bone or element represented in relation to side and size (Reitz and Wing 1999). Commensal fauna were identified on the basis of context (often found in humic and upper levels of excavations), lack of modification, and recovery of complete or near-complete skeletons.

Analysis began with the 2006 and 2007 laboratory seasons conducted in San Ignacio. Elements and species not conclusively identified were taken to UCLA's Cotsen Institute of Archaeology zooarchaeology lab with permission from the IOA. The zooarchaeology lab, under the direction of Dr. Thomas Wake, provided a large comparative collection for determining species identification. The analysis was broken into two parts: the fauna recovered and identified from the Chan Central Group and that from the Northeast Group (Figure 1). Analysis of materials from the Northeast Group was completed in fall of 2007. Fauna excavated during the 2006 field season at the Central Group and fauna recovered during burial analysis this season are currently under analysis (see Novotny this volume), housed at the University of California Riverside Archaeology Lab.

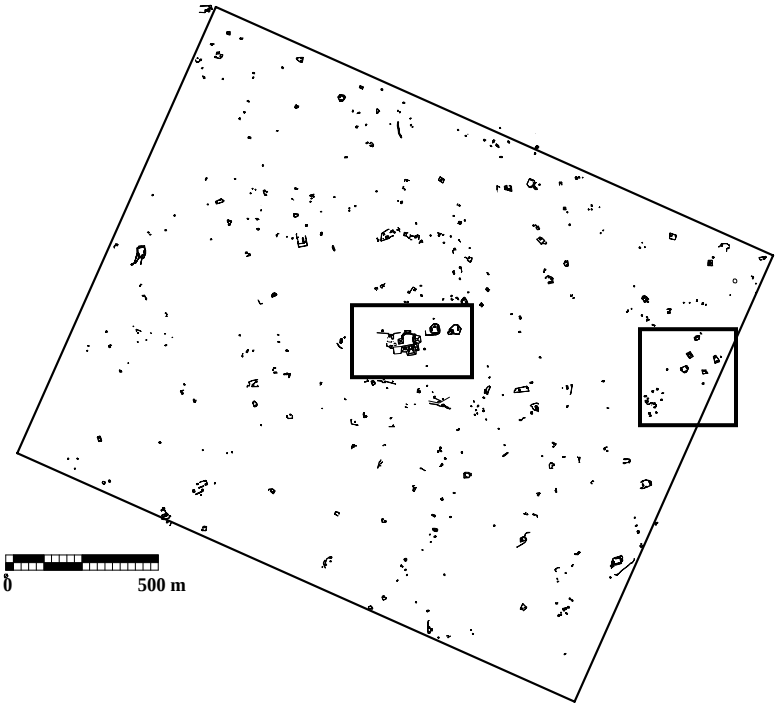

Figure 1: Map of Chan Community. The Central Group is marked by the square at the center of the site and the Northeast Group is marked by the square at the northeast of the site.

CENTRAL GROUP

Of fauna analyzed thus far, 702 pieces have been identified, weighing 303.15 grams (Table 1). The majority, or 45 %, of the fauna identified was that of the nine-banded armadillo (*Dasypus novemcinctus*). In examining context and preservation of materials, however, 70% of armadillo identified was classified as commensal (based on the recovery of near-complete skeletons). The remaining 30% has been characterized as ecofacts based on the preservation of bone, context, and modification (27% burned). Once we adjust the data to eliminate commensal species, then Artiodactyls dominate the assemblage at 48% with white-tail deer (*Odocoileus virginianus*) comprising 20% (Table 2). Armadillos did continue to comprise a large portion of Central Group ecofacts, approximately 20% by weight. In examining the distribution of elements within operations, 8 individual large mammals were identified, including 4 white-tail deer, 2 Brockett's deer (*Mazama americana*), 1 Tapir (*Tayassu tajacu*) and 1 giant anteater (*Myrmecophaga tridactyla*). A single individual of a raccoon (*Procyon lotor*) and a hispid pocket gopher (*Orthogeomys hispidus*) were also recovered. By operation, 72% of all fauna by count and 58% by weight was recovered from excavations at Operation 11 (Figure 1). Operation 12 and 6 follow in a distant second, each comprising approximately 17% of all fauna identified by weight. Fifty-three percent of all individuals were recovered from these three operations, including 2 white-tail deer, 2 brocket deer, 2 non-commensal armadillos, an anteater, and a raccoon.

Class/Order	Family	Genus Species	Weight (g)	MNI
Mammalia			34.80	0
Mammalia (small)			1.60	0
Mammalia (medium)			4.90	0
Mammalia (large)			4.40	0
Carnivora	Procyonidae	*Procyon lotor*	2.60	1
Artiodactyla	Cervidae		49.90	0
Artiodactyla	Cervidae	*Mazama americana*	3.40	2
Artiodactyla	Cervidae	*Odocoileus virginianus*	40.70	4
Artiodactyla	Tayassuidae	*Tayassu tajacu*	0.40	1
Cingulata	Dasypodidae	*Dasypus novemcinctus*	136.60	4
Edentata	Myrmecophagidae	*Myrmecophaga tridactyla*	10.80	1
Rodentia	Scuridae		0.80	1
Rodentia			7.25	5
Rodentia	Geomyidae	*Orthogeomys hispidus*	2.00	1
Rodentia	Tupaiidae	*Tupaia sp.*	0.10	1
Animalia			2.90	0

Table 1: Fauna Recovered from Central Group

Class/Order	Family	Genus Species	Weight (g)	MNI
Mammalia			34.80	0
Mammalia (small)			1.60	0
Mammalia (medium)			4.90	0
Mammalia (large)			4.40	0
Carnivora	Procyonidae	*Procyon lotor*	2.60	1
Artiodactyla	Cervidae		49.90	0
Artiodactyla	Cervidae	*Mazama americana*	3.40	2
Artiodactyla	Cervidae	*Odocoileus virginianus*	40.70	4
Artiodactyla	Tayassuidae	*Tayassu tajacu*	0.40	1
Cingulata	Dasypodidae	*Dasypus novemcinctus*	39.70	2
Edentata	Myrmecophagidae	*Myrmecophaga tridactyla*	10.80	1
Rodentia	Scuridae		0.80	1
Rodentia	Geomyidae	*Orthogeomys hispidus*	2.00	1
Animalia			2.90	0

Table 2: Fauna without Commensal Species

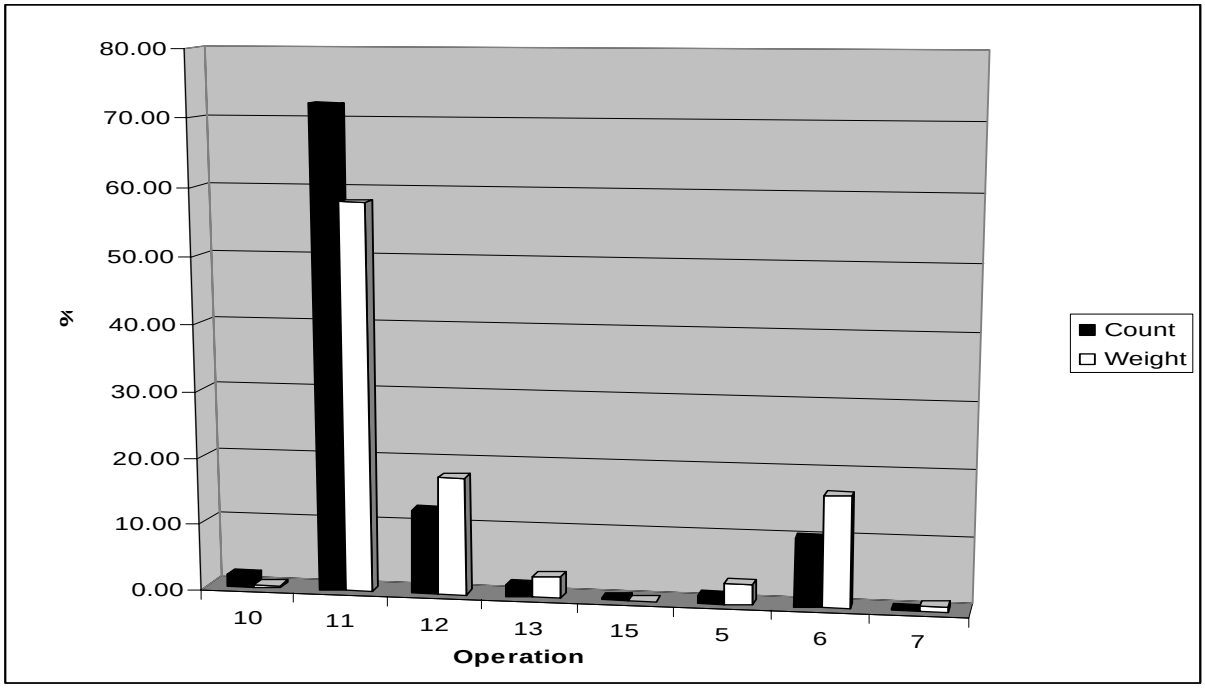

Figure 2: Percentage of Faunal Weight by Operation

NORTHEAST GROUP

At the Northeast Group, 611 pieces of fauna were identified, weighing little more than 400 g. Just over 99% of all faunal remains were recovered from NE-3 excavations (Table 3). The remaining 1% identified from architectural fill contexts in NE-1 includes the fragmentary remains of a single large Mammal, probably from the Order Artiodactyla and an unknown bird species (Aves). If we look at the distribution of faunal material by context type, it is clear that the majority, 48.3% comes from Deposit 1 at NE-3 (Figure 3). Because it was capped by the ultimate patio surface, fill and materials from Deposit 1 became mixed in with surrounding fill layers during the patio's construction. If we assume these fill contexts are part of Deposit 1, then these remains constitute 90% of all fauna recovered from the Northeast Group.

In examining fauna from Deposit 1, NE-3, it is apparent that large mammals (this includes categories of unknown large mammal, Cervidae, and Tayassuidae) dominate, making up 50.2% of the assemblage (Table 4). By examining the distribution of elements, it was clear that at least five individuals make up the large mammals, including 2 specimens of white-tail deer (*Odocoileus virginianus*), 1 brocket's deer (*Mazama americana)* and 2 white-lipped peccaries (*Tayassu tajacu)*. Collectively, these individuals comprise 27.5% of Deposit 1 faunal material (see Table 4). Although 38.5 % of the deposit can be attributed to unknown Mammal, the majority of these fragments are attributable to the larger species described above. Other taxonomic groups were identified including rabbit (Lagomorpha), bony fish (Osteicthyes), skunk (Mustelidae), squirrel (Scuridae), and turtle (Testudines). These contribute less than 1% to overall fauna weight. Contextually, Deposit 1 was characterized by dark brown loamy soil with pockets of ash found in and around a square hearth built into the western face of Structure 3, NE-3. Less than 3% of the deposit, however, shows evidence of burning. If large animals were cooked intact, then bones would remain uncharred as the surrounding flesh protects it. However, the ash in the soil may have preserved the animal bone, decreasing the relative acidity common to Upper Belize Valley soils.

Animal remains were identified from four other contexts at NE-3. Seven fragments of bone were recovered from architectural fill. This included a single piece of bone attributable to Artiodactyla and six defined only to Mammalia. The other three contexts are primary, including two burial deposits and one midden. Although Midden 5 contained a variety of ceramic and lithic materials, only one fragment of bone was identified, a Mammalian long bone fragment. While excavating Burial 5, we identified a small deposit of ash and burnt bones lying directly on top of the capstones. The fauna was poorly preserved, weighing only 13.2g (Table 5). The majority of it was identified as either Animalia or large mammal, although at least on unknown bird species was also present. Of the 64 pieces of bone identified, 59% was burnt. Fauna from Deposit 4, Burial 6 was found interred with the individual. Unfortunately it was highly fragmentary, weighing 23.2g which was all classified as Mammal. Although there was no evidence of ashy soil as in other deposits, over 36% of these bones were burned (see Table 5).

Research at the Northeast Group and Central Group suggest that ritual has been a major component of activities in the two areas (Blackmore 2004, 2006; Robin 2003, 2004; Robin et al. 2005). In this vein, it is worth mentioning the identification of four limestone "canines" from the two areas (Figure 4). While not bone, these artifacts are realistic replicas of medium and large-sized carnivore canines. Three of the four were recovered from excavations at the Chan central group, including an exact copy of a Jaguar canine (see Figure 4). These canines evoke the ferocity and reverence given to larger cat species, including the Jaguar, Puma and Ocelot (Miller and Taube 1993). The Jaguar, for example, played a prominent role in Mesoamerican religion,

associated primarily with the Underworld. While only one of the four approximates a Jaguar tooth, all are symbolic representations of such cat species and may speak to the kinds of ritual activity at these sites.

Group	Context	Class/Order	Family	Genus Species	Ct	MNI
NE-1	Architectural Fill	Aves			3	1
NE-1	Architectural Fill	Artiodactyla	Cervidae	*Odocoileus virginianus*	3	1
NE-1	Humus	Mammalia			1	0
NE-3	Deposit 1	Animalia			16	0
NE-3	Deposit 1	Artiodactyla			8	0
NE-3	Deposit 1	Artiodactyla	Cervidae		13	0
NE-3	Deposit 1	Artiodactyla	Cervidae	*Mazama americana*	12	1
NE-3	Deposit 1	Artiodactyla	Cervidae	*Odocoileus virginianus*	22	2
NE-3	Deposit 1	Artiodactyla	Tayassuidae	*Tayassu tajacu*	45	2
NE-3	Deposit 1	Mammalia			67	0
NE-3	Deposit 1	Lagomorpha	Leporidae		4	1
NE-3	Deposit 1	Carnivora	Mustelidae		2	1
NE-3	Deposit 1	Rodentia	Scuridae		1	1
NE-3	Deposit 1	Osteichthyes			7	1
NE-3	Deposit 1	Rodentia			7	1
NE-3	Deposit 1	Testudines			1	1
NE-3	Deposit 3, Burial 5	Animalia			22	0
NE-3	Deposit 3, Burial 5	Aves			2	1
NE-3	Deposit 3, Burial 5	Mammalia			22	1
NE-3	Deposit 4, Burial 6	Animalia			9	0
NE-3	Deposit 4, Burial 6	Mammalia			29	1
NE-3	Architectural Fill	Artiodactyla			1	0
NE-3	Architectural Fill	Mammalia			6	0
NE-3	Fill around Deposit 1	Animalia			59	0
NE-3	Fill around Deposit 1	Artiodactyla			7	0
NE-3	Fill around Deposit 1	Artiodactyla	Cervidae	*Mazama americana*	2	0
NE-3	Fill around Deposit 1	Artiodactyla	Cervidae	*Odocoileus virginianus*	3	0
NE-3	Fill around Deposit 1	Artiodactyla	Cervidae		18	0
NE-3	Fill around Deposit 1	Mammalia			20	0
NE-3	Midden 5	Mammalia			1	1

Table 3: Species Taxonomy according to Household and Deposit Type

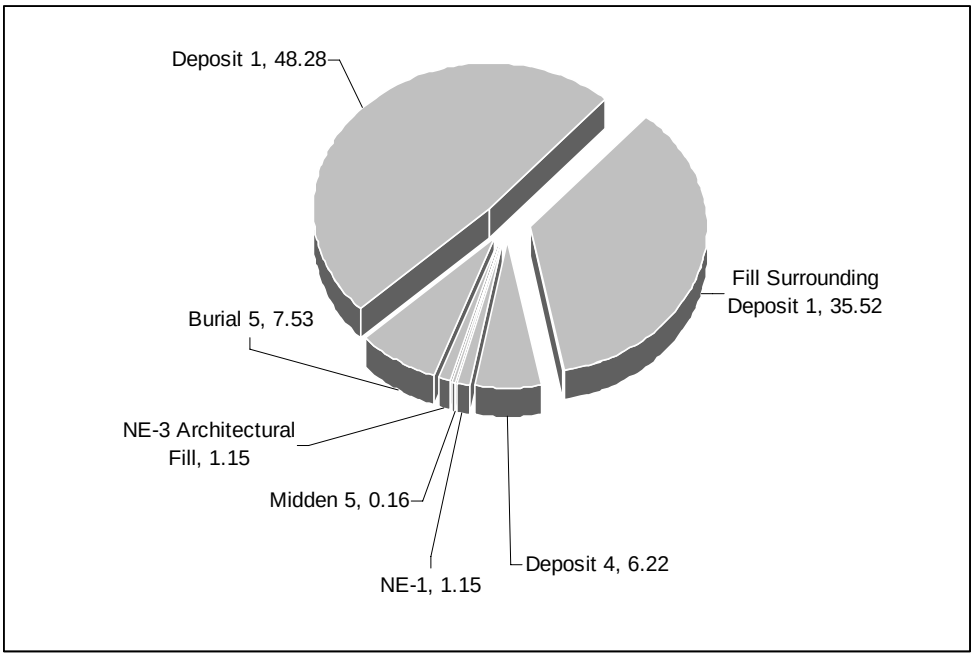

Figure 3: Distribution of Faunal Remains According to Context

Class/Order	Family	Genus Species	Weight (%)
Mammalia			38.51
Mammalia (small)			0.001
Mammalia (medium)			3.42
Mammalia (large)			1.11
Artiodactyla	Cervidae		21.59
Artiodactyla	Cervidae	*Mazama americana*	4.08
Artiodactyla	Cervidae	*Odocoileus virginianus*	11.09
Artiodactyla	Tayassuidae	*Tayassu tajacu*	12.33
Lagomorpha	Leporidae		0.03
Carnivora	Mustelidae		0.03
Rodentia	Scuridae		0.03
Rodentia			0.18
Osteichthyes			0.21
Testudines			0.03
Animalia			7.37

Table 4: Distribution of Deposit 1 Fauna by Weight (g)

Context	Count	Weight	Class/Order	Burnt Fragments (#)
Deposit 3, Burial 5	22	5.1	Animalia	12
Deposit 3, Burial 5	2	0.05	Aves	1
Deposit 3, Burial 5	22	8	Mammalia (large)	14
Deposit 4, Burial 6	30	23.2	Mammalia	11

Table 5: Frequency of Burnt Fragments in Deposits 3 and 4

Figure 4: Canine Artifacts from Chan Central Group (three left) and Northeast Group (far right)

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