BIOARCHAEOLOGICAL INVESTIGATIONS OF THE
RED HOUSE ARCHAEOLOGICAL SITE, PORT OF SPAIN, TRINIDAD: A
PRE-COLUMBIAN MID-LATE CERAMIC AGE CARIBBEAN POPULATION

by

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ABSTRACT

In 2013 structural assessments associated with ongoing renovations of the Red House, Trinidad and Tobago's Parliament building, revealed human remains buried beneath the foundation. Excavations and radiocarbon dating indicate the remains are pre-Columbian with ^{14}C dates ranging between approximately AD 125 and AD 1395. Due to the small overall sample size and the inability to attribute all individuals to a specific Amerindian period, the skeletal sample was considered as an aggregate. A bioarchaeological assessment of excavated graves and associated human skeletal material was conducted to determine the demographic profile and the pathological conditions exhibited by the collective skeletal 'population.' Osteological analyses included determining the minimum number of individuals (MNI), assessing the biological profile (e.g. sex, age, ancestry and stature), evaluating pathological conditions, antemortem and perimortem trauma and describing the overall taphonomic modifications. In addition, dental wear patterns, artificial cranial modifications and musculoskeletal stress markers were noted. Finally, the mortuary treatment and context was compared to the limited information published on contemporary skeletal samples from islands in the Lesser Antilles and nearby coastal regions of South America. The sample consisted of an MNI of 60 individuals including 47 adults and 13 juveniles. The skeletal completeness of these individuals ranged from a single skeletal element to more than 90% complete. Sex assessment was possible for 23 individuals with 11 females (23%) and 17 males (35%). Multiple antemortem conditions indicate a total of 35 individuals (58%) who exhibited one or more pathological condition including dental pathology (e.g. LEHs, carious lesions, antemortem tooth loss, dental wear, abscesses and a possible apical cyst), healed antemortem trauma, non-specific generalized infections, osteoarthritis, spinal osteophystosis and Schmorl's nodes. Additional antemortem conditions include examples of artificial cranial

modification in both sexes, and activity related humeral bilateral asymmetry. While not a representative population, the reconstruction of health, lifestyle and disease for these ancient peoples makes a significant contribution to the limited osteological research published on the Caribbean's pre-contact period.

To my family: James, Kristy, Kevin and Billy. For the lets-just-hang-out time you've given up, the Saturdays that have slipped by and the holidays that were pulled together at the last minute.

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CHAPTER ONE: INTRODUCTION

<u>Background</u>

In 2013 structural assessments associated with ongoing renovations of Trinidad and Tobago's Parliament building, commonly referred to as the Red House, revealed human remains buried beneath the foundation. Excavations and radiocarbon dating indicate the remains are pre-Columbian with ^{14}C dates ranging between approximately AD 125 and AD 1395 (Reid, 2015:123). An osteological analysis of human skeletal material excavated from the burials was conducted at the request of the Office of the Parliament of the Republic of Trinidad and Tobago and Dr. Basil Reid, Director of the Red House Archaeological Project. This analysis represents the first known report of a large skeletal sample from Western Trinidad and the second known report of a large skeletal sample from the island itself. The site's location under the parliament building is significant as well given the prominence and importance this structre holds for the nation's cultural heritage. Further, in addition to contributing new knowledge regarding the lifeways of Trinidad's First Peoples, the information garnered from this analysis adds to the overall body of knowledge concerning Ceramic Age health, activity and mortuary practices within the Caribbean.

While such studies often refer to populations that did not leave a written record as prehistoric, Reid (2009:2) points out that the word 'prehistory' was not introduced until 1851, and that the commonly used term 'prehistoric' can carry the connotation that simply because a culture did not have a written language they did not have a living or preserved history. Conversely, those living in the Caribbean prior to European contact had a rich and varied history, which is preserved in the archaeological record (Reid, 2009). The analysis of human remains recovered from The Red House site, studied in tandem with the archaeological material

recovered, can contribute to a more holistic understanding of this population's lifeways. When Christopher Columbus arrived on the island of Trinidad on July 31, 1498 he found a land already occupied by indigenous populations (Discover Trinidad, 2016; Fewkes, 1914; Government of Trinidad and Tobago, 1924:3). Although this date marks the point of European contact, it does not mark the beginning of time for these peoples. The terms pre-Columbian and pre-contact are used throughout this study to recognize that the aggregate sample recovered from the Red House site represents more than a collection of skeletal remains, it represents individual lives lived within a social structure, with each individual experiencing a full and complete life reflective of their personal and collective histories.

Purpose

The purpose of this study is to evaluate general demographics and assess health conditions and evidence of trauma both in the antemortem and perimortem periods for a mid to late Ceramic Age (AD 125-1395), pre-contact indigenous skeletal sample from Western Trinidad. In addition, published studies evaluating skeletal samples from neighboring islands and nearby costal regions of South America were used for inter-site comparisons.

Skeletal analyses included determining the minimum number of individuals (MNI), constructing biological profiles (e.g. sex, age, ancestry and stature), evaluating pathological conditions, antemortem and perimortem trauma and describing the overall taphonomic modifications. In addition to these skeletal analyses, a report of the findings was provided to Dr. Basil Reid and included in Dr. Reid's "Red House Restoration Archaeology Report" submitted to the Office of the Parliament of the Republic of Trinidad and Tobago. Further, an investigation into the site history was conducted to contribute to an understanding of the recovery and condition of remains available for analysis. The data obtained from this

investigation along with the skeletal analyses were utilized to provide context to the skeletal remains recovered, evaluate cultural indicators and address the following research questions:

- Based on its significance to both pre and post-contact populations, what information can be obtained regarding the history of the Red House site and how has this history affected the recovery and analysis of the skeletal remains?

- How does this sample compare to other mid to late Ceramic Age samples in the Caribbean regarding dental wear, artificial cranial modification and mortuary practices and what do these cultural indicators suggest about early lifeways at the Red House site based on the following indicators:
  - Type of dental wear observed within this sample?
  - Type of artificial cranial modification observed within this sample?
  - The types and variability of mortuary practices discerned within the archaeological site?

With these questions in mind it is important to note that a full biological profile could not be completed for every individual; however, as much of the biological profile as possible was assessed and all available data were considered in the overall analysis.

Methodological Approach and Limitations

Bioarchaeology incorporates the study of human skeletal remains with the archaeological and cultural contexts from which the remains originated (Larsen, 2015). Bioarchaeological investigations utilize multiple lines of evidence from many different disciplines including physical anthropology, archaeology, genetics and chemistry (Larsen, 2015). This cross-disciplinary collaboration enhances the researcher's ability to develop contextual interpretations of past lifeways. Agarwal and Glencross describe, "the duality of skeletal remains as both a

biological and cultural entity [that] has formed the basis of bioarchaeological theoretical inquiry" (2011:1). It is through the integration of these two aspects of the human skeleton that an interpretative framework for bioarchaeological investigations can be developed and reconstructions of past lifeways can take place. Through these bioarchaeological analyses certain cultural behaviors may be inferred including status, division of labor, social agency and interpersonal violence (Glencross, 2011; Larsen, 2015; Pearson and Buikstra, 2006; Zuckerman and Armelagos, 2011).

This research project utilized standard techniques employed by physical anthropologists in a bioarchaeological approach to understanding past populations (e.g. Aufderheide and Rodriguez-Martin, 1998; Baker et al., 2005; Brooks and Suchey, 1990; Buikstra and Ubelaker, 1994; Byers, 2011; Gill, 1998; Hillson, 2002; Jurmain, 1999; Larsen, 2015; Lewis, 2007; Lovejoy et al., 1985; Maresh, 1970; Meindl and Lovejoy, 1985; Ortner, 2003; Scheuer and Black, 2000; Smith, 1984; Tiesler, 2014; Ubelaker, 1989; Waldron, 2009; Webb and Suchey, 1985). Evaluation of the Red House sample began with an assessment of each burial utilizing standard data collection procedures and forms (Appendix A). Once a complete skeletal analysis was performed individual reports, including sections covering the condition of remains and processing, inventory and minimum number of individuals, sex and ancestry assessment, estimated age at death, estimated stature, antemortem conditions, perimortem trauma and postmortem modification, were produced (Appendices B-C). Once all skeletal remains were assessed individually, information for the entire sample was compiled and evaluated at an aggregate level to consider the overall demographic pattern, health, cultural indicators and patterns in mortuary practices such as burial position, alignment and inclusion of grave goods. When possible, an osteobiographical approach was used. Stodder and Palkovich (2014:1)

describe osteobiographies as "the study of the individual beginning with the skeleton and then expanding the analytical and interpretive scale from the grave outward to understand this person's context in life and in death." However, within this sample there were certain limitations, which restricted the ability to build fully developed osteobiographies for most individuals.

There were several limiting factors to consider when developing both the individual skeletal analyses and the demography of this sample. First, based on radiocarbon dates, this settlement site experienced either continual occupancy, or use as a burial complex for more than 1250 years, a time period suggesting up to three different cultural periods (Saladoid ~ 500 BC-AD 600, Arauquinoid/Guayabitoid ~AD 630-1300 and Mayoid ~AD 1300-1750). However, to date, limited testing of pottery sherds (n=16) indicated neither cauxi or caraipe temper (used by later Arauquinoid/Guayabitoid and Mayoid groups) suggests the possibility that this was one cultural group (Saladoid) and its descendent populations (Reid, 2015). Cultural groups related to the different time periods, as determined by the Red House site staff, are noted on the individual skeletal reports found in Appendices B-C. Due to cost constraints, not all skeletal remains were radiocarbon dated, and not all samples yielded dates. With an inability to conclusively identify all cultural groups, or place all individuals into a specific cultural group, the skeletal remains were aggregated and considered as one sample.

In addition to raising questions of population and cultural affinity, this extended time range was also likely responsible for substantial ground disturbance in the pre-contact period due to habitation by indigenous populations along with their use and reuse of the site as a burial complex, which may have inadvertently caused new burials to infringe upon older ones. Additionally, construction, reconstruction and renovation of the Red House itself further disturbed burials, commingling and repositioning skeletal remains and potential grave goods.

Further, for structural reasons excavation was limited to areas undergoing active remodeling. Without a complete excavation of the property, which was not feasible due to its location under the Parliament building at the center of the capital city, it is impossible to know the boundaries of the settlement site or the burial complex within this site. Thereby limiting the ability to discern the degree to which the individuals recovered are representative of the populations who once resided there. As such, mortuary analyses and interpretations should be tempered with an abundance of caution.

Significantly, the individuals recovered from the Red House site are the first known large skeletal sample recovered from Western Trinidad and the second known large skeletal sample investigated from the island itself. The Manzanilla-I (SAN 1) site, located on Trinidad's eastern coast, was excavated and researched by Leiden University in the Netherlands (Altena, 2004, 2005, 2007; Baetsen, 2003; Dorst, 2006; Healy et al., 2013); however, not all burials were fully excavated or analyzed. Due to the fragile nature of the remains, incomplete excavations necessitated that many measurements were taken *in situ* (Altena, 2007). The Red House site represents the first large skeletal sample from Trinidad in which all burials encountered were fully excavated and analyzed in a laboratory setting.

While the Red House and the Manzanilla-I (SAN 1) sites offer exciting new perspectives on the past lifeways of Trinidad's First People, there are few osteological data representing analogous groups with which to compare them. Overall, the Caribbean has not received the same level of attention to osteological analysis and documentation found in other parts of the world (Crespo-Torres et al., 2013; Goodwin, 1979; Laffoon and de Vos, 2011) and even fewer skeletal samples from the Lesser Antilles have been reported in the literature (Goodwin, 1979:477). And yet, this lack of documentation is not wholly due to a lack of skeletal remains. As Laffoon and de

Vos (2011:188) note "although many burials have been found throughout this region, many if not most are generally in poor states of preservation. Cemeteries or burial areas containing large numbers of burials or human skeletons are even more scarce." Further, many early excavations did not have the advantage of modern archaeological excavation methods. Following an assessment of skeletal remains recovered from St. Croix in 1989, Doran (n.d.:14-15) pointed out that "very few New World island populations have been studied from an osteological standpoint…the fragmented nature of the material makes it imperative from an osteological standpoint that only field personnel with osteological training be employed in any future investigations that might recover human skeletal material." Supporting this point, Laffoon and de Vos (2011) note that excavation of skeletal assemblages utilizing modern techniques and standards is rare in the Caribbean archipelago overall, and even less prevalent in the Lesser Antilles.

Reflective of the multinational colonial nature of the Caribbean islands, the limited osteological studies that are available have often been published in diverse languages such as French, Austrian, Dutch and Spanish. Additionally, different studies often focus on just one area of research such as dentition or pathology and older studies do not always include the methods of analysis utilized. In many cases human skeletal remains are simply mentioned as a small sub-section of an archaeological report, all factors which contribute to the difficulty in performing cross-site comparisons.

Although some comparisons can be made to the limited osteological data available from neighboring islands and relevant areas of South America, it will be the recovery of additional pre-contact samples from Trinidad and Tobago and the publishing of full osteological reports in

mainstream academic journals that will offer the greatest opportunity to extend the value of this

research through comparative analysis.

CHAPTER TWO: ARCHAEOLOGICAL BACKGROUND

Geographical Description

The Caribbean archipelago delineates the easternmost boundary of the second largest of the world seas. The Caribbean Sea covers an expanse even larger than Mediterranean Sea (Reid, 2014; World Atlas, 2016), and spans more than 2,754,000 km^2 of waterway (Figure 1). The Caribbean Sea is bordered by Florida to the north and Panama at its southern extremity, ranging approximately 1700 km (1056.331 miles) between the two. From east to west the expanse ranges between approximately 2300 and 2800 km (1429.154 and 1739.839 miles) and is bordered by the Lesser Antilles archipelago to the east and Central America to the west (Reid et al., 2014:3; Rick et al., 2013:37).

Figure 1. Map of the Caribbean Basin indicating Trinidad's geographic location as well as areas with archaeological sites containing human burials utilized in this study (white labels). Map created with Google Earth Pro.

The island nation of Trinidad and Tobago is located within the tropic zone of the northern and western hemispheres between latitudes 9° 40'–10° 50' N and longitudes 61° 55'–61° 56' W and represents the southeastern most island in the Lesser Antillean archipelago (Boomert, 2013; Liddle, 1946:683) (Figure 2). Interaction between the Caribbean and South American tectonic plates gave rise to the islands of Trinidad and Tobago. While the land bridge connecting the northeastern island of Tobago to Trinidad likely disappeared during the last glacial maximum, Trinidad did not separate from the South American landmass completely until the post-Pleistocene period. As a continental island Trinidad is bordered by the Atlantic Ocean to the east, the Caribbean Sea to the north and by the Gulf of Paria to the west (Figure 3).

Figure 2. Map of nearby coastal regions of South America closely tied to Trinidad's geography and early Amerindian migrations routes, from which archaeological sites containing human burials were sought. Map created with Google Earth Pro.

Figure 3. Map of Trinidad and Tobago indicating marine boundaries and nearest relationships to the Venezuelan coastline. Map created with Google Earth Pro.

Today Trinidad extends to within 11 km (6.8 mi) of Venezuela across the Serpent's

Mouth waterway at the southwestern extremity, and to within 19 km (11.8 mi) across the

Dragon's Mouth waterway at the northwestern extremity (Kobo Library, 2016). The island's

proximity to the South American mainland, as well as its proximity to other islands in the Lesser

Antilles, created what Boomert et al. (2013:1) describe as "the natural gateway for human

migrating, exchange and diffusion of culture."

Trinidad is defined physiographically by four costal regions and five major landforms

(Boomert et al., 2013). Each costal region presents a unique ecosystem with costal variation

ranging from estuarine environments to sandy beaches and rocky shorelines. Two lowland areas,

the Southern Lowlands and the Northern Basin, are rimmed by three mountain ranges, the

Southern, Central and Northern Ranges (Reid, 2015). Port of Spain, the nation's capital and the site of the Red House Archaeological project, lies at the base of the Northern Range (see Figure 3). Prior to slash and burn cultivation, logging and the commercialization of crops such as sugar, cocoa and citrus the clime would have been that of a tropical rainforest (Boomert et al., 2013, Bérard, 2013) providing a verdant landscape with abundant natural resources.

Island Systems

The insular nature of island systems offers a singular opportunity to investigate the interaction between early populations and their physical environment. As pointed out by Darwin (1859), islands create a reservoir of biological diversity based on their unique ecology. However, human interactions with the environment play a crucial role in reading this history. Based on evidence of anthropogenic disruption, Rick et al. (2013) have suggested the inclusion of an Anthropocene epoch in the geological timeline. This epoch varies by area, beginning at the point in which humans become the top predator and thereby drive ecological change. When an island is paired in close proximity to other islands, as is the Caribbean archipelago and other landmasses, such as South America, anthropogenic changes can be traced through movement, migration and cultural dispersal.

Trinidad separated from the South American mainland approximately 10,000 to 12,000 years ago (Pagán-Jiménez et al., 2015:243) and it is believed that the Caribbean islands experienced their first wave of migration and human settlement as early as 7790-7670 BP (Pagán-Jiménez et al., 2015). It is at this junction that Trinidad entered the Anthropocene epoch (Rick et al., 2013). The Greater Antilles were originally settled sometime later, between 5000-4000 BC (Curet and Reid, 2014; Wilson, 2007) followed by a second migratory wave leaving South America and settling in the Caribbean somewhat earlier than 2000 BC (Wilson, 2007:36).

Rick et al., (2013) also point out that although some studies have explored evidence of both overhunting (Steadman et al., 1984, 2005) and adaptation (Petersen, 1997) on these islands, overall there have been fewer archaeological investigations focused on human-environmental interaction in the Caribbean than there are in other island chains (Fitzpatrick and Keegan, 2007; Keegan et al., 2008). Continued archaeological investigations, such as the Red House Archaeological Project, provide necessary contributions to the analysis and understanding of how island systems influence cultural adaptations and how human interactions impact island systems.

Previous Archaeological Investigations of Caribbean Sites Containing Human Burials

In order to make osteological comparisons between the Red House sample and relevant skeletal samples from the Caribbean it was essential to compile a comprehensive overview of Caribbean skeletal data from the published literature. A survey of 14 Caribbean islands (see Figure 1) and three South American countries (see Figure 2) produced 33 sites containing human remains for comparison. A site-by-site review of the available osteological and mortuary data from each of these sites was conducted to identify similarities in patterns of health, cultural indicators and burial practices. A summary of burials available from these archaeological sites is presented in Table 1. These data, based on osteological and mortuary information extracted from a variety of archaeological and osteological sources (Appendix D), are presented in a generally north to south direction beginning at the northwestern-most aspect of the Lesser Antilles and concluding with coastal regions of South America (see Figures 1-2).

While expanding in recent years, the osteological study of skeletal remains and mortuary practices from the Caribbean are still relatively limited and have traditionally focused on areas in the Greater Antilles such as Cuba, Jamaica, the Dominican Republic and Puerto Rico, with fewer

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populations studied in the Lesser Antilles (Crespo-Torres et al., 2013; Goodwin, 1979). Unfortunately, while some osteological data were available for limited sites (Crespo-Torres et al., 2013; Doran, n.d.; Goodwin, 1979; Laffoon, 2012), skeletal data were either unavailable, or were confined to archaeological reports for the majority of sites containing human burials in the Lesser Antilles. Information was often drawn from brief descriptions of burials in archaeological reports, as opposed to osteological studies. Although skeletal comparisons were desired from nearby coastal areas of South America, even fewer studies were available from this region than from similar samples in the Lesser Antilles. This scarcity was caused in part by the inaccessibility of many osteological studies, particularly for area such as Venezuela, Guyana and Suriname, due to language barriers or the forum in which they were originally published. Therefore, the sites provided for comparison are not intended to represent an exhaustive evaluation of all skeletal material recovered to date; but do represent a comprehensive accounting of those studies available in English through both mainstream and accessible area-specific literature. Although the majority of studies reviewed contained only a summary analysis of the burials discovered, a few studies did provided detailed mortuary and osteological information. Relevant information gathered from this review of Caribbean sites containing human remains is compared to data collected from the Red House sample and presented in Chapter 5, Discussion.

Table 1. Compilation of Caribbean archaeological sites containing human burials indicating the total number of adult and juvenile remain (sex assessment is listed when provided in the original study). Refer to Figures 1-2 for island and country locations.

Country	Site	Female	Male	Ind.	Juv.	Total
St. Thomas						
	Tutu Village	14	6	2	20	42
St. Croix						
	Aklis	1	1			2
	Judith's Fancy	2	2			4
Anguilla						
	Rendezuous Bay				1	1
	Sandy Ground			1	1	2
St. Martin						
	Hope Estate[1]	4	3	2		9
Saba						
	Kelbey's Ridge 2	2	1		7	9
St. Eustatius						
	Golden Rock	3	2	2	2	9
	Smoke Alley[2]			2		
St. Kitts						
	Bloody Point	NA	NA	NA	NA	
Guadeloupe						
	Anse a la Gourde	NA	NA	NA	NA	93
	La Pointe de Grande Anse	NA	NA	NA	NA	16
St. Lucia						
	Grande Anse	1				1
	Lavoutte	NA	NA	NA	NA	45
Barbados						
	Chancery Lane	1	2	1		4
	Greenland and Hillcrest (pre-1985)[3]					
	Heywoods	NA	NA	NA	0	10
	Hillcrest	2	1			3
	Silver Sands	1	4	2	1	8
Carriacou						
	Grand Bay	NA	NA	NA	NA	19
Aruba						
	Santa Cruz C				1	1
	Santa Cruz D	NA	NA	NA	NA	NA
	Savaneta			1		1
	Seroe Noka					3-4
	Tanki Flip	1	5	2	7	15
Curacao						
	Koraal Specht Rock Shelter	NA	NA	NA	NA	NA
	Hato		1			1
Bonaire						
	Site of Kraledjijk School		1			1
Trinidad						
	Erin				1	1
	Manzanilla SAN-1	2	2	10	3	21
	The Red House	**11**	**16**	**20**	**13**	**60**
Guyana						
	Barbina Shell Mound	1		4	1	6
Suriname						
	Nickerie			2		
Venezuela						
	Rouse and Cruxent		NA			NA
	Totals	46	49	49	58	387/88

Ind= Indeterminate, Juv=Juvenile, NA=Not available,[1]Totals are approximated based on conflicting studies. [2]Based on the description it appears these are adult burials although it is not specified. [3]Noted as "multiple burials" Drewett (1991:169).

Introduction to Archaeological Investigations at the Red House Site

Indigenous Occupation in Trinidad

Indigenous occupation of the island of Trinidad dates back 7180 +/- 80 years to Banwari Trace, the oldest occupational site on the island. As sea levels began to rise following the last glacial maximum, which ended approximately 12,000 years ago (Wilson, 2007:26), the narrow land bridge connecting Tobago to Trinidad was inundated and Tobago became a separate island (Boomert, 2016). Sea levels continued to rise in the post-Pleistocene period with Trinidad ultimately separating from the mainland somewhere between 12,000 and 10,000 years ago (Pagán-Jiménez et al., 2015:243); however, both islands continued to be closely associated with South America (Rodríguez-Ramos et al., 2013; Boomert, 2000, 2013).

It is likely that other nomadic groups visited Trinidad prior to the island's separation from the mainland (Boomert, 2016). However, it was between 6000-4000 cal BC that Archaic peoples began the first large-scale occupation of the island (Rodríguez-Ramos et al., 2013). This occupation provided a basis from which a continued and culturally affiliated Ortoiroid occupation grew. Archaeological investigations suggest that these early occupants engaged in a variety of subsistence strategies including hunting, fishing and gathering. Rodríguez-Ramos et al. (2013:143) note that conclusive evidence for continued occupation of Trinidad by Ortoiroid groups until the arrival of the Ceramic Age immigrants has not yet been found. However, Early Ceramic Age groups can be seen in the archaeological record as early as 400 BC. Whether through diffusion or migration, the mechanisms of the Ceramic Age Saladoid expansion have not yet been specified, but it is known that there were interaction spheres existing from the lower Orinoco area in mainland South America to Trinidad and Tobago (Boomert, 2000, 2013).

Groups arriving on Trinidad from South America encountered rich and varied

ecosystems. According to Reid (2015) the soils of the Northern Range do not support an

agricultural economy; however, the lowland soils in the Northern Basin have alluvial

characteristics with great agricultural potential. Early settlements were often centered near

waterways, which provided both important resources and a mode of transportation. Boomert

(2016:26) points out that most Saladoid settlement sites in Trinidad and Tobago are found within

500 m of potable water and are less than 100 m above mean sea level. During the Amerindian

period the site where the Red House stands today was on the banks of the St. Ann's River

(Boomert, 2016:26). Until its diversion in 1787, the St. Ann's River (Reid, 2015:11), created an

ideal environment for hunting and fishing providing an area rich in the resources necessary for a

settlement at the site. Analysis of the textured soil layers at the Red House site by Ectox

Environmental Services suggests that these soils may have been subject to cultivation, and it is

possible that the people of the Red House Site employed horticultural or agricultural methods of

food production (Reid, 2015).

Multiple lines of evidence were available to reconstruct the subsistence strategies of the

Red House site people (Reid, 2015). Collagen was collected from 39 bone samples and apatite

was collected from 29 bone samples. The results of these analyses indicate a diet heavily based

on marine resources, but supplemented with C_3 based terrestrial foods. Although stable isotope

analysis did not indicate C_4 plants such as maize or millet, maize cob phytoliths were identified

on three grindstones recovered from the Red House site and indicate that "a maize diet cannot be

entirely ruled out" (Reid, 2015:123). In addition, lipid analysis was performed by researchers

from Brandon University in Manitoba, Canada utilizing 36 pottery sherds recovered from the

site. Of these, 23 sherds produced enough fatty acids to attempt residue identification (Malainey and Figol, 2015). The results of this analysis indicate that a variety of fish as well as peccary, agouti, deer and mollusks were also consumed (Reid, 2015:124). Faunal remains recovered from the Red House site support these finding (Table 2). Clearly, the ecosystems surrounding the site included a diverse food supply from marine, estuarine, riverine and terrestrial sources (Reid, 2015) offering this population an abundant and varied selection of food resources.

Table 2. Listing of faunal remains recovered from the Red House. Data provided by Basil Reid, PhD.

Identified Species	Skeletal Elements Recovered			
	Section A	Section B	Section C	Total
Lappe/Paca: (*Cuniculus paca*)	75	8	5	**88**
Armadillo: (*Dasypus novemcinctus*)	108	17	66	**191**
Agouti: (*Daspyrocta leporina*)	254	62	122	**438**
Manicou: *(Didelphis marsupialis insularis)*	95	34	21	**150**
Red brocket deer: *(Mazama americana trinitatis)*	144	43	72	**259**
Wild pig: *(Tayassu tajacu)*	135	26	102	**263**
Domestic pig: *(Sus scrofa domesticus)*	19	32	3	**54**
Iguana: (*Iguana iguana*):	73	7	13	**93**
Canid/Dog: (*Canis familiaris*)	54	4	7	**65**
Equine:(*Equus ferus caballus*)	1	1	1	**3**
Bovine: *(Bos primigenius)*	57	8	20	**85**
Fish : (*Scombridae* and *Serranidae*)	35	14	31	**80**
Catfish: (*Ariidae*)	42	76	519	**637**
Stingray: (*Dasyatidae*)	1	1	0	**2**
Red Howler monkey (*Alouatta macconnelli*)	1	0	1	**2**
Crab	0	1	3	**4**

Mortuary Practices

The study of mortuary practices contributes to our understanding of past lifeways (Hoogland and Hofman, 2013) including aspects of daily life such as personhood, social memory, gender identity and social structure. It is through the comparison of mortuary practices among different populations that these patterns emerge. Mortuary practices at the Red House site varied widely. However, given the expanse of time covered by the burials, along with site disturbance occurring throughout time, this is not an entirely unexpected result. Burials ranged

from tightly flexed to extended and often reflected primary, and possible secondary burials based on cultural practices such as manipulation of skeletal elements and the removal of some elements from their primary burial and the re-interment of them in a later burial (Reid, 2015). In addition, one juvenile burial was found placed in a pot with associated grave goods. Worked or modified grave goods were rarely recovered with individual burials, although two juvenile burials included items such as beads and a pendant.

Site Description

The Red House is located at the heart of Trinidad's capital city, Port of Spain, in St. George County. Situated at the base of the Northern Range where the Gulf of Paria's costal expanse delineates the Northern Basin's western boundary (Liddle, 1946; Reid, 2015), Port of Spain was not always Trinidad's capital. Founded by the Spanish in 1592, the capital was originally located in St. Joseph, in what was previously the Amerindian settlement of Goanagoanare, more inland and further to the east than Port of Spain (Liddle, 1946; Francis, 2015). At that time what is now Port of Spain was home to an indigenous population with two settlements, Conquerabia and Cumucurapo. Not only was this location still heavily wooded and encompassing "a muddy mangrove shore" (Ottley, 1962:13), the coastal location did not offer Europeans the safety that the more inland site did, as indigenous population already settled in more coastal areas were both willing and quite able to defend their right to remain in their villages (Francis, 2015). As a result, what is now Port of Spain was passed by and St. Joseph became the new Spanish colony's administrative center. It was not until 1757 that Port of Spain became the capital, and by 1760 the town had grown into a port with commerce and trade supporting a population of approximately 400 individuals. Early residents engaged in a variety of farming and fishing activities establishing a town around two streets that are now known as

Duncan and Nelson streets (Ottley, 1962). The town grew outward from there. In 1802 Trinidad was formally ceded to England by Spain and remained under British colonial rule until Trinidad gained independence on August 31, 1962. Port of Spain has now grown to approximately 5155 km^2 and is ideally placed as a commercial and political center (City Population, 2016; Reid, 2015).

Today the Red House is located in a thriving economic and cultural center (Figure 4). Encompassing a full block it is bounded on the north by Knox Street, on the east by Abercromby Street and Woodford Square (formerly Brunswick Square), on the south by Heart Street, and on the west by St. Vincent Street. As one of the earliest Government buildings in Port of Spain, the city grew up around the Red House. Although current renovations of the Red House began in 2008 (Basil Reid, PhD, personal communication) it was not until structural assessments were undertaken in 2013 that knowledge of an earlier occupation was uncovered. With radiocarbon dates (AD 125 to AD 1395) (Reid, 2015) placing the people of the Red House site in the mid to late Ceramic Age, the archaeological investigations at the Red House shed new light on the indigenous history of the island. Although it is not known why early colonial rulers chose this exact location to build their governmental offices, this decision ensured that Trinidad's indigenous history would be permanently intertwined the Trinidad and Tobago's future. The present investigation into the lifeways of the site's early inhabitants contributes valuable information to an understanding of the country's pre-contact period and enriches the Red House's position as both an important reflection on the country's past and a bright symbol of its future.

Figure 4. Map of commercial area surrounding the Red House. Map created with Google Earth Pro.

Site Chronology

In order to place the overall osteological analysis in context it is important to consider

the background of the Red House itself. The foundation stone for the new Government

Building, as it was known, was laid on February 15,1844 by then Governor, Sir Henry McLeod

(Insall, 2013). The Government building was initially designed as two separate buildings

(Figures 5-6), with the courthouse located in the south building and offices for the Legislative

Council located in the north building. Although incomplete, the buildings were inaugurated for

public use in 1848 with the opening of a suite of law offices in the southern building (Insall,

2013). A small roadway large enough for carts and pedestrian traffic ran between the northern

and southern buildings, which were connected by a central arch supported by a colonnade

allowing traffic to pass between Lower Prince Street and Upper Prince Street and continue on

to Brunswick Square.
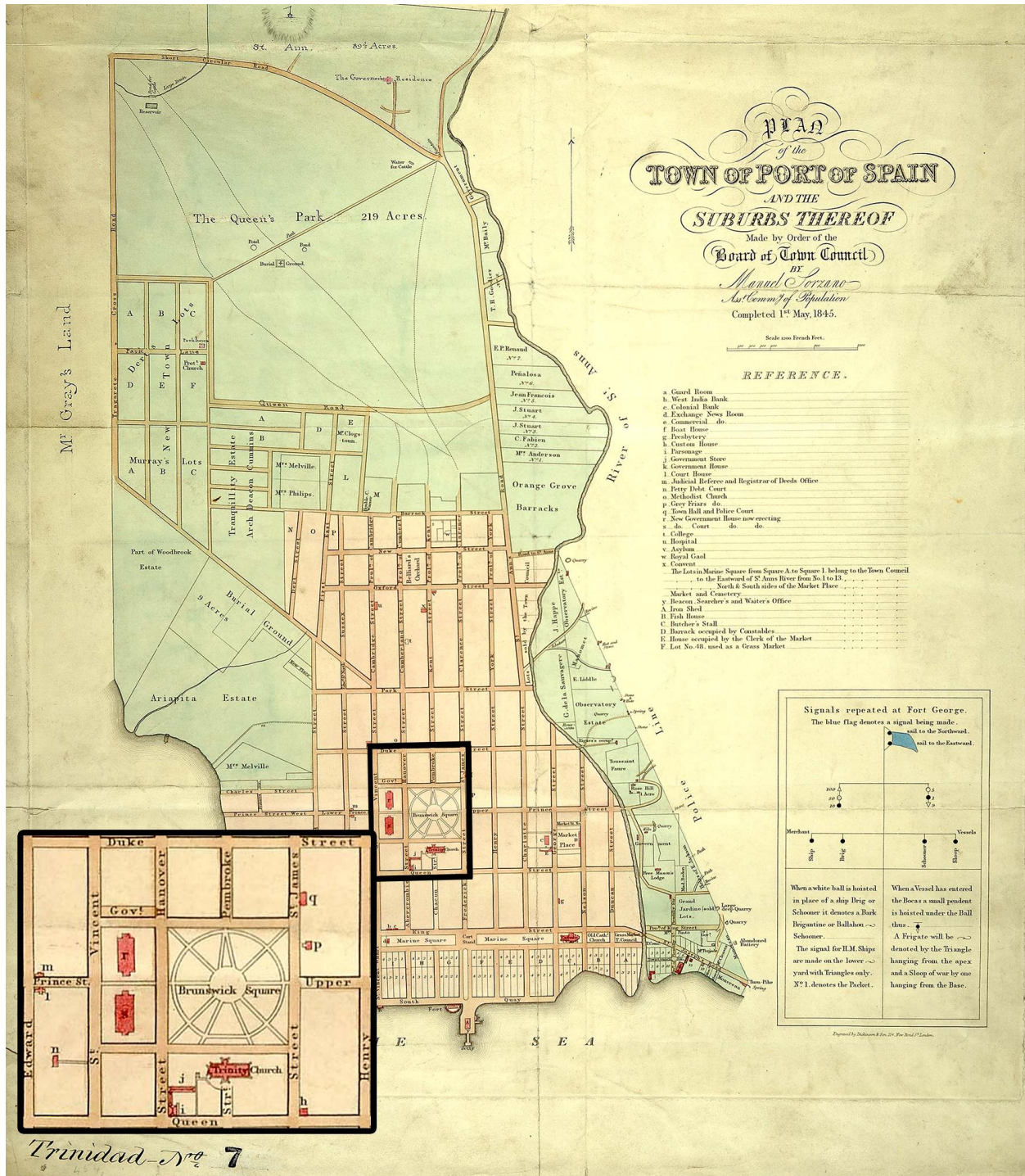
Figure 5. Map of Port of Spain circa 1845 highlighting the original Government Building (in red) comprised of two independent structures connected by a colonnade. These two buildings would become the foundation from which the Red House was constructed (map courtesy of the UK National Archives).

Figure 6. The first government buildings. Note the roadway to the right of the carriage and the colonnade connecting the north and south buildings (image courtesy of the UK National Archives).

Install (2013) reports that by 1892 the delay in completion of the buildings had become an issue to townspeople, the concerns of whom were reported in the *Port of Spain Gazette,* which admonished, "Nothing further has been done to complete the buildings since their erection some fifty years ago. The only attempt to relieve the monotony of the whole is to be seen in the arching of the carriageway through the courtyard which is a perfect skeleton and, like the ruins of Pompeii, is more suggestive of what the buildings must have been than of what they were intended to be" (Insall, 2013:8). Between 1892-1897 the buildings went through several renovations and were enlarged by adding two-story additions to both the north and south end (Insall, 2013:8). Additional rooms were built within the inner courtyard in 1895 (Figure 7). When the buildings were commissioned the City Council stipulated that Prince Street must remain open to traffic noting that the street "should never be closed to the public" (Insall, 2013:8). Although eventually combined into one building, the passage between the north and south buildings was first partially enclosed, restricting vehicular traffic while still allowing

access between them for use as a pedestrian walkway. The building was painted its distinctive

red color in 1897 in preparation for Queen Victoria's Diamond Jubilee, and was thereafter

known as the "Red House" (Insall 2013) (Figures 8-9).
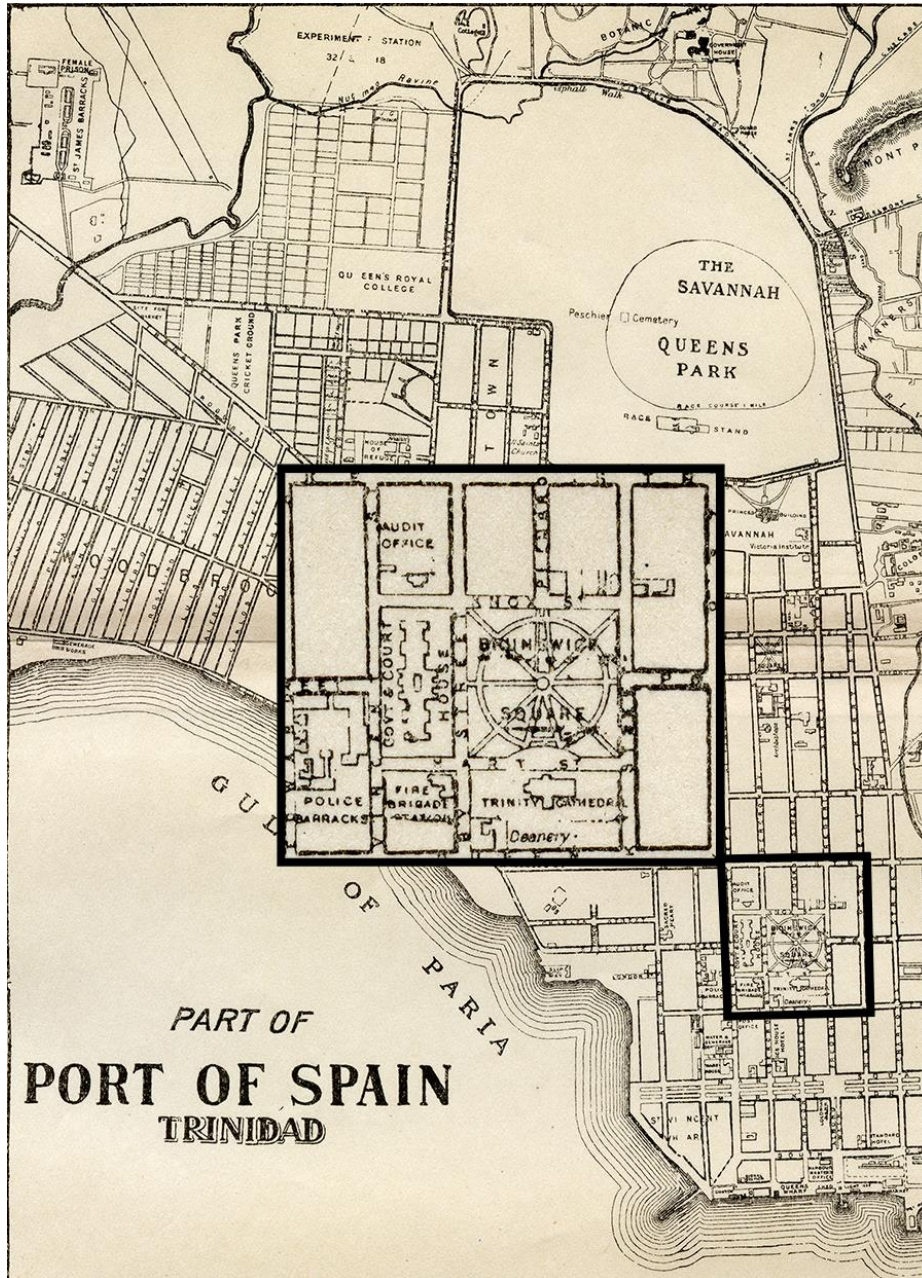
Figure 7. Map of Port of Spain circa 1890-1895 highlighting the Government Building following renovations to join both halves of the structure while leaving a pedestrian walkway (collection of the author).

Figure 8. Image of the Red House circa 1903 or earlier (image courtesy of the UK National Archives).

Figure 9. Postcard circa 1910 following renovations for the Queen's Jubilee. Note the title in the upper right; the name has now been changed to the 'Red House' (collection of the author).

Although the Red House experienced several periods of construction and renovation, it was the near complete destruction of the building, which led to the most extensive renovations. As an island nation, water defines much of Trinidad's culture and history. In 1903 the need for fresh water became the catalyst for uprise and sweeping changes to the structure of the Red House when riots broke out over water rites and usage. A shortage of water during the late 1800s and early 1900s (Commission of Enquiry, 1903; Laurence, 1969; Williams, 1982) initiated investigations into the cause, which revealed that the shortage was brought about by both an inadequate supply and careless usage. As Laurence (1969:5) notes, "[t]oo many people left their taps running." Compounding the problem, more affluent citizens often left the water running overnight to fill 1000-2000 gallon capacity plunge baths (Laurence, 1969). The shortage was addressed in 1895 with a plan to install water meters. However, change was difficult and while some progress was made in the following seven years, by 1902 the government took the additional step of requesting that citizens reduce water use. When these measures failed to illicit the hoped for response the Director of Public Works began to enforce the law by cutting off water pipes that were in non-compliance. Taking enforcement seriously "[i]n 1901 he cut off 185 pipes, in the next year 163; and in the first twelve weeks of 1903 he cut off 181, often without notice" (Laurence 1969:6). It was this aggressive enforcement, at a time when some small measures of improvement were being achieved, that created the antagonism leading to public protest by the Ratepayers Association on March 14, 1903 (Figure 10). Nearly 2000 people attended, testament to the depth of the controversy over access and water rights.

Figure 10. Image depicting the crowd gathered on March 14, 1903 to debate the Waterworks Ordinance (image courtesy of the UK National Archives).

On March 23, 1903 the question of water rights came to a head when the Governor created a de facto public ban from a critical council meeting called to discuss the water rites issue. Tickets were issued for admittance; however, by ensuring that the majority of the tickets were given to clerks in the Government offices, there were few tickets remaining for members of the Ratepayers Association who planned to attend the meeting (Commission of Enquiry, 1903; Laurence, 1969; Williams, 1982). At approximately noon on that day the crowd waiting outside began to attack the council chamber (Figures 11-12) throwing stones and vandalizing property (the Governor's carriage was thrown into the gulf) (Commission of Enquiry, 1903; Laurence, 1969).

The Red House 20 March 1903 "Pelting began"

Figure 11. Image taken outside the council chambers as protests begin. Note comment "pelting began" (image courtesy of the UK National Achieves).

Crowd at Eastern Side of Red House. 23rd March 1903. – Between 12 & 1 P.M.
(Looking down Abercrombie Street)

Figure 12. Protests continue (image courtesy of the UK National Achieves).

The assault lasted until approximately 2:30 in the afternoon when someone in the crowd set the council chambers on fire (Figure 13). Dr. Stephen Laurence was an eyewitness to the riot and noted in his memoirs of the event "I could not help feeling that a few police would have stopped it easily" (Laurence 1969:12). However, once the fire broke out the riot was soon over and Dr. Laurence continues "[a]bout this time I drove away to some work at Woodbrook. Soon the rising columns of smoke caught my attention. By the time I got back to the heart of the city the riot was over" (Laurence 1969:12).

The Burning of the Red House. 20 March 1903

Figure 13. Image of the Red House on fire, view from Knox Street (image courtesy of the UK National Achieves).

The interior and roof of the Red House were completely destroyed (Figures 14-17) (Commission of Enquiry, 1903; Insall, 2013; Laurence, 1969; Ottley, 1962; Richardson, 2004) and the damage caused by the water riot had a lasting impact, not only on the building itself, but on archaeological investigations over 110 years later.

Figure 14. Image of the Red House following the fire, view from Knox Street (image courtesy of the UK National Achieves).

Figure 15. Image of the Red House following the fire, view from Heart Street (image courtesy of the UK National Achieves).

Figure 16. Image of the Red House following the fire, east or west exposure (image courtesy of the UK National Achieves).

Figure 17. Image of the Red House following the fire, the Rotunda Fountain Area (RFA) where seven burials would later be excavated (image courtesy of the UK National Achieves).

The building was rebuilt between the years of 1904-1907. In an official government dispatch issued on February 9, 1904 plans for the new Red House were submitted with the direction that "as much of the old Red House as still remains standing will be utilized by the Director of Public Works" (Insall, 2013:19). The new building was inaugurated on February 4, 1907 by then Governor, Sir H.M. Jackson. It was during the rebuilding and renovation of the Red House that both buildings were fully integrated into the unified structure seen today. Although the above chronology reflects the documented changes to the structure of the Red House, current archaeological investigations revealed a tantalizing clue to additional renovations. Excavations of the Red House foundation uncovered sheets of the *Port-of-Spain Gazette* fused to the bottom of the poured concrete floor (O'Neil and Syriac-Lynch, 2015). Most of the 95 pieces of paper recovered were either illegible or without dates. However, two slabs of concrete had newspaper pages dated May 6, 1919 firmly embedded in the concrete (Reid, 2015). This find indicates that in addition to the many documented changes at the Red House (Table 3) additional renovations occurred and suggests that other, previously unknown renovations, may have occurred following the 1904-1907 rebuilding of the Red House.

Table 3. Timeline of major construction and renovation events in the Red House's history.

Date	Event
1844	The foundation stone is laid
1848	Two buildings with a passage between them are inaugurated for use
1892-1897	Renovations and enlargements are undertaken
1895	The buildings are enlarged and a new entrance pavilion is added
1895-1897	The passageway is reduced to a pedestrian walkway
1897	The building is painted red in honor of Queen Victoria's Diamond Jubilee
1903	The roof and inner walls are gutted by fire
1904-1907	The building is rebuilt and fully integrated into one structure
1919	Renovations in the basement level are undertaken
2008	Renovations of the Red House begin
2011	The Office of the Parliament relocates from the Red House to the Hyatt Hotel
2013	Structural assessments are undertaken, archaeological material and human remains are encountered

Excavation and Skeletal Recovery

The Red House site is designated SGE-51 based on-site registration conventions of The University of West Indies Archaeology Centre (Reid, 2015). Prior to the commencement of archaeological work the Urban Development Corporation of Trinidad and Tobago (UDeCOTT) contracted AMCOWELD Engineering Services, Ltd. to provide a structural analysis of the site. During this inspection (March-April, 2013) pottery, biofacts and human remains were found commingled with European artifacts (Reid, 2015). Archeological work began on July 1, 2013 with a continuation of these inspection units. The Red House basement was then subdivided into sections A, B and C, and then further subdivided into smaller units depending on the area (Reid, 2015). Skeletal remains were only recovered from sections A and B (Figure 18).

The skeletal recoveries were completed prior the author's contracted analysis period. Based on discussions with the site managers and excavation assistants, when in the course of the general archaeological excavation human remains were encountered, work halted and a site manager was called. Once human remains were confirmed a documentation team was called in and each burial was photographed and drawn *in situ*. The job of excavating the burial was assigned to a select group of individuals who ensured the remains were removed in as intact a manner as possible. Often the matrix was removed along with the remains to protect them in transit to on-site storage.
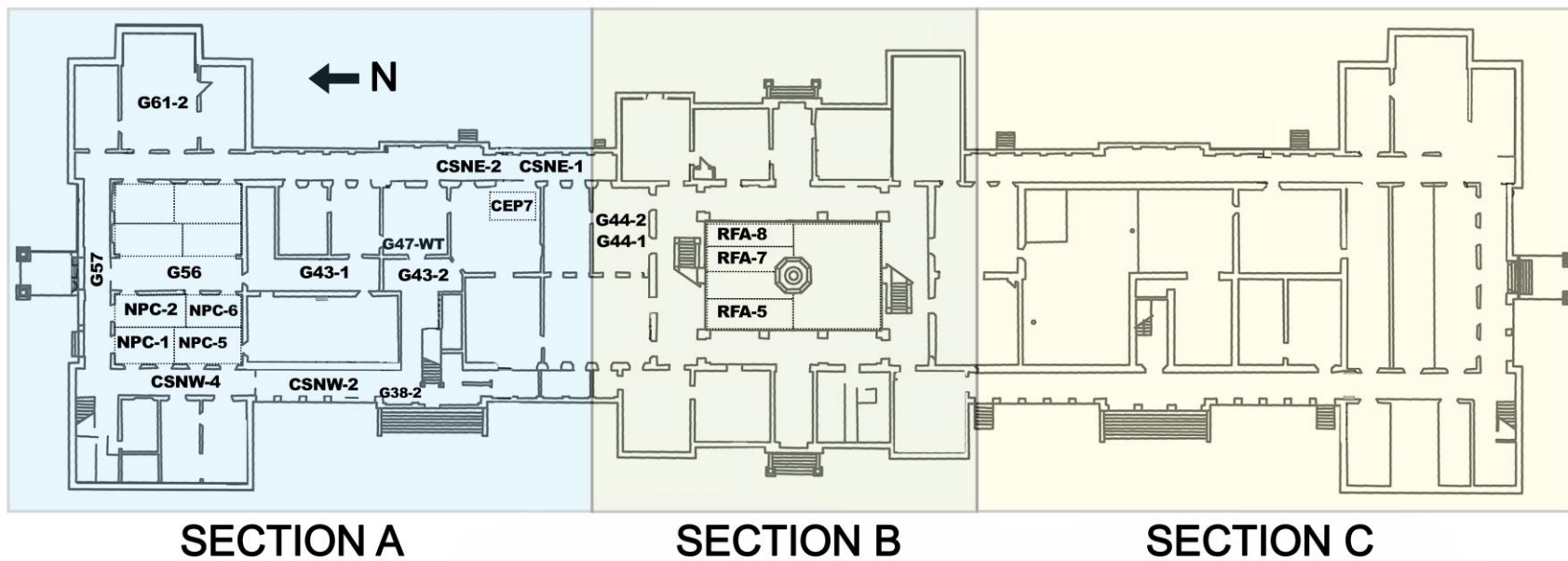
Figure 18. Red House floor plan labeled with sections and subdivisions that included human burials, which were excavated during the Red House Archaeology Project. The floor plan was compiled by the author based on drawings, information and photographs provided by the Red House archaeological team.

The original scope of work contracted with the Parliament of the Republic of Trinidad and Tobago identified approximately 21 skeletons, five skulls, five sets of post-cranial human remains and unassociated human bones to be analyzed. Upon arrival on-site the inventory had grown to include 39 sets of human remains. Throughout the on-site analysis additional individuals were identified based on both commingled remains in what were previously considered individual burials and the identification of previously unrecognized juvenile remains. The original inventory list included one juvenile individual; during the analysis three individuals previously classified as adults were reclassified as a juveniles and an additional nine sets of juvenile remains were recovered from the faunal assemblage. Thus, the on-site analysis increased the overall skeletal sample to 60.

CHAPTER THREE: MATERIALS AND METHODS

In order to provide an overview of the specific tasks that were performed during the skeletal analyses, and identify some of the limitations that affected the overall analysis, the following laboratory steps and/or methods are discussed further: skeletal processing and documentation, determining MNI, assessment of the biological profile (e.g. age, sex, ancestry and stature), evaluation of antemortem conditions and perimortem trauma along with taphonomic modifications.

Laboratory Facilities and Skeletal Storage

Laboratory facilities were provided on-site and consisted of a portable construction trailer equipped with several six foot long folding tables. Skeletal remains were stored on-site in two similar construction trailers. All construction trailers were climate controlled to protect the remains from fluctuations in temperature and humidity. Access to the skeletal remains was provided through the site managers. Each set of remains was stored independently in a cardboard "Banker Box" type container labeled with the appropriate contextual site information. When smaller elements were bagged within the box, each bag was individually labeled with the provenience. Initially smaller skeletal elements were stored in plastic bags within the storage box. During the course of the on-site analysis all human remains were re-bagged into paper bags to prevent moisture build up. All bags were then re-labeled with the appropriate contextual information.

Postmortem Modifications and Taphonomy

The fragmentary and incomplete nature of the skeletal remains made many other taphonomic modifications difficult to assess. Therefore, only a general description of taphonomic alterations including soil staining, taphonomic degradation, compression and breakage observed on the skeletal material is provided.

Processing and Documentation

Many of the skeletons exhibited some degree of encasement within the excavated matrix (Figure 19). The skeletal elements encased in soil ranged from small regions of the skeleton to the entire individual and required carful cleaning and frequent reconstruction. Due to time constraints reconstruction was limited to only those elements necessary for the skeletal analysis. Time constraints also necessitated the delegation of some cleaning responsibilities to site personnel. When possible, diagnostic elements were reserved for cleaning and processing by the researcher to mitigate potential for postmortem damage.

Figure 19. Image of matrix encased tarsals, metatarsals and phalanges
(A-CSNW-4-2).

Most of the skeletal elements were at least minimally encased in matrix. To loosen this matrix a spray bottle filled with plain water was utilized to dampen the soil, which allowed the separation and removal of the encased bones. Wooden dowels and soft brushes of various sizes were used to gently remove the loosened soil (Figure 20). The amount of matrix removed, particularly from the crania and mandibles, required careful consideration. Due to the frequently fragmentary nature of the bones it was not always possible to completely remove the encasing matrix. By leaving some soil, particularly within the endocranial space, the overall cranial morphology could be retained. Retention of the overall shape was important to analyses of both morphological features and cultural indicators (e.g. artificial cranial modification) However, this did reduce the ability to observe any possible endocranial abnormalities such as endocranial lesions. In addition, cervical vertebrae were frequently retained within the endocranial space and were therefore unobservable in these cases. Once as much matrix as possible was removed the bones were allowed to thoroughly air-dry. Although time consuming, allowing the skeletal elements to dry completely was important as dry edges are necessary for skeletal reconstructions. In addition, it was important to ensure that no moisture, which could allow mold to grow, was retained when the elements were placed in long term storage.

Figure 20. Soft brushes, wooden dowels and a spray bottle of plain water were utilized to loosen the encasing matrix (A-CSNW-4-2).

Reconstruction

Reconstruction was accomplished utilizing either Elmer's Glue or Duco Cement. Although the reversible qualities of Elmer's Glue were preferred, due to the fragile nature of the remains and the inability to remove all adhering dust and matrix, the stronger bond of Duco Cement was often required. Once conjoining edges were bonded the element was placed in a container of rice for stabilization until the bond set (Figure 21.

Figure 21. Reconstructed femora drying in rice (B-RFA-7-2).

Rice was chosen over sand for stabilization due to its larger size, facilitating easier removal of loose grains from bonded seams. Under ideal circumstances all damaged elements would be reconstructed. However, given the time constraints involved, only those elements considered diagnostic were reconstructed. The skull contains many features that are useful indicators of both sex and ancestry, making reconstruction of these elements particularly important. Unfortunately, a complete reconstruction of many of the crushed skulls was not possible due to

the high degree of fragmentation (Figure 22). Therefore, such efforts were focused on reconstructing as many of the cranial vaults and dentitions as possible. In addition, since complete long bones are required to calculate stature, reconstruction efforts were also focused on repairing as many of the long bones as possible.

Figure 22. Fragmented remains from a commingled burial (A-CSNW-4-3 and A-CSNW-4-4).

The individual bones present for each skeleton were laid out in anatomical order and

an inventory was conducted. If duplicate skeletal elements were present for remains

excavated as one individual, the skeletal material was sorted into individuals (where

possible). When individualization was not possible an MNI was calculated. Methods for

determining which skeletal elements belonged to which individual are covered under the

Minimum Number of Individuals (MNI) section. Completeness was scored based on overall

completeness and ranged from < 25% complete, which at times represented only one or two

elements, to the recovery of nearly all skeletal elements (> 90% complete). However, there

were no burials in which all skeletal elements were recovered.

Photography

Photography was accomplished utilizing a Cannon 5D Mark II DSLR® with a variety of

lenses including a 100mm macro lens, a 16-35mm lens and a 28-70mm lens. Images taken of all

skeletal elements together (an overall image) were hand-held; however, all close-up images and

images of individual elements were taken with the camera secured to a tri-pod and tethered to a

MacBook Air® running Cannon EOS Digital Capture Software® (Figure 23). Lighting inside the

construction trailer was a combination of florescent light and ambient light provided by two

exterior windows. The ambient light changed frequently and a standard gray card was used to

calibrate lighting and accommodate for variable lighting conditions, thereby providing the truest

color capture possible.

Figure 23. Laboratory area dedicated to digital photography with equipment tethered to a MacBook Air® utilizing EOS Digital Capture software®.

All skeletal elements recovered for each burial were photographed prior to cleaning (Figure 24). Once the bones were cleaned and reconstructed the individual bones present for each skeleton were laid out in anatomical order for an overall image. Next, photographs relevant to the biological profile, including photographic documentation of the skull, dentition, pubic symphysis and auricular surface were taken. In addition, any individual bones displaying diagnostic information relevant to trauma or pathology were photographed. All digital images were immediately filed by element and burial number on an external hard-drive to maintain contextual information and were then backed-up to a secondary laptop computer each evening.

Figure 24. Overall photograph documenting remains prior to processing (A-CSNE-1-2).

Minimum Number of Individuals (MNI)

The MNI was calculated based on the number of individual skeletal elements in each burial following Buikstra and Ubelaker (1994). When duplicate elements were noted the specific site location or context where individual skeletons were excavated, along with the proximity to commingled human bones mixed in the faunal material was considered. The spatial relationships were determined based on a site map and excavation depths for the skeletal recoveries provided by site staff. Site disturbance from the construction of the Red House were also considered as they likely affected numerous *in situ* burials. Further, horizontal and vertical distances to one another were considered when known. For example, although Burial B-RFA-5-LB contains shaft fragments for three right femora, it is possible that one of the fragmented femora belongs to Burial B-RFA-5-1. This possibility is based upon both horizontal and vertical proximity of the long bones to the other burials within this subdivision and the depth at which the bones were recovered. The long bones were recovered at a depth of 1.12m, and Skeleton 1 was recovered at a depth of 1.13m. Conversely, Skeleton 2 was not considered, as the excavation depth was 1.5m.

When calculating MNI, duplication of skeletal elements was the first consideration (i.e. the same skeletal element from the same side). However, developmental age (juvenile or adult) and biological age (young adult versus older adult), size of the bones, sex and robusticity were also taken into account. Further, in some instances taphonomic criteria were also considered when sorting commingled bones into individuals. Identifying human skeletal elements, particularly juvenile individuals that were commingled with faunal remains in numerous sections, increased the MNI.

Biological Profile

A biological profile (e.g. sex, age, ancestry and stature) was developed for each set of remains utilizing standard data collection and analysis procedures (e.g. Brooks and Suchey, 1990; Buikstra and Ubelaker, 1994; Byers, 2011; Gill, 1998; Klales et al., 2012; Lovejoy et al., 1985; Maresh, 1970; Meindl and Lovejoy, 1985; Ortner, 2003; Phenice, 1967; Scheuer and Black, 2000; Ubelaker,1989; Webb and Suchey, 1985). Each element of the biological profile and the data collection standard applied is discussed below.

Sex Assessment

When possible, sex assessment was conducted using morphological criteria of the skull and pelvis following standard methods (e.g. Buikstra and Ubelaker, 1994; Byers, 2011; Klales et al., 2012; Phenice, 1967) as the application of standardized methods facilitates cross-site comparisons. In extremely fragmentary burials morphological and metric criteria of the long bones were applied following standards provided by Byers (2011). Depending on the completeness of the skeleton, sex was assessed as male or female or probable male or probable female. The designations indeterminate and probable were used in cases of very limited and fragmented material when it was not possible to accurately assess sex. The total number of males

was calculated by adding male and probable male, while the total number of females was calculated by adding female and probable female. An accurate assessment of sex based on morphological criteria of the skeleton cannot be accomplished until after puberty; therefore, juvenile sex assessment was not conducted, with one exception. Burial A-CEP7-1, an individual between 15-18 years of age at death, exhibited morphological development of multiple characteristics associated with sex therefore enabling an assessment of 'male' to be made.

Age at Death

Age at death was estimated using a variety of aging standards. For juveniles, the developing adult dentition standards provided by Ubelaker (1989) were utilized as they have the advantage of being based on a Native American population (*Arikara)*. Epiphyseal fusion of secondary ossification centers was also considered based on standard methods (e.g. Baker et al., 2005; McKern and Stewart, 1957; Schaefer, 2008; Scheuer and Black, 2000), and if complete long bones were present, they were measured to estimate age using standards provided by Maresh (1970) and Ubelaker (1989).

Skeletal elements exhibiting morphology commonly evaluated in adult aging standards such as the pelvic joint surfaces were often missing or damaged. When possible, the pubic symphysis aging method by Brooks and Suchey (1990) and the auricular surface aging method by Lovejoy et al. (1985) was employed in adult age estimation. In addition, when possible, adult age was estimated through fully erupted dentition and fusion of secondary ossification centers such as the medial end of the clavicle and the iliac crest utilizing standard methods (e.g. Baker et al., 2005; Buikstra and Ubelaker, 1994; McKern and Stewart, 1957; Schaefer, 2008; Scheuer and Black, 2000; Webb and Suchey, 1985). When these aging methods were not observable due

to poor preservation, degree of cranial suture closure (Meindl and Lovejoy, 1985) along with

tooth wear and antemortem tooth loss (Smith, 1984) were used for gross assessment.

Based on this analysis, individuals were assigned to an age cohort. The juvenile age

cohorts follow Baker et al. (2005), which include: fetal (1st to 3rd trimester), infant (0 to 1 year),

young child (1 to 6 years), older child (7 to 12 years), and adolescent (13 to 19 years). Adult age

cohorts follow Buikstra and Ubelaker (1994), which include: young adult (20 to 34), middle

aged adult (35 to 50) and older adult (50+). When it was not possible to refine the age at death to

one adult age cohort a combination of two age cohorts was utilized, creating a broader age

range. In addition, when it was not possible to assign any adult age cohort, the individual was

listed only as 'adult.'

Ancestry Assessment

Ancestry assessment is based on morphological criteria of the skull. Therefore, traits of

the face, dentition and cranial vault suture form were assessed based on standard methods (e.g.

Byers, 2011; Gill, 1998; Ubelaker, 1989) as they represents the most accurate traits used for

ancestry assessment. Amerindian populations display ancestral traits consistent with Asian

populations (Ubelaker, 1989). In addition, the combination of Asian traits, particularly

shoveled shape incisors, with culturally modified traits such as extreme dental wear and

artificially induced cranial modification are consistent with Amerindian skeletal populations.

Stature Estimation

Stature is best estimated through regression equations established from comparable

populations. As no such equations exist based on pre-Columbian Caribbean populations, stature

was estimated using equations developed by Angel and Cisneros (2004), who modified

regression equations by Genovés (1967) utilizing a modern sample of Amerindians making

them, "more appropriate to calculate stature from long bones of American pre-Hispanic populations than any other hitherto used" (Genovés, 1967:67).

Complete long bones were required to estimate stature. However, due to the fragmentary nature of the remains it was not possible to reconstruct the length of long bones for the majority of individuals. When multiple long bones were present for stature estimation, a stature equation using the femur, the longest bone in the human body, was preferred because it contributes the most to living stature (Christensen et al., 2014:287). When the femur was not present, the tibia or humerus was preferred (if present). An estimated stature was then provided for males and females.

Antemortem Conditions

Antemortem conditions were observed and documented during the analysis to create a baseline for the overall health of the population to which the sample belonged. An overview of the different types of antemortem conditions that were assessed is provided below.

Pathological Conditions of the Skeleton

Non-specific Indicators of Stress

Lewis (2007) notes that non-specific indicators of metabolic stress can be expressed in the form of porous and hypertrophic lesions of the skull (e.g. cribra orbitalia, porotic hyperostosis), linear enamel hypoplasias and Harris lines. Non-specific indicators of stress were assessed as either absent or present. When present, the type of non-specific stress and form of expression (e.g., cribra orbitalia, porotic hyperostosis, etc.) was recorded following standards provided by Buikstra and Ubelaker (1994).

Infectious Disease

Skeletal indications of infections disease may be observable in cases such as periostitis, osteomyelitis, tuberculosis, syphilis, leprosy and polio (Waldron, 2009). Periosteal reaction or periostitis, infection of the periosteal surface covering the bone, is the least severe form of expression (Mann and Hunt, 2005). If the infection is not controlled, periostitis may progress to osteitis, involving the cortical bone or osteomyelitis, in which the medullary cavity becomes infected (Aufderheide and Rodriguez-Martin, 1998). Indicators of infectious disease were assessed as either absent or present. When present, the type of disease (e.g., periostitis, osteitis, etc.) and degree of expression was recorded following standards provided by Buikstra and Ubelaker (1994).

Osteoarthritis / Spinal Osteophytosis

Osteoarthritis is commonly recognized as a non-inflammatory arthritis produced by the break down of the articular cartilage of synovial joints, which results in a progressive deterioration of joint, bone and cartilage (Burt et al., 2013; Rogers and Waldron, 1995; Waldron, 2009). Spinal osteophytosis is expressed as osteophytic lipping on the margins of the vertebral bodies. Indicators of osteoarthritis or degenerative joint disease such as eburnation, osteophytes and osteophytic lipping, and spinal osteophytosis were assessed as either absent or present. When present, the degree of expression was recorded following standards provided by Buikstra and Ubelaker (1994).

Dental Pathology

Enamel Defects

Enamel is the hardest tissue in the human body and often survives in the archaeological record (Hillson, 2002). Enamel defects may take the form of hypoplasias, which are a variations in enamel thickness caused by developmental disruptions during the secretion of the enamel matrix, and opacities, which occur due to mineralization disruptions during maturation of the dentition. In addition, discolorations caused by either non-specific metabolic disorders or deficiencies in mineralization (Hillson, 2002) may also be present. Defects are expressed as areas of missing enamel such as pits and furrows indicative of linear enamel hypoplasias (Waldron, 2009). Enamel defects were assessed as either absent or present. When present, the type and degree of expression was recorded following standards provided by Buikstra and Ubelaker (1994).

Dental Calculus

Dental plaque is created by the calcification of bacteria that feed on saliva and gingival crevice fluid in the mouth (Hillson, 2002). When dental plaque mineralizes it forms dental calculus, which can be found adhering to tooth enamel in expected patterns, generally in the areas nearest to the salivary ducts (Mickleburgh and Pagán-Jiménez, 2012). When noted in this sample, excessive accretion of calculus, defined as a code 3 or higher following standards provided by Buikstra and Ubelaker (1994), was recorded.

Dental Caries

Dental caries (carious lesions) can be defined as the demineralization of tooth enamel and dentin resulting from bacterial fermentation and its acidic byproducts (Hillson, 2002; Larsen,

2015). Such lesions are formed as acid-producing bacteria found in dental plaque erode tooth enamel (Hillson, 2002). Carious lesions were assessed as either absent or present. When present, the number of carious lesions and their specific location within the dental arcade was recorded following standards provided by Buikstra and Ubelaker (1994).

Periodontal Disease and Antemortem Tooth Loss

Periodontal disease results from inflammation of the soft tissues surrounding the alveolar socket supporting the teeth (Hillson, 2002; Larsen, 2015) and is expressed through alveolar resorption, pitting and the formation of a cylindrical cavity around the apical root, which is often a precursor to antemortem tooth loss (Hillson, 2002; Waldron, 2009). While periodontal disease is one of the main contributors to antemortem tooth loss, there are other possible causative factors such as excessive wear and dental caries. Periodontal disease and antemortem tooth loss were assessed as either absent or present. When present, the degree of periodontal disease (mild, moderate or extensive) and the specific location within the dental arcade was recorded (by tooth number) following standards provided by Buikstra and Ubelaker (1994). In addition, the total number of antemortem teeth lost per individual was noted.

Abscesses

Periapical abscesses result from pus secreting periapical granulomas (Hillson, 2002). (Hillson, 2002). Chronic infection can allow the pus to progresses down the root canal and collect at the apex (Hillson, 2002); over time a fistula may emerge through the thin alveolar bone in the periapical region creating a periapical abscess (Hillson, 2002; Waldron, 2009). The fistula emerges most frequently on the buccal side of the jaw; however, it may exit in a number of places including the lingual side, the maxillary sinus or the nasal cavity. Periapical abscesses were assessed as either present or absent. When present, the specific location within the dental

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arcade was recorded following standards provided by Buikstra and Ubelaker (1994).

Dental Wear and Attrition

Dental wear and attrition can be caused by tooth-on-tooth contact, abrasive particles found in the mouth, mastication and the use of teeth as tools (Hillson, 2002; Larsen, 2015; Scott 1979; Smith 1984) and is produced as the upper and lower dental arcades come in contact through the mastication process or through the use of teeth as tools (Hillson, 2002; Larsen, 2015; Scott 1979; Smith 1984). Occlusal wear is the most common type of tooth wear and is most often described as either abrasion or attrition. Larsen (2015:277) describes abrasion as wear "caused by contact between the tooth and food or other solid exogenous materials" and attrition as wear "caused by tooth-on-tooth contact in the absence of food or various other abrasives." Larsen (2015) also points out that chemical dissolution is another cause of erosion of the dental enamel. However, he suggests that due to the difficulty in differentiating between wear caused by abrasion, attrition and erosion, all three should be considered in combination when discussing wear among past populations.

Due to time constraints extensive measurement of dental wear angles and patterns was not possible during this analysis. Dental wear and attrition were therefore scored based on methods (e.g. Smith, 1984) utilized in the Tutu study, a comparable sample from St. Thomas (Larsen, 2002; Righter, 2002).

Artificial Cranial Modification

Artificial cranial modification is undertaken during infancy while the growing cranial bones are comparatively plastic in nature, thereby facilitating the manipulation of their shape (Lozada, 2011; van Duijvenbode, 2012; Tiesler, 2014). Manipulation involves applying pressure

to the growing cranium, typically from birth until the third year of life (Aufderheide and Rodriguez-Martin, 1998; Tiesler, 2014). The location of the pressure is responsible for the shape of the modification, while the length of time the force is applied determines the degree of expression achieved (van Duijvenbode, 2012; Tiesler, 2014). The shape produced by cranial deformation is general placed in one of two categories: annular, producing a circumferential shape or tabular, creating an elongated flattened skull with anteroposterior shortening (Rhode and Arriaza, 2006; Lodaza, 2015; Tiesler, 2014). Deformation can be attained through a variety of methods and generally takes one of three general forms, either annular (obliquely conical) with variations of each form often observed or one of two main tabular forms: tabular erect (creating a high, short box like vault) or tabular oblique (in which the vault angles posteriorly) (Tiesler, 2014). O'Brien and Stanley (2013:461) discriminate between two types of artificial cranial modification that they term "boards and cords." A cord or cloth, alone or along with a more ridged material such as a board or soft pad, is bound around the cranium and tightened daily until the desired deformation is achieved (Aufderheide and Rodriguez-Martin, 1998; Tiesler, 2014). Artificial cranial modification was assessed as either present or absent. When present, the type of modification was recorded following descriptions provided by Tiesler (2014).

Bilateral Asymmetry

Bilateral asymmetry is a form of musculoskeletal stress marker, or marker of occupational stress, indicating repeated use of a limb or joint with a resulting change in bone morphology (Jurmain, 1999; Kennedy, 1989; Larsen 2015; Ruff et al., 1994). While time did not permit an extensive examination of each set of skeletal remains for all possible musculoskeletal stress markers (MSM), some indications of MSM, such as bilateral asymmetry of the limbs,

were observed. In order to ensure that observations were based on true bilateral asymmetry, the possibility of commingled remains (thereby explaining the asymmetry as belonging to two individuals) was ruled out. This was accomplished by confirming that there were no duplicate elements in the burial and by an examination of burials in close proximity for missing elements. Once all other possibilities were ruled out, these occurrences were documented and recorded by type and location. Due to the fragmentary nature of the remains, midshaft measurements could not be taken; therefore, each asymmetrical skeletal element was measured at multiple locations (based on available skeletal material) to quantify bilateral variation.

Antemortem Trauma

Antemortem trauma, such as healed fractures, is the most common form of trauma found in the archaeological record (Waldron, 2009). Antemortem trauma was assessed as either absent or present. When present, the type of trauma and level of healing was recorded following standards provided by Buikstra and Ubelaker (1994).

Perimortem Trauma

One area that was difficult to assess was the presence of perimortem trauma due to the fragmentary and incomplete nature of the remains. Perimortem trauma is defined as trauma that occurs while bone still exhibits wet properties but which "does not take into consideration the death event" (Passalacqua and Fenton, 2012:402). Fracture patterns in dry bone differ from those found in fresh bone due to loss of moisture with "propagating fracture fronts jumping at split line cracks, producing a jagged or stepped edge known as split line interference" (Johnson, 1985:176). Therefore, fracture patterns assist in the differentiation between perimortem and postmortem fractures. When observed, fracture patterns consistent with biomechanical stresses

applied during the perimortem period were recorded using standard terminology (e.g. Hart, 2005; Symes et al., 2012; Zephro and Galloway, 2013).

Burial Patterns and Grave Goods

How the body is positioned within the grave is useful in comparing burial patterns found within and between sites. Body position was described utilizing terminology defined by Sprague (2005), who notes that the terminology was developed in accordance with recommendations from the Society for American Anthropology (SAA). Sprague (2005:27) also notes that these are the most common terms used in multinational studies, which aids in comparative analyses. Three features of the burial environment were assessed, body position, alignment and skeletal articulation (Table 4). Burial position is based on the level of flexure observed. Alignment is based a combination of two ordinal directions (e.g., N-S), and can be any variation of two directions opposite one another of the compass (Figure 25). Further, Sprague (2005) points out that while body alignment pertains to two directions, orientation pertains only to the location of the head within the burial environment. Therefore, in this analysis the term alignment is used, with the location of the head corresponding to the first direction given (i.e., N-S corresponds to a burial with the head at the north and the feet at the south). Articulation refers to the level in which skeletal remains maintain their anatomical position (see Table 4). In addition, an assessment was made regarding whether or not a burial appeared to be disturbed prior to archaeological excavation. In this sample, burials were assessed as either disturbed, non-disturbed or highly disturbed (see Table 4).

Table 4. Lists of preferred burial terminology based on Sprague (2005).

Burial Position	Alignment	Articulation	Disturbance
Extended ~180°	N-S (and variations along the axis)	Articulated	Disturbed
Semi-flexed ~180°-90°	S-N (and variations along the axis)	Semi-articulated	Non-disturbed
Flexed ~ 90°-10°	E-W (and variations along the axis)	Partial articulation	Highly disturbed
Tightly flexed ~ 10°	W-E (and variations along the axis)	Rearticulated	
Haphazard		Disarticulated	
		Disturbed	
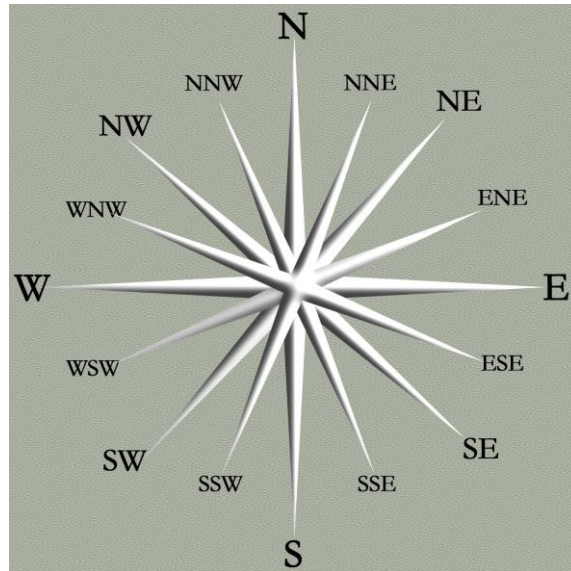
Figure 25. Illustration of variations in cardinal directions
along the N-S, S-N, E-W and W-E axes.

Grave goods, or artifacts intentionally left with the remains at the time of interment, were
assessed based on items recorded during the excavation as well as items encountered during the
course of processing the remains and removing them from the encasing matrix.

CHAPTER FOUR: RESULTS

Results for each analysis described in the Materials and Methods section are presented below following the order established in that section. The ability to accurately assess each of the components making up the biological profile was impeded at times by the completeness and preservation level of each set of skeletal remains and is noted in the final analysis. Standards utilized for each analysis are provided in the Materials and Methods section.

Postmortem Modifications and Taphonomy

Taphonomic modifications were difficult to assess due to the many post-depositional processes affecting the remains. Extensive postmortem damage, fragmentation and project time constraints precluded a detailed inventory of all observable taphonomic modifications on each skeletal element. As a result, only a general description of such modifications is noted here. A detailed inventory of skeletal elements recovered with each burial including an overall assessment of completeness can be found in the individualized skeletal reports (Appendices B-C).

The skeletal remains exhibited overall tan soil staining with varying degrees of cortical bone erosion. Numerous bones were noted to be friable and crushed from burial and post-depositional processes. Further, a variety of postmortem changes were present due to disturbances occurring during construction of the Red House as well as the excavation and processing of remains prior to analysis. Unfortunately, despite the archaeological team's best efforts, removing the remains from the hardened matrix encasing them, followed by their subsequent cleaning to allow observation of diagnostic features, resulted in additional postmortem damage. The overall level of completeness of skeletal elements available for analysis varied from less than 25% complete to more than 90% complete. Interestingly, the Rotunda

Fountain Area, Subdivisions 5-8 contained the greatest number of skeletons between 75-90% complete. All other areas varied widely in the completeness of the skeletons recovered.

<u>Minimum Number of Individuals (MNI)</u>

Once each burial was inventoried and any commingled remains were isolated an MNI was calculated based on duplication of elements, age (juvenile or adult, as well as younger or older adult) and proximity to other burials with missing elements. An MNI of 60 represents a conservative estimate based on the specific criteria outlined in the Material and Methods section and acknowledges the limitations noted in the introduction under the Methodological Approach and Limitations section. This MNI includes 47 adult individuals (Table 5, note that Burial B-RFA-5-LB represents an MNI of 2) and 13 juvenile individuals (Table 6). One set of juvenile remains (A-G56-2-2) was noted on the original inventory provided by the Red House staff, two sets of juvenile remains (A-CEP7-1and A-G38-2-SIP) were reclassified as juvenile through analysis of the originally excavated burials, and one set of juvenile remains (A-CEP7-2) was identified as a commingled burial with A-CEP7-1. The remaining 9 sets of juvenile remains were identified through assessment of faunal assemblages recovered from the site. Once it was recognized that juvenile remains were commingled with faunal remains an additional two days were added to the research period to allow the faunal remains to be reviewed. However, due to the shear volume of faunal remains recovered and project time constraints not all remains could be evaluated. As such, it is likely that more juvenile remains are commingled with the faunal remains that could not be reviewed prior to the project's closure date.

Table 5. Adult burials by sex and age.

Sex and Burial #	Age	Sex and Burial #	Age
Probable Female		***Indeterminate***	
A-NPC-5-1	Young Adult	A-G43-1-2b	Adult
Female		A-G43-1-3b	Adult
A-CSNW-2-1	Young Adult	A-G56-1-2	Adult
B-RFA-8-2	Young-Middle Adult	A-G56-2-1	Adult
A-G38-2-1a	Middle-Older Adult	A-NPC-1-4a	Adult
A-G38-2-1b	Middle-Older Adult	A-NPC-1-5	Adult
A-NPC-2-3	Middle-Older Adult	A-NPC-2-2	Adult
B-RFA-8-1	Middle-Older Adult	A-NPC-3-1	Adult
A-NPC-1-3a	Older Adult	B-G44-1-1	Adult
A-NPC-2-4	Older Adult	B-G44-2-1	Adult
A-NPC-6-1	Older Adult	B-RFA-5-LB	Adult
B-RFA-7-1	Older Adult	B-RFA-5-1	Adult
Probable Male		A-G38-1-3	Young Adult
A-NPC-1-3b	Adult	A-CSNE-1-3	Middle-Older Adult
A-NPC-2-1	Adult	A-G43-1-4a	Middle-Older Adult
A-G61-2-1	Young-Middle Adult	A-CSNW-4-1	Older Adult
A-G57-C-2	Middle-Older Adult	A-CSNW-4-3	Older Adult
Male		A-CSNW-4-4	Older Adult
A-CSNE-1-2	Young Adult	A-NPC-1-1	Older Adult
A-G43-1-2a	Young Adult		
A-G43-1-1	Young Adult		
A-G47-WT-2	Adult		
A-G56-1-1	Adult		
A-CSNE-2-1	Middle Adult		
A-G43-1-3a	Middle Adult		
B-RFA-7-2a	Middle Adult		
A-G43-2-1	Middle-Older Adult		
A-NPC-7-1	Middle-Older Adult		
A-CSNW-4-2	Older Adult		
B-RFA-5-2	Older Adult		

Table 6. Juvenile burials by age cohort and estimated age.

Burial #	Age	Sex
Infant		
A-G38-1-1	0-1 yrs	Indeterminate
Young Child		
A-G43-2-3	2-3 yrs	Indeterminate
A-CEP7-2	3-4 yrs	Indeterminate
A-G43-2-2	3-4 yrs	Indeterminate
A-G56-2-2	3-4 yrs	Indeterminate
A-G57-C-1	3-4 yrs	Indeterminate
B-G44-2-2	3-4 yrs	Indeterminate
A-G43-1-4b	4-6 yrs	Indeterminate
A-G47-WT-1	5-6 yrs	Indeterminate
A-G38-1-2	Young Child	Indeterminate
Older Child		
A-G38-2-SIP	6-8 yrs	Indeterminate
A-NPC-1-4b	8-10 yrs	Indeterminate
Adolescent		
A-CEP7-1	15-18 yrs	Male

Biological Profile

Sex Distribution

A total of 47 adults and one adolescent were evaluated for morphological characteristics of the skeleton suggestive of sex (Table 7). Unfortunately, due to the fragmentary and incomplete nature of many of the remains it was not possible to accurately assess sex for 20 of the adults (42%), which are therefore listed as indeterminate. Overall, there were slightly less individuals assessed as female than those assessed as male. A total of 11 individuals (23%) were assessed as female including one assessed as probable female and 10 assessed as female. A total of 17 individuals (35%), including one adolescent (see Sex under the Material and Methods section), were assessed as male including four assessed as probable male and 13 assessed as male (see Tables 5-6).

Table 7. List of trait expression evaluated in sex assessment.

Cranial Traits	Postcranial Traits
Frontal shape	Subpubic angle, acuteness
Glabella/brow ridge robusticity	Subpubic concavity, degree of expression
Supraorbital margin sharpness	Pubic bone shape
Zygomatic arch termination	Ventral arch, presence or absence
Mastoid process volume	Ischiopubic ramus width and shape
Temporal lines robusticity	Greater sciatic notch width
Nuchal crest robusticity	Preauricular sulcus, presence or absence
Mental eminence, degree of expression	Sacrum shape
Gonial flaring, degree of expression	Joint surface robusticity
Ascending ramus width	
Mandible shape (U/V)	

Age Distribution

Of the 60 individuals calculated to be within this MNI, approximately 22% (13) are juvenile (see Table 6). One was aged as an infant (0 to 1 year), eight were aged as a young child (1-6 years), three were aged as an older child (7-12), and one was aged as an adolescent (13-19). Young children represented the largest juvenile age cohort (61.5%).

Assigning an age cohort to the 47 adults (Table 8) was difficult, as many aging surfaces were not preserved due to the fragmentary and incomplete nature of many skeletons. Overall, out of 47 adult individuals, 17 were assigned only as adult (Burial B-RFA-5-LB represents an MNI of two), six were assigned as young adult (20-34), two were assigned as young to middle adults (20-49), three were assigned as middle adults (35-49), nine were assigned as middle or older adults (35-50+), and 10 were assigned as older adults (50+).

Table 8. Adult burials listed by age cohort and sex.

Category/Age	Burial	Sex	Category/Age	Burial	Sex
Adult			**Middle Adult**		
	A-G43-1-2b	I		A-CSNE-2-1	M
	A-G43-1-3b	I		A-G43-1-3a	M
	A-G56-1-2	I		B-RFA-7-2a	M
	A-G56-2-1	I	**Middle-Older Adult**		
	A-NPC-1-4a	I		A-G38-2-1a	F
	A-NPC-1-5	I		A-G38-2-1b	F
	A-NPC-2-2	I		A-NPC-2-3	F
	A-NPC-3-1	I		B-RFA-8-1	F
	B-G44-1-1	I		A-CSNE-1-3	I
	B-G44-2-1	I		A-G43-1-4a	I
	B-RFA-5-LB	I		A-G43-2-1	M
	B-RFA-5-1	I		A-NPC-7-1	M
	A-G47-WT-2	M		A-G57-C-2	PM
	A-G56-1-1	M	**Older Adult**		
	A-NPC-1-3b	PM		A-NPC-1-3a	F
	A-NPC-2-1	PM		A-NPC-2-4	F
Young Adult				A-NPC-6-1	F
	A-CSNW-2-1	F		B-RFA-7-1	F
	A-G38-1-3	I		A-CSNW-4-1	I
	A-CSNE-1-2	M		A-CSNW-4-3	I
	A-G43-1-2a	M		A-CSNW-4-4	I
	A-G43-1-1	M		A-NPC-1-1	I
	A-NPC-5-1	PF		A-CSNW-4-2	M
Young-Middle Adult				B-RFA-5-2	M
	B-RFA-8-2	F			
	A-G61-2-1	PM			

Ancestry Assessment

Most morphological traits associated with ancestry such as cranial vault suture form, orbit shape, malar suture form, palate shape, incisor shape, dental wear and features of the nasal bones (bridge shape, spine, boarder and width) are found in the skull (Byers, 2011; Gill, 1998; Ubelaker, 1989). Due to the fragmentary nature of many skulls, particularly of the delicate facial bones of the splanchnocranium, it was not possible to assess ancestry based on morphology alone for many individuals. Therefore, multiple lines of evidence were evaluated including morphological traits consistent with Native American and Asian populations, particularly patterns of dental wear such as shovel shaped incisors (Figure 26) and a rounded palate shape as

well as radiocarbon dating and the inclusion of pre-Columbian artifacts (Figure 27). All of which

indicate that the Red House sample is of Amerindian ancestry.

Figure 26. Shovel shaped incisors (#s 7 and 9) consistent with Amerindian ancestry (A-CSNE-1-2).
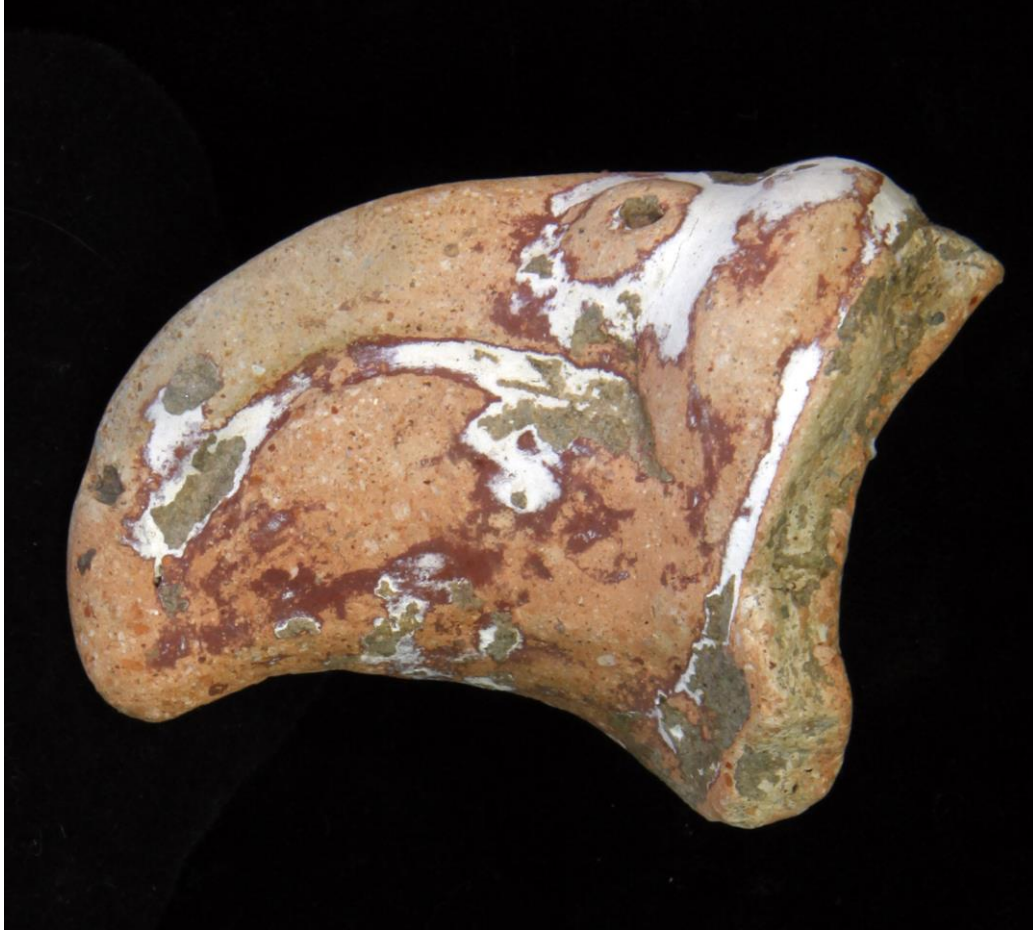
Figure 27. Saladoid (~ 500 BC-AD 600) pottery sherd, consistent with an Amerindian settlement site recovered during excavations at the Red House site.

Stature Estimation

Due to the highly fragmentary nature of most long bones, stature estimation utilizing equations developed by Angel and Cisneros (2004) could only be conducted on the remains of four females and eight males (Table 9). Female stature ranged from 144.52cm (4' 8¾") to 157.18cm (approximately 5' 2") with a mean stature of 151.86cm (approximately 4' 11¾"). Male stature ranged from 157.67cm (approximately 5' 2") to 161.22cm (approximately 5' 3½") with a mean stature of 160.12cm (approximately 5' 3"). Overall, the mean male stature was 8.26cm (approximately 3¼") greater than the mean female stature.

Table 9. Stature calculations for individuals with at least one complete or reconstructed long bone available for measurement.

Burial #	Bone	cm	Inches	Feet and Inches
Female				
B-RFA-8-2	Tibia	144.52	56.90	4' 8¾"
B-RFA-7-1	Radius	151.68	59.72	4' 11½"
B-RFA-8-1	Tibia	154.04	60.65	5' ½"
A-NPC-2-3	Radius	157.18	61.88	5' 2"
Male				
A-G43-2-1	Humerus	157.67	62.07	5' 2"
A-G43-1-3a	Femur	158.44	62.38	5' 2"
A-G43-1-1	Femur	159.80	62.91	5' 3"
B-RFA-5-2	Ulna	160.18	63.06	5' 3"
B-RFA-7-2a	Femur	160.93	63.36	5' 3"
A-CSNW-4-2	Ulna	160.70	63.27	5' 3"
A-G43-1-2a	Femur	161.16	63.45	5' 3 ½"
A-CSNE-1-2	Ulna	161.22	63.47	5' 3 ½"

Antemortem Conditions

Multiple antemortem conditions were noted in both adult and juvenile remains. Pathological conditions are highlighted below and include possible examples of anemia (e.g cribra orbitalia and porotic hyperostosis), generalized infections (e.g. periostitis and osteomyelitis), arthritic changes and degenerative joint disease (e.g. osteoarthritis, spinal osteophystosis, Schmorl's nodes), dental pathologies (e.g. enamel defects, excessive dental calculus, dental caries, periodontal disease, antemortem tooth loss, apical abscesses, a possible apical cyst and dental wear and attrition), artificially induced cranial modifications and humeral bilateral asymmetry. In addition to the pathological conditions noted there were several examples of healed antemortem trauma. Overall 35 individuals, or 58% of the skeletal sample, exhibited one or more antemortem condition (Tables 10-11).

Table 10. Overview of antemortem conditions noted on adult skeletal remains sorted by sex and age.

Sex	Burial #	Age	Non-Specific Stress / Infectious Disease				Degenerative Joint Disease			Dental Pathology					Other		
			CO	PH	PO	OM	OA	SO	SN	AC	AM	DA	DC	LEH	ACM	BLA	FX
Probable Female																	
	A-NPC-5-1	YA					✓						✓				
Female																	
	B-RFA-8-2	YA-MA					✓	✓			✓						
	A-G38-2-1a	MA-OA	✓				✓			✓	✓	✓	✓				
	A-G38-2-1b	MA-OA			✓						✓						✓[1]
	B-RFA-8-1*	MA-OA			✓		✓	✓			✓						
	A-NPC-2-3	MA-OA			✓		✓				✓			✓	✓		
	A-NPC-1-3a	OA					✓				✓						
	A-NPC-2-4	OA					✓				✓						
	A-NPC-6-1	OA			✓						✓					✓	
	B-RFA-7-1	OA					✓				✓						✓[2]
Probable Male																	
	A-NPC-2-1	A					✓				✓						
	A-G61-2-1	YA-MA									✓						
	A-G57-C-2	MA-OA						✓					✓				
	A-CSNW-4-4	OA									✓						✓[3]
Male																	
	A-CSNE-1-2	YA	✓	✓			✓		✓								
	A-G43-1-2a	YA							✓								
	B-RFA-7-2a	MA		✓													
	A-G43-1-3a	MA					✓				✓		✓		✓	✓	
	A-CSNE-2-1	MA	✓			✓	✓				✓	✓			Poss.		
	A-G43-2-1	MA-OA									✓		✓		✓		✓[4]
	A-NPC-7-1	MA-OA															✓[5]
	A-CSNW-4-2	OA					✓	✓			✓				Poss.	✓	✓[6]
	B-RFA-5-2	OA	✓	✓							✓	✓	✓				
Indeterminate																	
	A-G56-1-2	A					✓										✓[7]
	A-NPC-2-2	A					✓										
	A-NPC-3-1	A									✓						
	B-G44-2-1	A				✓											
	B-RFA-5-1	A			✓												
	B-RFA-5-LB	A			✓												
	A-CSNE-1-3	MA-OA					✓	✓									
	A-CSNW-4-1	OA									✓						
	A-CSNW-4-3	OA									✓						
	A-NPC-1-1	OA									✓						

Non-Specific Stress: CO=Cribra Orbitalia, PH=Porotic Hyperostosis. Infectious Disease: PO=Periostitis, OM=Osteomyelitis. **Degenerative Joint Disease:** OA=Osteoarthritis, SO=Spinal Osteophytosis, SN=Schmorl's Nodes. **Dental Pathology:** AC=Poss Apical Cyst, AM=Antemortem Tooth Loss, DA=Dental Abcess, DC=Dental Caries, LEH=Linear Enamel Hypoplasia. **Other:** ACM=Artificial Cranial Modification, BLA=Bilateral Asymmetry, FX=Fractures (1=Ribs, 2=MC4, 3=Humerus, 4=Radius, 5=BFT, 6&7=MC5) *also note a benign Button Osteoma was observed on the cranium of individual BRFA-8-1.

Table 11. Overview of antemortem conditions noted on juvenile skeletal remains sorted by age.

Sex	Burial #	Age	Non-Specific Stress / Infectious Disease				Degenerative Joint Disease			Dental Pathology					Other		
			CO	PH	PO	OM	OA	SO	SN	AC	AM	DA	DC	LEH	ACM	BLA	FX
I	SIP	6-8 yrs	✓	✓									✓	✓			
I	A-G43-1-4b	4-6 yrs			✓												
M	A-CEP7-1	15-18 yrs											✓		✓		

Non-Specific Stress: CO=Cribra Orbitalia, PH=Porotic Hyperostosis. Infectious Disease: PO=Periostitis, OM=Osteomyelitis. **Degenerative Joint Disease:** OA=Osteoarthritis, SO=Spinal Osteophytosis, SN=Schmorl's Nodes. **Dental Pathology:** AC=Poss Apical Cyst, AM=Antemortem Tooth Loss, DA=Dental Abcess, DC=Dental Caries, LEH=Linear Enamel Hypoplasia. **Other:** ACM=Artificial Cranial Modification, BLA=Bilateral Asymmetry, FX=Fractures

Pathological Conditions of the Skeleton

Non-specific Indicators of Stress

There were several cases of both active and healed porous and hypertrophic lesions (as described by Buikstra and Ubelaker, 1994) that may be associated with anemia, but may also be indicators of other forms of non-specific stress (Walker et al., 2009; Larsen, 2015; Lewis 2007). In this sample there were two adult individuals (A-CSNE-1-2 and A-G38-2-1a) with porous lesions consistent with cribra orbitalia (Figure 28) and three adult individuals (A-CSNE-2-1, B-RFA-7-2a and B-RFA-7-2a) with porous hypertrophic lesions consistent with porotic hyperostosis (Figure 29). In addition an older age child (A-G38-2-SIP) exhibited lesions consistent with both cribra orbitalia (Figure 30) and porotic hyperostosis (Figure 31).

In order to obtain a percentage of individuals exhibiting non-specific indicators of stress an inventory of skeletal elements (in many cases represented by fragments only) exhibiting these conditions was conducted and divided into the number of elements exhibiting the condition. Cribra orbitalia is typically located in the eye orbits. In this sample 26 eye orbits were available for analysis and four adult orbits and one juvenile orbit, or 19.23% of the sample exhibited porous lesions consistent with cribra orbitalia. Further, porotic hyperostosis is typically located on the parietal and occipital bones. In this sample bones or fragments of bone representing at least 88 parietal or occipital bones were recovered and four adults and

one juvenile, or 5.68% of the sample exhibited porous hypertrophic lesions consistent with

porotic hyperostosis.

Figure 28. Anterior view of the orbits exhibiting porous lesions consistent with cribra orbitalia in adult remains (A-CSNE-1-2).

Figure 29. Posterior view of the cranium exhibiting healed porous hypertrophic lesions (arrow) consistent with porotic hyperostosis in adult remains (B-RFA-7-2a).

Figure 30. Anterior view of the right orbit exhibiting porous lesions consistent with cribra orbitalia in juvenile remains (A-G38-2-SIP).

Figure 31. Posterolateral view of the cranium exhibiting porous hypertrophic lesions consistent with porotic hyperostosis in juvenile remains (A-G38-2-SIP).

Infectious Disease

A number of individuals exhibited evidence of bone infections such as periostitis and osteomyelitis. In this sample, a total of ten individuals representing both sexes exhibited reactive bone formation on long bone shafts (Table 12). Eight individuals (A-G38-2-1b, A-G43-1-4b, A-NPC-2-3, A-NPC-6-1, B-RFA-5-1, B-RFA-5-2, B-RFA-5-LB and B-RFA-8-1) exhibited reactive bone formation on long bone shafts consistent with periostitis (Figure 32) and two individuals (A-CSNE-2-1 and B-G44-2-1) exhibited extensive reactive bone growth (involucrum) with a cloaca (an opening allowing puss to drain) to long bones, consistent with osteomyelitis (Figure 33) (Aufderheide and Rodriguez-Martin, 1998; Larsen 2015).

In order to obtain a percentage of individuals exhibiting bone infections an inventory of skeletal elements (in many cases represented by fragments only) exhibiting these conditions was conducted and divided into the number of elements exhibiting the condition. In this sample Fifty-five femora were available for analysis and 2 femora, or 3.64% of the sample, exhibited periostitis in the femur. Forty-seven tibiae were available for analysis, 8 tibiae, or 17.02% of the sample, exhibited periostitis and one tibia, or 2.13% of the sample, exhibited osteomyelitis in the tibia. Forty-one fibulae were available for analysis and three fibulae, or 7.32% of the sample exhibited periostitis in the fibula. Fifty-seven humeri were available for analysis and one humerus, or 1.75% of the sample exhibited osteomyelitis in the humerus.

Table 12. Distribution of infectious bone disease observed by type, age and sex.

Type of Infection	Burial #	Age	Sex	Bone Involved
Periostitis				
	A-G43-1-4b	4-6 yrs	I	L/R Tibiae
	B-RFA-5-1	A	I	L Femur
	B-RFA-5-LB	A	I	R Femur, L Tibia
	A-G38-2-1b	MA-OA	F	R Tibia
	B-RFA-8-1	MA-OA	F	L/R Tibiae, L Fibula
	A-NPC-2-3	MA-OA	F	L/R Radii, L Fibula
	A-NPC-6-1	OA	F	R Tibia, R Ulna
	B-RFA-5-2	OA	M	L/R Tibiae, L/R Fibulae
Osteomyelitis				
	B-G44-2-1	A	I	L Tibia
	A-CSNE-2-1	MA	M	L Humerus

Figure 32. Medial view of right tibial shaft fragment exhibiting reactive bone formation consistent with periostitis (A-G38-2-1b).

Figure 33. Medial view of left tibial shaft fragment exhibiting reactive bone formation and cloaca consistent with osteomyelitis (B-G44-2-1).

Osteoarthritis / Spinal Osteophytosis

In this sample arthritis, expressed as osteoarthritis and spinal osteophytosis, was noted in major joints of numerous individuals (see Table 10). Osteoarthritis was present in synovial joints of 15 adult individuals, including one individual (A-NPC-2-4) with eburnation (advanced bone polishing) of the right patella (Figure 34) and the left inferior articular surface of the first cervical vertebra (C1).

Figure 34. Anterior view of the right patella exhibiting indicators of arthritic changes including eburnation (bone polishing) osteophytic lipping and porosity. (A-NPC-2-4).

Spinal osteophytosis occurs as osteophytes create lipping at the attachment site of the annulus fibrosus, (the outer section of the fibrocartilaginous intervertebral disks) (Burt et al., 2013; Rogers and Waldron, 1995). Overall, six adult individuals (B-RFA-8-1, B-RFA-8-2, A-CSNE-1-3, A-CSNW-4-2, A-G43-1-3a and A-G57-C-2) exhibited spinal osteophytosis (Figure 35). Two adult individuals (A-G43-1-2a and A-CSNE-1-2) exhibited Schmorl's nodes, another degenerative disk disease (Figure 36), expressed by a scooped depression of the vertebral bodes due to a vertical disk herniation (Burt et al., 2013; Rogers and Waldron, 1995).

Figure 35. Lower thoracic vertebrae exhibiting osteophytes consistent with spinal osteophytosis (A-CSNE-1-3).

Figure 36. Lumbar vertebra L3 exhibiting scooped depression in the vertebral body consistent with Schmorl's nodes (A-G43-1-2a).

Dental Pathology

Dental pathologies represent a significant component of overall health in both modern and past populations. Oral disease and inflammation has been linked to higher mortality rates resulting from cardiovascular disease in present day populations. Larsen (2015) suggests that these links may therefore be reflective of a similar trend in past populations.

A variety of dental pathologies were noted in this sample including enamel defects, periodontal disease, antemortem tooth loss, abscesses and dental caries. In addition, although dental calculus is not generally considered a pathological condition, it is associated with a variety of dental pathologies and is traditionally classified under dental disease (Mickleburgh and Pagán-Jiménez, 2012). Likewise, dental wear and attrition are normal physiological processes and do not necessarily indicate pathological conditions (Larsen, 2015). However, as extreme wear and attrition may predispose the dentition to disease it also included in this section.

Enamel Defects

Only two individuals in this sample, an adult (A-NPC-2-3) (Figure 37) and a juvenile (A-G38-2-SIP) exhibited linear enamel hypoplasias (LEHs) as described by Buikstra and Ubelaker (1994). LEHs occur during crown development due to stress-related disruptions in enamel production resulting in linear areas of decreased enamel thickness (Hillson, 2002; Waldron 2009). In this sample 1,193 teeth were recovered for analysis and four teeth, or .003% exhibited LEHs.

Figure 37. Labial view of teeth #s 6, 10 and 11 exhibiting linear enamel hypoplasias (A-NPC-2-3).

Dental Calculus

Dental calculus is most often found on the dentition nearest the salivary ducts on the lingual side of the mandibular anterior teeth and buccal side of the maxillary molars (Hillson, 2002, Mickleburgh and Pagán-Jiménez, 2012). In this sample two individuals (A-G38-2-1a and B-RFA-5-2) exhibited extreme calculus accretion on both the labial and lingual surfaces of the mandibular anterior teeth (Figure 38). In both cases it is possible that the antemortem tooth loss of the central incisors (#s 24 and 25) contributed to the unusual location (labial) and the extremity of the calculus buildup on the lateral incisors.
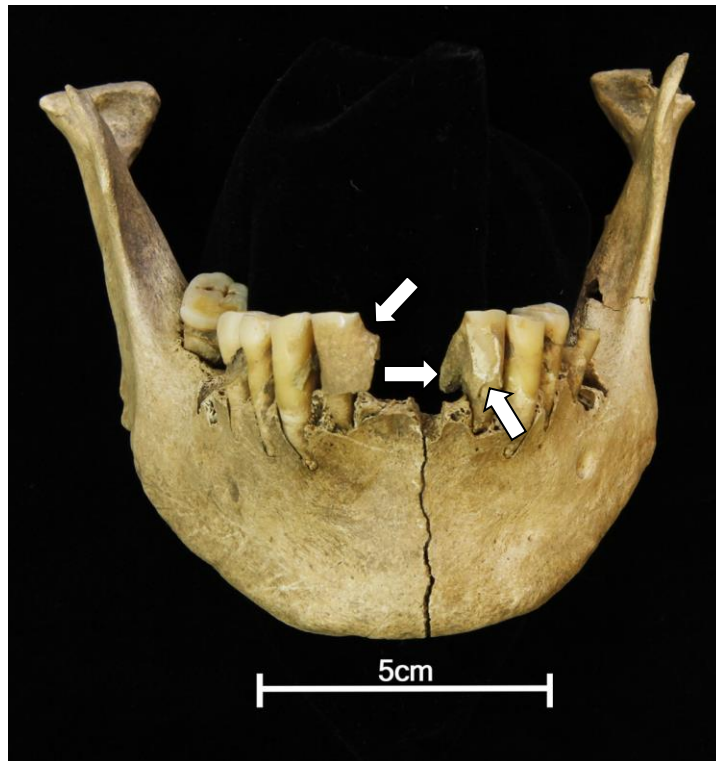
Figure 38. Anterior view of the mandibular dentition exhibiting
extreme calculus accretion on both the labial and lingual surfaces
(arrows). Also note postmortem loss of calculus build up on the
labial surface of the left lateral incisor, #23
(B-RFA-5-2).

Dental Caries

Within this sample only 12 adult individuals exhibited carious lesions (Table 13). Of

these, six individuals exhibited large occlusal carious lesions (Figure 39) and six individuals

exhibited smaller, often interproximal, lesions. The overall prevalence of carious lesions per

individual ranged from one to five (see Table 13). In addition, two juvenile individuals exhibited

carious lesions. Individual A-G38-SIP exhibited a large occlusal carious lesion to the lower left

deciduous first molar (L) and individual A-CEP7-1 exhibited a small interproximal carious

lesion to the left mandibular second molar (#18). In this sample 1,193 teeth were recovered for

analysis and 28 teeth, or .023% exhibited dental caries.

Figure 39. Superior view of the mandible exhibiting large dental caries on the occlusal surface of the right second molar (#31) and root of the right first molar (#30). Also notice possible congenital absence of both mandibular third molars (#s 17 and 32) (A-G43-1-3a).

Table 13. Distribution of dental caries in adult dentition available for analysis by sex and age.

Burial #	Age	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	Total
Probable Female																																		
A-NPC-5-1	YA	-	-	C	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	-	X	X	-	X	-	-	-	-	-	-	-	-	2
Female																																		
A-G38-2-1a	MA-OA	A	A	A	C	C	X	C	P	X	X	X	X	C	-	-	-	-	A	A	X	A	X	X	X	A	A	X	X	X	X	A	A	4
A-G38-2-1b	MA-OA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	A	A	A	A	A	A	A	A	A	A	X	A	A	A	A	A	1
B-RFA-8-1	MA-OA	-	-	-	-	X	-	-	-	X	-	-	-	-	-	-	-	X	A	A	C	P	C	C	-	-	X	X	X	P	A	X	A	3
A-NPC-6-1	OA	-	-	X	C	X	X	X	X	X	P	X	X	X	X	-	-	P	P	A	P	X	X	P	A	A	X	A	A	P	P	A	P	1
Probable Male																																		
A-NPC-1-3b	A	-	X	C	-	-	X	-	-	-	-	-	-	-	-	X	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	1
Male																																		
A-G43-1-2a	YA	-	-	-	-	-	-	-	P	P	P	P	C	-	-	-	-	-	X	X	C	X	X	X	X	X	X	X	P	X	P	P	X	2
A-G43-1-3a	MA	CA	X	P	X	X	P	X	X	P	X	A	A	C	A	X	CA	CA	X	X	X	X	P	X	X	X	X	X	X	X	W	C	CA	2
A-G43-2-1	MA-OA	-	P	P	X	X	X	X	P	P	X	P	X	A	X	-	C	X	X	A	X	X	X	A	A	X	X	P	X	X	X	X	X	1
A-NPC-7-1	MA-OA	-	X	X	X	P	P	P	X	X	P	P	X	X	P	P	CA	CA	P	X	X	X	X	X	X	P	X	X	X	X	X	C	CA	1
A-CSNW-4-2	OA	A	P	A	A	C	P	P	P	P	P	P	X	A	A	A	A	A	P	X	C	X	C	A	X	P	X	X	P	X	P	C	C	5
B-RFA-5-2	OA	A	A	P	A	P	X	-	-	A	A	C	C	A	A	C	A	A	A	P	X	X	X	X	A	A	X	X	X	X	P	A	X	3
	Total	0	0	2	2	2	0	1	0	0	0	2	1	2	0	2	2	0	0	2	1	1	1	0	0	0	0	0	0	0	1	3	1	26

A=Antemortem tooth loss, C=Carious lesion, CA=Possible congenital absence, P=Present, X=Postmortem tooth loss - =Dentition not recovered.

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Periodontal Disease and Antemortem Tooth Loss

Within this sample 21 individuals exhibited antemortem tooth loss (Table 14). The

overall prevalence of antemortem tooth loss per individual ranged from 2 to 16 teeth (see Table

14). Furthermore, six of the above individuals were either completely edentulous (Figure 40) (A-

NPC-1-1 and A-NPC-1-3a) or nearly edentulous (A-CSNW-4-3, A-CSNW-4-4, A-NPC-2-4 and

B-RFA-7-1) in at least one dental arcade. In addition to antemortem tooth loss, three individuals

(A-G43-1-3a, A-NPC-2-3 and A-NPC-7-1) exhibited possible congenital absence of both

maxillary and mandibular third molars and one individual (A-CSNE-1-2) exhibited congenital

absence of the mandibular third molars. Although congenital absence could not be confirmed in

all cases, it was possible to confirm one case (A-CSNE-1-2) during reconstruction of the

mandible. Prior to reconstruction it was noted that no alveolar socket was present for the right

mandibular third molar (#34).

Figure 40. Superior view of edentulous mandible
exhibiting antemortem tooth loss of all mandibular
dentition (A-NPC-1-3a).

Table 14. Distribution of antemortem tooth loss in adult dentition available for analysis by sex and age.

Burial #	Age	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	Total
Probable Female																																		
A-NPC-1-1	OA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	A	A	A	A	A	A	A	A	-	-	-	10
Female																																		
B-RFA-8-2	YA-MA	U	U	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	A	X	X	-	-	-	-	-	P	P	X	A	X	X	2
A-G38-2-1a	MA-OA	A	A	A	C	C	X	C	P	X	X	X	X	C	-	-	-	-	A	A	X	A	X	X	X	A	A	X	X	X	X	A	A	10
A-G38-2-1b	MA-OA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	A	A	A	A	A	A	A	A	A	X	A	A	A	A	A	15
A-NPC-2-3	MA-OA	A	A	P	P	X	P	P	-	-	P	P	X	X	X	X	CA	CA	A	P	X	X	X	A	P	X	X	X	X	X	X	X	CA	3
B-RFA-8-1	MA-OA	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	X	A	A	C	P	C	C	-	-	X	X	X	P	A	X	A	4
A-NPC-1-3a	OA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	16
A-NPC-2-4	OA	?	?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	15
A-NPC-6-1	OA	-	-	X	C	X	X	X	X	X	P	X	X	X	X	X	-	-	P	P	A	P	X	X	P	A	A	X	A	A	P	P	A	6
B-RFA-7-1	OA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	A	A	X	P	A	A	A	A	P	A	P	A	A	A	12
Probable Male																																		
A-NPC-2-1	A	-	-	-	?	?	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	A	A	A	P	P	A	A	A	6
A-G61-2-1	YA-MA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	P	P	P	P	-	-	-	P	P	P	P	P	A	A	4
Male																																		
A-CSNE-2-1	MA	X	-	-	?	?	-	-	-	-	-	-	X	P	P	X	P	A	A	A	X	A	P	P	P	X	X	P	P	P	A	A	A	7
A-G43-1-3a	MA	A	X	W	X	X	CH	X	X	P	X	A	A	C	A	X	CA	CA	X	X	X	X	X	P	X	X	X	X	X	X	W	C	CA	3
A-G43-2-1	MA-OA	-	P	P	X	X	X	X	P	P	X	P	X	A	X	-	C	X	X	A	X	X	X	A	A	X	X	P	X	X	X	X	X	4
2	OA	A	P	A	A	C	P	P	P	P	P	P	X	P	A	A	A	A	P	X	C	X	A	X	P	X	X	P	X	P	C	C	C	8
B-RFA-5-2	OA	A	A	P	A	P	X	-	-	A	A	C	C	A	A	C	A	A	A	P	X	X	X	X	A	A	X	X	X	X	P	A	X	13
Indeterminate																																		
A-NPC-3-1	A	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	A	A	B	B	B	-	-	-	-	-	-	-	-	-	-	-	2
1	OA	-	-	-	-	-	-	-	-	-	-	A	-	A	X	X	-	-	-	A	P	A	A	P	A	P	A	P	P	A	A	A	A	11
3	OA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	P	A	A	A	P	P	P	A	A	A	A	7
4	OA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	A	A	A	A	A	A	A	A	P	P	A	A	A	A	14
	Total	3	3	2	2	0	0	0	0	2	1	2	1	2	3	1	2	12	12	11	8	6	7	9	12	11	5	5	7	7	11	13	12	172

A=Antemortem tooth loss, C=Carious lesion, CA=Possible congenital absence, P=Present, X=Postmortem tooth loss - =Dentition not recovered.

Abscesses

Two individuals (A-G38-2-1a and B-RFA-5-2) within this sample exhibited periapical

abscesses (Figure 41). Furthermore, one individual (A-G38-2-1a), exhibited a somewhat

circular mass (Figure 42) in the right maxillary sinus of the fractured (postmortem) maxilla,

above the root apex of tooth #4 (second premolar) and the medial side of the remodeled

alveolus of tooth #3 (first molar). It is not possible to speculate if tooth #3 was lost due to an

abscess because the alveoli is completely remodeled in the area of the molars. However, teeth

#s 12 and 13 on the other side of the maxilla both contain apical abscesses. According to Mann

and Hunt (2005), an apical granuloma or periapical cyst can develop following the abscess of a

tooth. Furthermore, Hillson (2002) asserts that the most common cyst type is a periapical cyst

(also called a radicular cyst) developing most frequently in the anterior dentition of the

maxillary pallet.

Figure 41. Oblique view of the left maxilla exhibiting abscesses and large occlusal carious lesions of the left maxillary premolars (#s 11 and 12) (B-RFA-5-2).
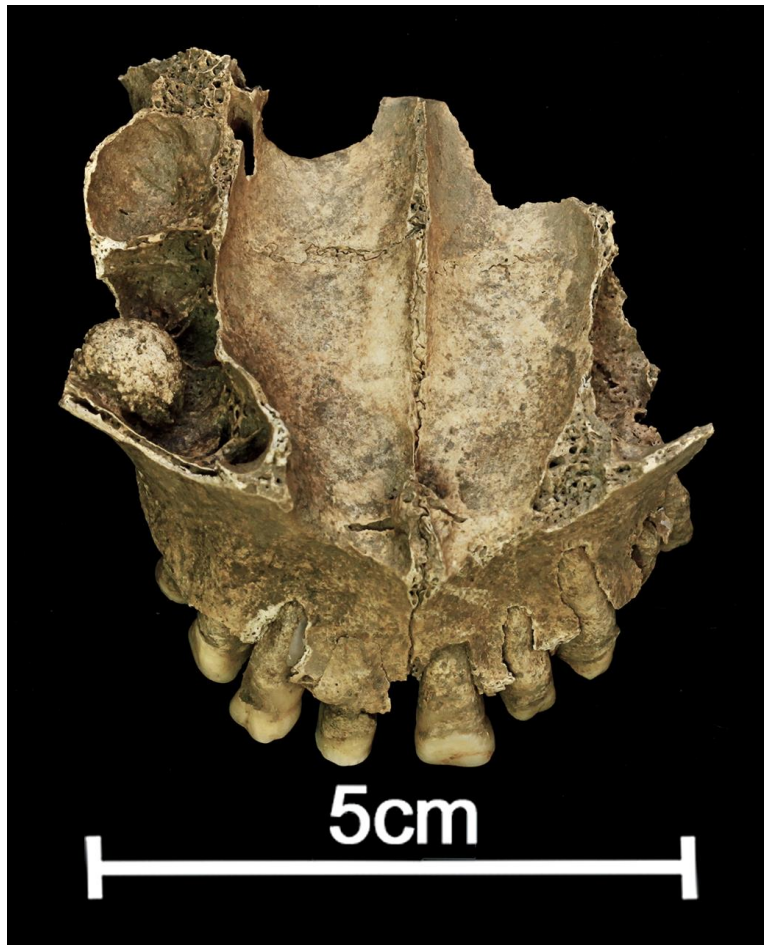
Figure 42. Superior view of the palate and maxillary sinus exhibiting a circular mass consistent with an apical granuloma or periapical cyst (A-G38-2-1a).

Dental Wear and Attrition

Many individuals within this population exhibited dental wear associated with either mastication or the use of teeth as tools. One individual in particular (B-RFA-8-1) exhibited advanced wear that was most likely caused by using the teeth to process some form of fiber (Figure 43). The right maxillary central incisor (#8) exhibited a clear groove running anterior to posterior (labial to lingual) along the occlusal surface. Wear based on food processing and mastication was scored (Table 15) utilizing Smith's (1984) dental wear chart to allow comparison to the most similar data available for a Caribbean sample. In keeping with the

analysis conducted at the Tutu site (Larsen et al., 2002), maxillary left central incisors (tooth #9) and maxillary left first molars (tooth #14) were scored. Additionally, when these teeth were not available their antimeres (teeth #s 3 and 8) were scored. Within the Red House sample either the maxillary left central incisor, the maxillary left first molar or their antimeres were available for analysis from 14 adult individuals. Wear on the teeth evaluated ranged from minimal wear (score of 2) to advanced wear (score of 7). When all scored teeth were averaged, a score of 4.44, reflective of moderate wear, was obtained.

Figure 43. Occlusal view of the right maxillary central incisor (#8) exhibiting a labial-lingual groove indicative of non-masticatory wear consistent with the use of teeth as tools (B-RFA-8-1).

Table 15. Tooth wear scores for maxillary teeth (#s 3, 8, 9 and 14) based on Smith (1984).

Burial #	Age	Tooth Numbers and Wear Scores			
		3	8	9	14
Female					
A-CSNW-2-1	YA			6	3
B-RFA-8-2	YA-MA	7		4	
A-G38-2-1a	MA-OA			6	
A-NPC-2-3	MA-OA				7
A-NPC-6-1	OA			4	5
Probable Male					
A-NPC-1-3b	A				3
A-NPC-2-1	A				4
A-G57-C-2	MA-OA	6			
Male					
A-CSNE-1-2	YA			2	
A-G43-1-3a	MA		5		
B-RFA-7-2a	MA			6	2
A-G43-2-1	MA-OA	3			
Indeterminate					
A-NPC-3-1	A			4	
A-G38-1-3	YA	3			

In their 1983 study of a skeletal population from the Corondó site in Brazil, Turner and Machado introduced a new dental wear pattern known as lingual surface attrition of the maxillary anterior teeth (LSAMAT). They identified this pattern as pronounced flat wear on the lingual aspect of the anterior maxillary teeth with no corresponding advanced wear level on the anterior mandibular teeth. Five individuals within this sample (A-CSNW-2-1, A-G38-2-1a, A-NPC-3-1, B-RFA-7-2a and B-RFA-8-2) exhibited pronounced flat wear on the anterior lingual surface of maxillary incisors consistent with LSAMAT (Figure 44). In this sample 23 anterior teeth were available for analysis and 13 teeth, or 56.5% exhibited LSAMAT.

Figure 44. Lingual view of teeth #s 7, 8, 9 and 10 exhibiting pronounced flat wear on the lingual aspect of the anterior maxillary teeth consistent with LSAMAT (B-RFA-7-2).

Artificial Cranial Modification

In this sample there are four examples (A-CEP7-1, A-G43-1-3a, A-G43-2-1 and A-NPC-2-3), and two possible examples (A-CSNE-2-1 and A-CSNW-4-2), of culturally induced cranial modification (Table 16). Both sexes are represented; however, five individuals are male, while only one is female. Four individuals (see Table 16) exhibited a form of artificial cranial modification most closely resembling a tabular form of cranial modification. Individual A-CEP7-1 exhibited a form of artificial cranial modification most closely resembling an oblique tabular form (Figure 45a) in which the compression is applied below lambda causing the cranial vault to lean posteriorly. Individual A-NPC-2-3 exhibited a form of artificial cranial modification most closely resembling the tabular shape with an elongated cranial vault that is most recognizable in the superior view by the flat occipital and broad, bulging posterior parietals (Figure 45b). Individuals A-G43-1-3a and A-G43-2-1

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(Figures 45c -45d) exhibited a form of artificial cranial modification most closely

resembling a modified (front to back) tabular erect form in which the compression causes

the vault to have a slightly higher, broader form than that seen in oblique tabular

modifications. The remaining two possible examples of cranial modification (A-CSNE-2-1

and A-CSNW-4-2), exhibited a form of artificial cranial modification most closely

resembling an annular shape in which compression is applied equally around the vault

creating a rounded vault. However, due to the highly fragmentary and reconstructed nature

of the cranial vault this assessment should be considered tentative. In this sample 19 cranial

vaults were complete enough to evaluate shape and four cranial vaults, or 21% of the sample

exhibited artificial cranial modification.

Table 16. List of individuals exhibiting artificial cranial modification by cultural period and type of modification.

Cultural Period and Burial #	Sex	Age	^{14}C Dates	Type of Modification
Saladoid				
A-G43-1-3a	M	MA	AD 340-425 AD 420-575	Modified Tabular
A-G43-2-1	M	MA-OA	AD 475-485 AD 540-640	Modified Tabular
A-CSNW-4-2	M	OA	AD 230-380	Possible Annular
Post Saladoid				
A-NPC-2-3	F	MA-OA	AD 1220-1285 AD 1265-1295 AD 1370-1380	Tabular Erect
A-CEP7-1	M	Juvenile 15-18	AD 1255-1290 AD 1380-1420	Oblique
A-CSNE-2-1	M	MA	AD 1280-1325	Possible Annular

Figure 45. Four examples of artificial cranial modification (ACM). Arrows indicate remodeling of the cranium due to the modification process. Types of ACM observed at the Red House site include (a) tabular oblique (A-CEP7-1), (b) tabular erect most recognizable in the superior view by the flat occipital and broad, bulging posterior parietals, (A-NPC-2-3), (c) modified (front to back) tabular erect (A-G43-1-3a) and (d) modified (front to back) tabular erect (A-G43-2-1).

Bilateral Asymmetry

Three individuals within this sample exhibited bilateral asymmetry of the upper limbs recognized by expanded cortical thickness and enlarged muscle attachment sites, with humeral asymmetry most apparent. Of the three individuals who exhibited humeral bilateral asymmetry, individual A-CSNW-4-2 exhibited bilateral asymmetry of the humeri (Figure 46) as well as the radii and ulnae, individual A-G43-1-3a exhibited bilateral asymmetry of the right humeri (Figure 47) and the right ulnae (the fragmentary radius could not be assessed) and individual A-NPC-6-1 exhibited bilateral asymmetry of the right humeri (Figure 48). It is important to note that it was not possible to assess bilateral asymmetry of the forearm bones for individual A-NPC-6-1 because the left forearm bones were not recovered.

Figure 46. Anterior view of both humeri exhibiting bilateral asymmetry expressed by extensive cortical thickening of the right humeral shaft (A-CSNW-4-2).

Figure 47. Anterior view of both humeri exhibiting bilateral asymmetry expressed by extensive cortical thickening of the right humeral shaft (A-G43-1-3a).

Figure 48. Anterior view of both humeri exhibiting bilateral asymmetry expressed by extensive cortical thickening of the right humeral shaft (A-NPC-6-1).

Antemortem Trauma

Bioarchaeological interpretation of trauma patterns in past populations may reveal certain lifestyle conditions under which individuals lived, as well as allow inferences regarding gender and power relations to be made (Larsen, 2015). Therefore, in order to interpret patterns of injury it is important to gather as much contextual information regarding social and behavioral customs as possible. Further, age and sex should be taken into consideration when

constructing trauma analyses (Larsen, 2015). Ideally, comparable population studies will provide information about the prevalence of injury type by skeletal element along with associated behavioral activities.

Seven individuals within this sample exhibited healed fractures (Table 17) including a healed depressed fracture above the left orbit of an older male individual (A-NPC-7-1), three healed transverse fractures of metacarpal shafts: a 4th metacarpal (B-RFA-7-1) of an older female and two 5th metacarpals (A-CSNW-4-2, an older male and A-G56-1-2, an adult of indeterminate sex). In addition, one middle-older aged female (A-G38-2-1b) exhibited fractured ribs (Figure 49) while two instances of fractured long bones were noted including a healed displaced mid-shaft fracture to the right humerus (Figure 50) of an older probable male (A-CSNW-4-4) and a healed Colles' fracture with dorsal displacement to the distal left radius (Figure 51) of a middle-older aged male (A-G43-2-1).

Table 17. Types and locations of antemortem fractures observed by sex and age.

Sex and Burial #	Age	Type of Fracture
Female		
A-G38-2-1b	MA-OA	Ribs – Shaft fracture (two unsided, un-numbered ribs)
B-RFA-7-1	OA	MC4 - Transverse shaft fracture
Probable Male		
A-CSNW-4-4	OA	Humerus - Displaced mid-shaft fracture
Male		
A-G43-2-1	MA-OA	Radius - Colles' fracture with dorsal displacement
A-NPC-7-1	MA-OA	Frontal - Depressed cranial fracture consistent with BFT
A-CSNW-4-2	OA	MC5 - Transverse shaft fracture
Indeterminate		
A-G56-1-2	A	MC5 - Transverse shaft fracture

Figure 49. Superior view of two rib fragments exhibiting healed fractures (A-G38-2-1b).

Figure 50. Posterior view of the right humeral shaft exhibiting a healed, displaced and slightly angled mid-shaft fracture (A-CSNW-4-4).

Figure 51. Posterior view of both radii exhibiting boney remodeling and shortening of the left radius consistent with a healed Colles' fracture with dorsal displacement (A-G43-2-1).

Perimortem Trauma

Perimortem trauma can be identified due to the viscoelastic nature of bone, which is composed of both organic (collagen) and inorganic (hydroxyapatite) components, which, along with the shape of the bone, influence the manner in which bone responds to inflicted trauma (Hart, 2005; Symes et al., 2012; Zephro and Galloway, 2013). The interaction of these components explains both the flexibility and strength of human bone in the perimortem period (while still exhibiting wet characteristics). When exposed to bending forces, bone responds with more resistance than steel (Hart, 2005). However, following biological death bone begins to dry out, collagen breaks down and bone loses its elastic properties. Only one individual, an adolescent male (A-CEP7-1), expressed trauma that occurred while the bone exhibited wet properties consistent with perimortem trauma.

To conceptualize bone's response to BFT, the principals of Young's Modulus and the stress strain curve, which define the limits of a material's elasticity, are employed. Material temporarily deforms but then returns to its original shape as long as it is in the linear and elastic phase (Berryman and Symes, 1997; Symes et al., 2013). Once a material's elasticity is exceeded (stress exceeds strain) the yield point is reached and deformation cannot be reversed. The speed of the load is the determining factor affecting the failure point. Bone is less able to resist slow loading forces, as it is placed under extended stress during both the elastic and plastic stage (Berryman and Symes, 1997; Symes et al., 2013). These forces lead to plastic deformation and are indicative of blunt force trauma.

Individual A-CEP7-1 exhibited cranial trauma consistent with slow loads indicative of BFT. The left side of the cranial vault exhibited a depressed fracture (approximately 25mm x 30mm wide), which is evident on the anterolateral aspect of the left parietal from which several

primary radiating fractures extend (Figures 52-54). Fractures are described based on their

position (anterior, posterior, superior and inferior) and include a fracture extending

approximately 120mm anteriorly from the impact site and terminating on the superior border of

the left orbit. In addition, two radiating fractures extend posteriorly and terminate approximately

50mm posterior of the impact site (Figure 52-54) and a third radiating fracture extends

approximately 25.8mm inferiorly terminating on the squamosal suture (Figure 54). It is also

possible that separation of the left superior aspect of the coronal suture and the superior aspect of

the left squamosal suture, which are consistent with diastatic fractures, occurred as a result of the

impact. Although many fractures of the orbit and delicate facial bones were noted, it is not

possible to associate these fractures with perimortem trauma due to extensive post-depositional

damage.
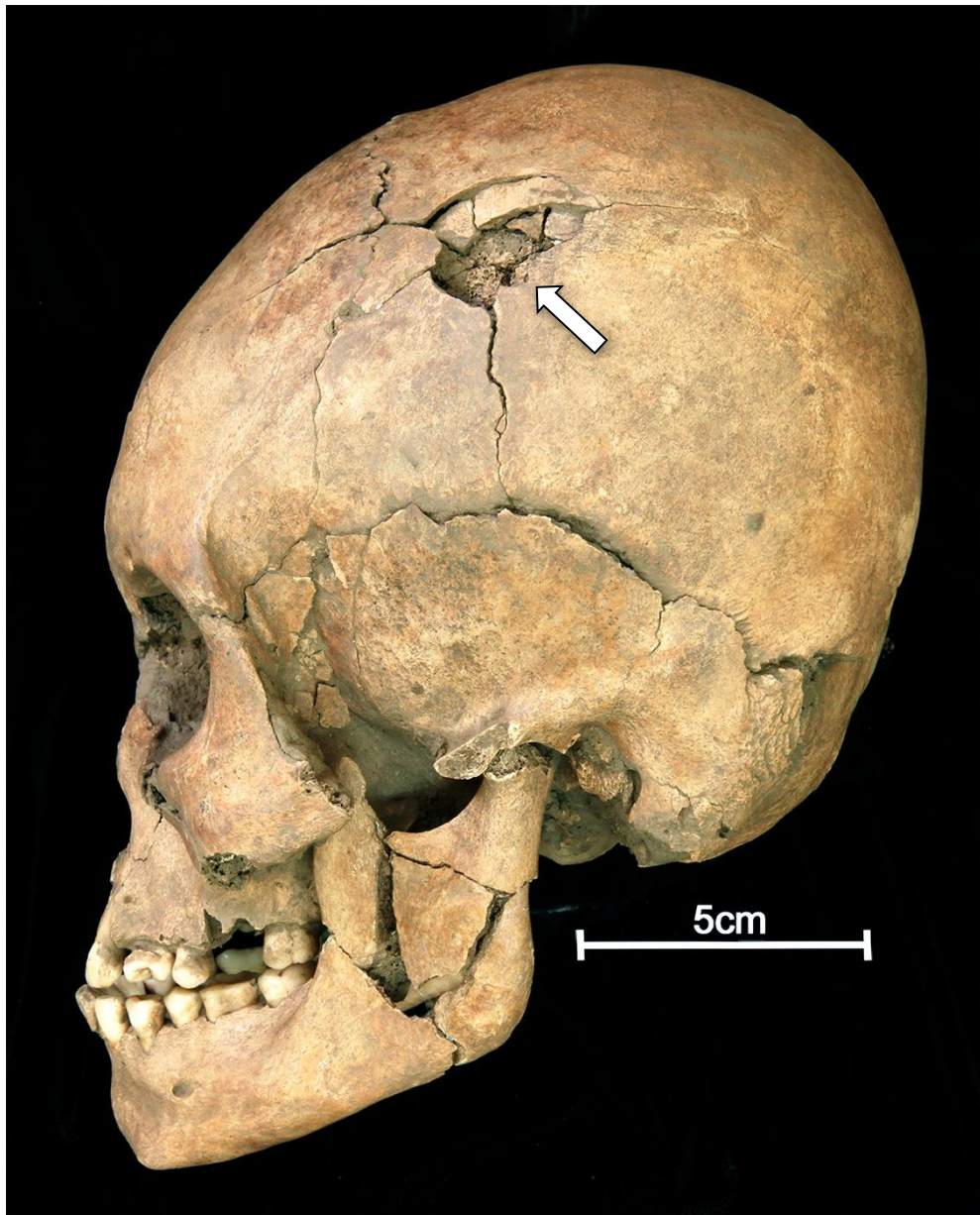
Figure 52. Left lateral view of the cranium and mandible exhibiting a depressed fracture consistent with blunt force trauma (A-CEP7-1).
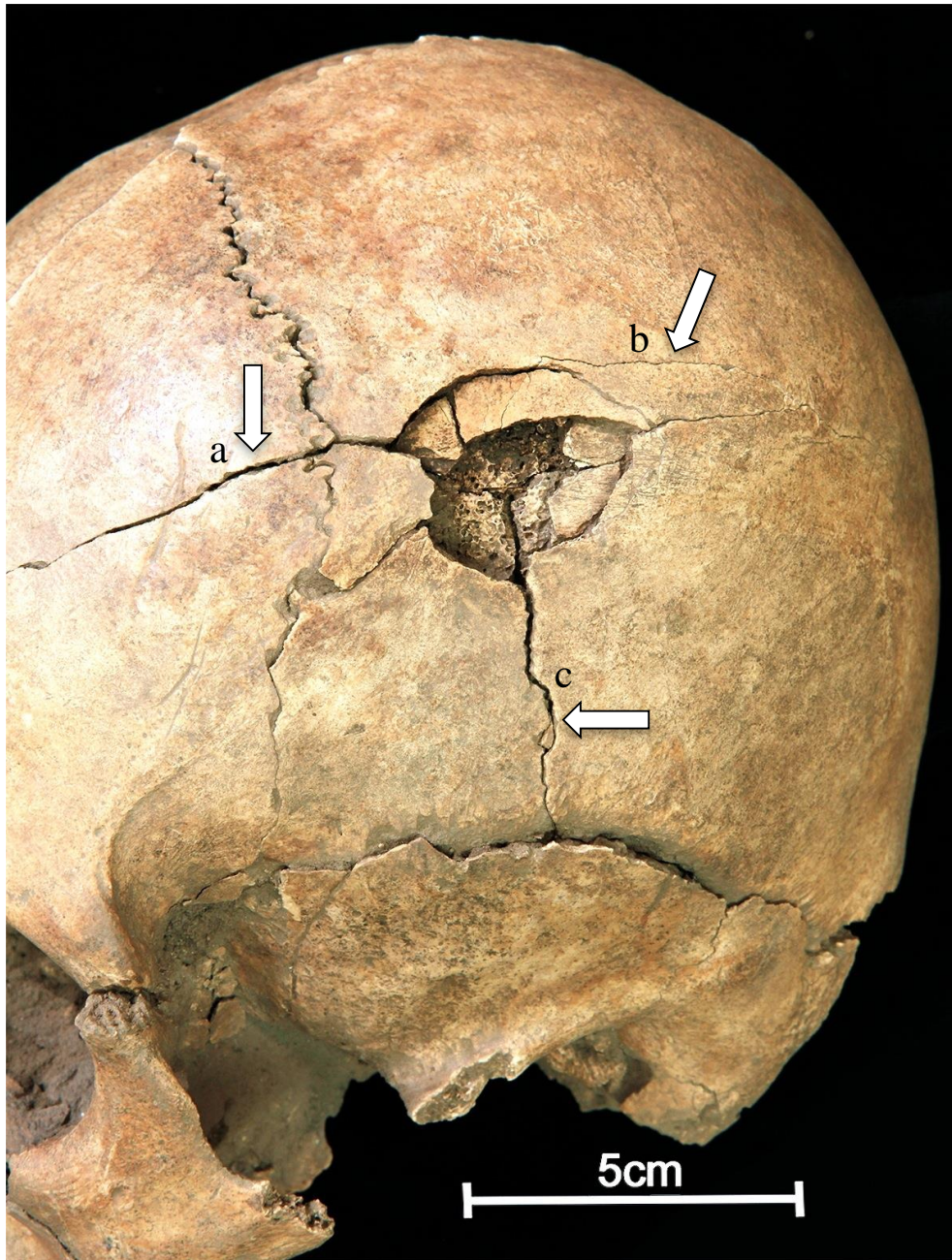
Figure 53. Left lateral view of primary radiating fractures resulting from blunt force trauma: (a) anterior, (b) posterior and (c) inferior (A-CEP7-1).
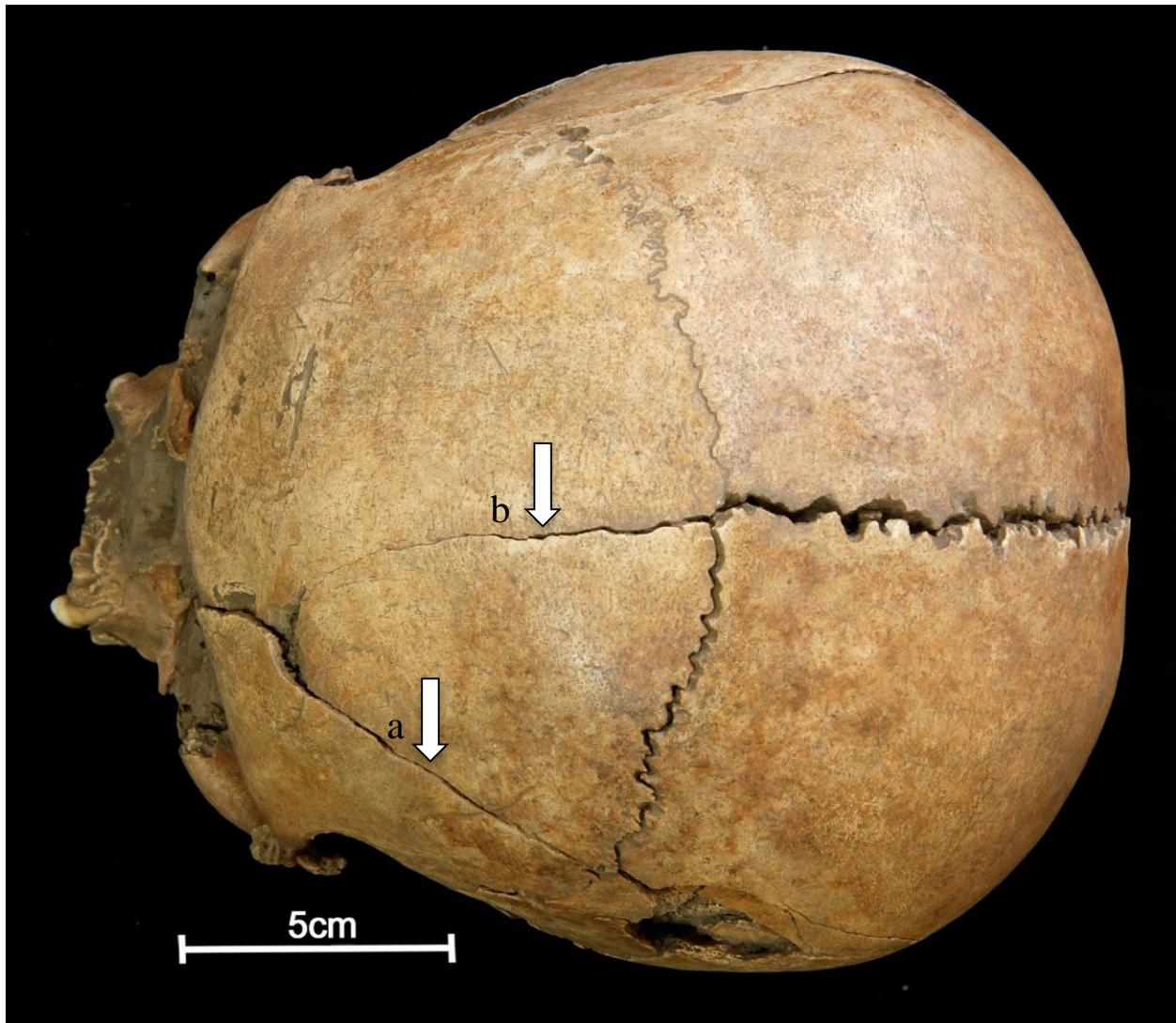
Figure 54. Superior view of the cranium exhibiting a primary perimortem radiating fracture (a) and postmortem linear fracture (b), which was likely caused by post-depositional compression of the cranium.

Burial Patterns and Grave Goods

Burials at the Red House site exhibited wide a variety of burial positions and alignments. Completeness of the burial varied from nearly intact primary burials to possible secondary interments, which may suggest certain Caribbean cultural practices such as manipulation of the skeletal elements in primary burials or the retention and later interment of some elements in later burials (Hoogland and Hofman, 2013). Assessing which of the burials

were possible secondary interments due to cultural practices was complicated by the disturbed nature of the burials, which may have resulted from Amerindian site use, as well as the construction, reconstruction and renovation of the Red House.

In cases where burial position could be observed, the position varied greatly from extended burials (Figure 55) to tightly flexed burials (Figure 56), with many positions unobservable due to the disturbed nature of the burials (Table 18). Five adult burials (A-G38-2-LB, A-G43-1-2b, A-G43-1-3b, A-NPC-1-3b and B-RFA-5-LB) are clearly representative of commingled remains and B-RFA-5-LB represents an MNI of two. Therefore, burial position could not be evaluated for these burials. Adult burials for which position could be assessed included four extended burials (A-CSNW-4-2, A-G43-1-2a, A-NPC-5-1 and B-RFA-8-2), and two likely extended burial (A-G56-2-1 and A-G57-C-2). Both A-G56-2-1 and A-G57-C-2 extended under the building's foundation. Therefore, the complete *in situ* position was unobservable. In addition to extended burials, fourteen adult burials exhibited some form of flexed burial (Figure 57) positioning (see Table 18). Of these, three (A-G43-1-1, A-G61-2-1 and A-NPC-2-2) were semi-flexed and two (A-G43-1-3a and B-RFA-8-1) were tightly flexed. Interestingly, one of the semi-flexed burials appears to have been placed in a prone or face down position. It was not possible to determine burial position for 21 of the adult burials due to the disturbed nature of the skeletal elements recovered.

Figure 55. *In situ* burial A-CSNW-4-2, illustrating an extended burial position (image courtesy of Basil Reid, PhD).

Figure 56. *In situ* burial A-G43-1-3a illustrating a tightly flexed burial position (image courtesy of Basil Reid, PhD).

Figure 57. *In situ* burial B-RFA-5-2, illustrating a flexed burial position (image courtesy of Basil Reid, PhD).

Table 18. Adult burial position and level of articulation based on Sprague (2005).

Burial Position and Number	Cultural Period	Sex	Articulation	Burial Position and Number	Cultural Period	Sex	Articulation
Extended				*Undetermined*			
A-CSNW-4-2	SL	M	A	A-G56-1-2	SL	I	PA
A-G43-1-2a	AR	M	SA	A-G56-1-1	SL	M	D
A-NPC-5-1	AR	PF	SA	A-NPC-3-1	AR	I	PA
B-RFA-8-2	AR/MY	F	A	B-RFA-5-1	AR	I	PA
Likely Extended				*Highly Disturbed*			
A-G56-2-1	AR	I	D	A-CSNW-4-1	SL	I	D
A-G57-C-2	N/A	PM	A	A-NPC-1-3a	SL	F	D
Semi-flexed				A-NPC-6-1	SL	F	D
A-G43-1-1	AR	M	SA (prone)	A-NPC-7-1	SL	M	D
A-NPC-2-2	AR	I	PA	A-NPC-1-1	AR	I	D
A-G61-2-1	N/A	PM	PA	A-NPC-2-1	AR	PM	D
Flexed				A-CSNE-1-3	AR/MY	I	D
A-G43-2-1	SL	M	PA	A-CSNE-2-1	AR/MY	M	D
A-CSNE-1-2	AR	M	SA	A-CSNW-4-3	N/A	I	D
A-G38-2-1a	AR	F	A	A-CSNW-4-4	N/A	I	D
A-NPC-2-4	AR	F	A	A-G38-1-3	N/A	I	D
B-RFA-7-1	AR	F	A	A-G43-1-4a	N/A	I	D
B-RFA-7-2a	AR	M	SA	A-G47-WT-2	N/A	M	D
A-CSNW-2-1	AR/MY	F	SA	A-NPC-1-4a	N/A	I	D
A-NPC-2-3	AR/MY	F	PA	A-NPC-1-5	N/A	I	D
B-RFA-5-2	AR/MY	M	A	B-G44-1-1	N/A	I	D
Tightly-flexed				B-G44-2-1	N/A	I	D
A-G43-1-3a	SL	M	A	*Commingled*			
B-RFA-8-1	AR	F	A	A-G38-2-1b	N/A	F	with A-G38-2-1a
				A-G43-1-2b	N/A	I	with A-G43-1-2a
				A-G43-1-3b	N/A	I	with A-G43-1-3a
				A-NPC-1-3b	N/A	PM	with A-NPC-1-3a
				B-RFA-5-LB	N/A	I	D (MNI=2)

Cultural Periods: SL=Saladoid. Post Saladoid Periods (AR=Arauquinoid/Guayabitoid), AR/MY=Dates crosses Arauquidoid/Mayoid periods, MY=Mayoid). Articulation: A=Articulated, SA=Semi-articulated, PA=Partially articulated, D=Disarticulated (based on Sprague (2005).

Less information was available to assess the burial position of juvenile burials as the majority of the juvenile remains were identified through an assessment of faunal remains. However, the incomplete remains of Burial A-CEP7-1 suggest that this may have been an extended burial. In addition, Burial A-G57-C-1 represents a tightly flexed burial. Due to the extremely fragile nature of the skeletal elements these remains were left fully encased in matrix. Burial A-G38-2-SIP is unique in that it is the only set of remains found interred in a pot, or burial bowl (Figure 58). Burial position could not be determined for Burial A-G56-2-2 due to the disturbed nature of the skeletal elements recovered. Further, burial position could not be determined for the remaining nine sets of juvenile remains as they were identified through an assessment of faunal remains and no *in situ* photographs exist for evaluation.

Figure 58. *In situ* burial A-G38-2-SIP, illustrating a bowl burial (image courtesy of Basil Reid, PhD).

Articulation of adult skeletal remains ranged from disarticulated to fully articulated (see Table 18). Overall, only nine sets of remains appear fully articulated, 13 sets of remains vary from semi-articulated to partially articulated and 25 sets of remains are disarticulated. Further, only six sets of remains appear basically undisturbed, other than disturbance caused by the excavation process. Only one set of juvenile remains (A-G57-C-1) appeared fully articulated, while one set of incomplete juvenile remains (A-CEP7-1) was partially articulated. The remaining 11 sets of juvenile remains were disarticulated.

In this sample, alignment could only be assessed for 24 burials (Table 19). Of these, 10 burials (48%) were aligned along a variation of the N-S axis with six N-S burials, one NE-SW

burial, one NW-SE burial and two NNE-SSW burials. An additional 10 burials (48%) were

aligned along a variation of the S-N axis with five S-N burials, three SW-NE burials and two

SSW-NNE burials. Interestingly only two burials (8%) were aligned along the E-W axis, there

were no W-E burials, and only two burials (8%) were aligned along the WNW-ESE axis.

Table 19. Burial alignment with associated burial position based on Sprague (2005) by cultural period.

Burial #	Axis	Position	Cultural Period	Sex
Burial dated to the Saladoid period (500 BC-AD 600)				
A-CSNW-4-2	N-S	Extended	SL	M
A-G43-1-3a	NNE-SSW	Tightly Flexed	SL	M
A-G56-1-2	NNE-SSW	Undetermined	SL	I
A-G43-2-1	S-N	Flexed	SL	M
Burial dated to the post-Saladoid, Arauquinoid/Guyabitoid, period (AD 630-1300)				
A-G38-2-1a	N-S	Flexed	AR	F
B-RFA-7-1	N-S	Flexed	AR	F
B-RFA-5-1	N-S	Undetermined	AR	I
B-RFA-8-1	NE-SW	Tightly Flexed	AR	F
A-CSNE-1-2	NW-SE	Flexed	AR	M
A-NPC-3-1	S-N	Undetermined	AR	I
A-G43-1-2a	SW-NE	Extended	AR	M
A-G43-1-1	SW-NE	Semi Flexed	AR	M
B-RFA-7-2a	SW-NE	Flexed	AR	M
A-NPC-5-1	E-W	Extended	AR	PF
A-G56-2-1	E-W	Likely Extended	AR	I
*Burial dated to post-Saladoid period and crossing both the Arauquinoid/Guyabitoid period (AD 630-1300) and the Mayoid period (AD 1300-1750)**				
B-RFA-5-2	S-N	Flexed	AR/MY	M
A-CEP7-1*	S-N	Extended	AR/MY	M
B-RFA-8-2	S-N	Extended	AR/MY	F
A-CSNW-2-1	SSW-NNE	Flexed	AR/MY	F
A-NPC-2-3	SSW-NNE	Flexed	AR/MY	F
Burial without radiocarbon dates				
A-G57-C-2	N-S	Likely Extended	N/A	PM
A-G57-C-1*	N-S	Tightly Flexed	N/A	I
A-G56-2-2*	WNW-ESE	Highly Disturbed	N/A	I
A-G61-2-1	WNW-ESE	Semi Flexed	N/A	PM

Sex: F= female, PF=possible female, M=male, PM=possible male, I=indeterminate. *Although the Mayoid period extends to AD 1750, no human remains radiocarbon dated past the pre-contact period.

Although a complete listing of pottery, shell and faunal remains that may have been

placed in the burial at the time of death is not available, certain artifacts were noted (Tables 20-

21). Potential grave goods consisted of faunal remains, un-worked shell, stone and pre-

Columbian pottery sherds. Two juvenile burials (A-CEP7-2 and A-G38-2-SIP), included a pendant and worked beads (Figure 59-61). Radiocarbon dates were available for 11 of the 14 (11 adult, 3 juvenile) burials, which contained potential grave goods. Interestingly all but one burial (A-CSNW-4-2) containing potential grave goods dated to post-Saladoid cultural periods. Two burials (A-CSNW-4-2 and A-G57-C-1) show signs of disturbed assemblages as colonial artifacts (a glass bottle and metal nail) were found commingled with artifacts from the pre-contact period.

Table 20. Artifacts found in association with adult burials. Artifact data provided by Basil Reid, PhD.

Sex and Burial #	Age	Cultural Period	Artifacts Recovered
Female			
B-RFA-8-2	YA-MA	AR/MY	Faunal Remains, Pottery Shells (around burial)
B-RFA-8-1	MA-OA	AR	Pottery, Shells (around burial)
B-RFA-7-1	OA	AR	Faunal Remains, Stones, Pottery, Shells
Probable Male			
A-G57-C-2	MA-OA	N/A	Faunal Remains, Stones, Pottery
Male			
A-G43-1-2a	YA	AR	Lithic (possible polishing stone) Pottery
A-G43-2-1	YA_MA	N/A	Phyllite Pendant (found in the same subdivision and at the same level as burial A-G43-2-1, but association not confirmed)
B-RFA-7-2a	MA	AR	Faunal Remains, Stones, Pottery, Shells
A-CSNW-4-2	OA	SL	Pottery, Metal Nail*
B-RFA-5-2	OA	AR/MY	Shells, Pottery
Indeterminate			
A-CSNE-1-3	MA-OA	AR	Shell
B-RFA-5-LB	A	N/A	Lithics, Grindstone, Pottery, Shells
B-RFA-5-1	A	AR	Faunal Remains, Stones, Pottery, Shells

Cultural Periods: SL=Saladoid. Post Saladoid Periods (AR=Arauquinoid/Guayabitoid), AR/MY=Dates crosses Arauquidoid/Mayoid periods, MY=Mayoid). *Colonial era find, likely due to construction/renovation of the Red House.

Table 21. Artifacts found in association with juvenile burials. Artifact data provided by Basil Reid, PhD.

Burial #	Age	Cultural Period	Artifacts Recovered
A-CEP7-2	3-4 yrs	N/A	Phyllite Beads (2) Serpentinite Beads (2) Quartz Beads (4) Quartz Crystal (1)
A-G57-C-1	3-4 yrs	N/A	Faunal Remains, Stones, Pottery, Shells, Glass Bottle*
A-G38-2-SIP	6-8 yrs	AR	Phyllite Beads (3) Phyllite Pendant (1)

Cultural Periods: SL=Saladoid. Post Saladoid Periods (AR=Arauquinoid/Guayabitoid), AR/MY=Dates crosses Arauquidoid/Mayoid periods, MY=Mayoid). *Colonial era find, likely due to construction/renovation of the Red House.

Figure 59. Burial A-CEP7-2, a juvenile approximately 3-4 years of age at death during cleaning. Note bead near second molars.
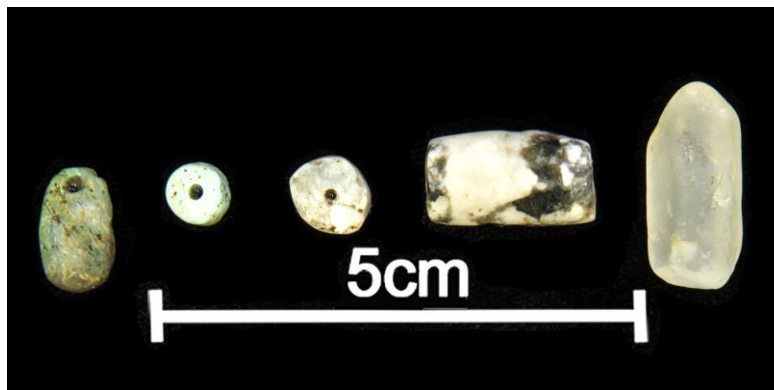
Figure 60. Artifacts recovered from the matrix encasing burial A-CEP7-2, a juvenile approximately 3-4 years of age at death.

Figure 61. Artifacts recovered from the matrix encasing burial A-G38-2-SIP, a juvenile approximately 6-8 years of age at death.

In addition, while none of the burials had indications of cremation, fragments of charcoal were recovered with the skeletal remains. Due to time constraints a comprehensive accounting of charcoal recovered from burials at the Red House site was not undertaken. Therefore, a complete list of all charcoal fragments recovered is not available; however, at least three instances of this nature were noted (B-RFA-5-2, B-RFA-7-1 and B-RFA-8-2).

CHAPTER FIVE: DISCUSSION

"A tide swept through the sciences in the nineteenth and early twentieth century and eroded one of the basic concepts of the past, the idea of simple causal relationships, the immediate and sole dependence of a thing or event upon a particular prior thing or event. This sweeping theoretical change did not wipe out determinism, but conditioned scientists to look for multi-faceted relationships and fields of interactivity on all levels of analysis" (Steward, 1959:81).

Underlying the analysis of the Red House sample is the importance of developing interpretations within the context of the time period and environment in which the people of the Red House site lived. Therefore, when exploring possible interpretations of their lifeways it is necessary to consider Trinidad's unique location as a continental island positioned at the southernmost tip of the Caribbean archipelago. This location afforded the early inhabitants of the island access to a variety of resources, not only from the island itself, but also from the nearby mainland and other Caribbean islands. Boomert (2000:1-3) discusses this connectedness, defining the "Lower Orinoco Interaction Sphere" as the area of interaction between the mainland and nearby Caribbean islands. He also points out that the geographic location of both Trinidad and Tobago created a "natural gateway" for early migration from South America though Trinidad and Tobago to the West Indies. However, it is important to note that movement and diffusion would not have been unidirectional (Curet, 2014) and that while the island's gateway location permitted cultural diffusion and exchange through the Lesser Antilles northward to the Greater Antilles, it would also have allowed continued exchange with the mainland, particularly near costal regions such as Venezuela, Guyana and Suriname (Glazier, 1978).

Boomert (2000:3) credits Watters (1983, 1997) for pointing out that past interpretations of movement within this region often suffered from a bias toward terrestrial routes. Instead, Boomert (2000:3) suggests that the Lower Orinoco Interaction Sphere should be visualized as "a body of land united rather than divided or bounded by water." He supports his position with the

observation that far more evidence has been collected supporting social interaction between Amerindians from Venezuela's eastern coast and Trinidad's western coast than has been collected supporting social interaction between Amerindians living on opposite coasts of Trinidad itself. Comparisons of similar populations such as these offer the best opportunities for solid interpretations of past lifeways. While there are fewer osteological data derived from comparative skeletal populations in the Caribbean than in other parts of the world, it was possible to make comparisons of significant osteological, as well as mortuary findings, by consulting multiple, often non-osteological, sources. These comparisons are included in the discussion of the Red House burials; however, it is important to first consider how the sites' complex history affected the recovery and analysis of the skeletal remains.

Post-depositional Processes and Site Considerations

The construction, renovation, expansion and remodeling of the Red House resulted in extensive post-depositional disturbances at the site. These disturbances posed a number of challenges for preservation of the human skeletal remains within the graves. First, there was the long and continued use of the site by Amerindians that more than likely led to contemporaneous disturbance of graves, particularly as new interments disturbed older interments, either unintentionally or as a result of cultural practices (Hoogland and Hofman, 2013). At the same time, the construction, re-construction and renovation of the Red House over a span of over 160 years created additional subterranean disturbances impacting *in situ* burials. As a result extensive postmortem damage occurred to the remains and in many instances the remains may be incomplete because of disturbances due to both site activities from Amerindian habitation and construction activities over the years. In addition to postmortem damages, these site disturbances led to extensive commingling of Amerindian skeletal material that was not expected prior to the

on-site skeletal analysis. Further, the hard and frequently solid matrix consisting mainly of clay and sandy loam (based on soil profiles provided by the Red House site staff) found at the Red House site complicated the excavation and cleaning of the remains. The skeletal material became quite brittle in this environment resulting in additional fragmentation of many skeletal elements. As a result, skeletal preservation and completeness were issues to consider when performing the analyses.

<u>The Red House Burials</u>

While not all analyses could be performed for all burials, certain assumptions and interpretations could be made from the data gathered. Radiocarbon dates indicate that the Red House site was utilized as a settlement site with burials dated from approximately AD 125 to AD 1395 (Reid, 2015), a span of more than 1250 years. Therefore, the minimum number of 60 individuals found within this sample represents either multiple generations of one group or multiple groups. Although the analysis of pottery sherds identified neither cauxi nor caraipe temper (used by later Arauquinoid/Guayabitoid and Mayoid groups), this time span encompasses up to three different cultural periods (Saladoid ~BC 500-600, Arauquinoid/Guayabitoid ~AD 630-1300 and Mayoid ~AD 1300-1750). Based on the pottery analysis, it is suggested that the Red House sample represents one cultural group (Saladoid) and its descendent populations (Reid, 2015). However, as the number of pottery sherds available for analysis was limited (n=16), this conservative position may be refined should future pottery analyses utilizing larger samples become possible.

Of particular concern when making interpretations from skeletal samples is developing an understanding of the extent to which the skeletal sample recovered represents the living population (Hoppa and Vaupel, 2002; Pinhasi and Bourbou, 2008). Ideally, a skeletal sample

represents all individuals who died during the time and at the place being studied. Best-case scenarios include recovery of all individuals originally interred in the burial complex. However, in practice this rarely occurs (Pinhasi and Bourbou, 2008). Differential burial practices and preservation levels impact the recovery and analysis of skeletal remains. As such, certain segments of a population are most likely underrepresented. Juvenile remains in particular are both more likely to be confused with faunal remains, and more apt to suffer from poor preservation, often resulting in an underrepresentation within the given population (Pinhasi and Bourbou, 2008). However, Mays (1998) notes that in soil with a neutral pH juvenile remains were recovered at the same rate as adult remains indicating that poor preservation may not have as much impact on representation as recovery methods and differential burial practices do. Differential burial practices may relate to age (as in juvenile remains), status (either high status or low, as in the case of criminals, suicides, etc.) or disease (mental retardation, leprosy) and can therefore affect representation (Donnelly et al., 1999; Pinhasi and Bourbou, 2008).

In 1992 Wood et al. published *The Osteological Paradox*, a study that has become the cornerstone of debates over the representativeness of skeletal populations for nearly a quarter century. Wood et al. (1992) identify three main areas of concern when evaluating the representativeness of skeletal populations. First, that individual responses to disease vary based on the overall health of the individual including their susceptibility to physiologic stress and the response of their immune system, what they termed a "hidden heterogeneity in risks" (Wood et al., 1992:349). In their comprehensive review of the osteological paradox DeWitte and Stojanowski (2015) highlight the complications created by the hidden nature of frailty, those characteristics which cannot be observed directly in making interpretations of past health from skeletal populations. They also discuss the importance of documenting the origins and effects of

heterogeneity in frailty, and point out that little research has been done on the subject. The second area of concern Wood et al. (1992) recognize in their study identifies selective mortality as an important agent acting upon heterogeneous frailty, which varies depending on mortality levels. Wood et al. (1992) utilize stature as an example; however, the concept can be applied to any skeletal indicator of stress. During periods of high mortality a broader segment of the living population is represented in the burial population; however, during periods of lower mortality only the most vulnerable (those with the highest frailty) are represented. In these cases, the frequency of apparent stress indicators increases. Third, they point to demographic nonstationarity as an important consideration in interpreting the burial population. A stationary state is one in which there is no migration, fertility and mortality conform to age-specific periods, age distributions have reached equilibrium and there is a flat growth rate (Wood et al., 1992:344). When populations move away from a stationary state, and Wood et al. (1992) point out that no population is ever stationary, fertility has a greater impact on age at death distributions than mortality does, thus creating a paradoxical situation in which statistical analyses of mean age at death become better measures of fertility than of mortality. Unfortunately, the fragmentary and incomplete nature of the Red House sample, as well as the site's extended period of use, limits the ability to utilize measures such as mean age at death for interpretation. However, regardless of the method of analysis, it is important to keep the concerns raised by the osteological paradox in mind when approaching interpretations of past populations.

Demographic Make-Up of the Red House Sample

Identifying the demographic make up of the recovered remains was the first step in developing a framework upon which an interpretation of lifeways could be built. However, the

site's extended period of use combined with an inability to accurately place all skeletal remains within either a specific cultural group or more narrow time range created several challenges in assessing the demographic makeup of the populations from which this sample is derived. Fundamental to any demographic profile is an understanding of the population size. Adams and Konigsberg (2008) suggest that instead of a simple MNI researchers faced with commingled remains utilized the Most Likely Number of Individuals (MLNI) method. This quantitative approach allows extrapolation from both isolated and pair-matched skeletal elements to an estimate of original population size. However, they caution that in the case of fragmentary remains exhibiting poor preservation MNI is the best quantification technique available. Thus the MNI (60) calculated for the Red House site represents a conservative estimate based on the criteria outlined in the Materials and Methods section.

However, based on the limitations outlined in the Methodological Approach and Limitations section, this number reflects only the sample size and is not representative of the original populations who once resided at this site. Factors such as the site's continual occupancy and use as a burial complex for more than 1250 years were likely responsible for substantial ground disturbance in the pre-contact period. Additionally, construction, reconstruction and renovation of the Red House itself further disturbed burials. However, the main factor mitigating the representativeness of the skeletal sample is the limited excavation area. Due to renovation plans the site excavation was limited to areas undergoing active remodeling. Without a complete excavation of the property, it is impossible to know the boundaries of the settlement area or the burial complex within the settlement site. Consequently, it is impossible to know the extent of the mortuary sample, or to what degree the individuals recovered are representative of the populations who once resided at this site.

Curet (2014) points out that paleodemographic studies provide an opportunity to investigate both the internal structure of local populations as well as how population structure affects the social, political and economic environment in which they live. He also notes that few studies based on Caribbean skeletal samples have been approached from a paleodemographic perspective. It is this evaluation of populations at the local level that has the greatest potential to increase our understanding of early lifeways (Curet, 2005). However, Curet (2005) cautions the researcher to consider sample bias when developing paleodemographic interpretations. This is perhaps the most restrictive concern in attempting to develop a paleodemographic model from the Red House sample. Since the continual occupancy of the Red House site as a settlement area and burial complex for more than 1250 years suggests up to three different cultural periods (Saladoid ~ 500 BC-AD 600, Arauquinoid/Guayabitoid ~AD 630-1300 and Mayoid ~AD 1300-1750), but may also represent one cultural group (Saladoid) and its descendent populations (Reid, 2015), all remains were aggregated into one skeletal sample. As such, the inability to attribute all recovered remains to a specific cultural period precludes evaluating the remains at a population level. As noted above the overall size of each of the populations who resided at the Red House site over the course of these many years is unknown. In addition, paleodemography is built upon an understanding of age distributions at death (Hoppa and Vaupel, 2002). One of the major challenges in paleodemography is capturing the "right-most tail of the age distribution in archaeological populations - the oldest old" (Hoppa and Vaupel, 2002:1). Unfortunately, the condition and completeness of the remains prohibited a refined age assessment. Therefore, based on recommendations provided by Curat (2014) and Hoppa and Vaupel (2002) it is not advisable to undertake a paleodemographic analysis from the Red House sample.

While a paleodemographic approach, as opposed to a simple accounting of age and sex is desirable, an assessment can still be undertaken regarding age and sex within the Red House skeletal sample. Once an MNI was calculated the next step in establishing as much of a demographic profile as possible was assessing sex and estimating age. Of the 60 individuals identified, 80% (47 adults and one adolescent) were evaluated for sex. When assessing these individuals, there was a slight male bias with 17 individuals (35%) classified as male and 11 individuals (23%) classified as female. However, the high number of indeterminate remains (42%) likely skewed the overall analysis of sex distribution within this sample. Similar challenges were faced in conducting age assessments. In some cases it was not possible to narrow an age cohort at all, in which case individuals were simply identified as adult (17). In other instances adult individuals could be placed in broad categories such as young adult (6), young-middle adult (2), middle adult (3), middle-older adult (9) and older adult (10). In most cases juvenile remains could be aged more closely, with one individual aged as an infant (0 to 1 year), eight individuals aged as young children (1-6 years), three individuals aged as older children (7-12) and one individual aged as an adolescent (13-19).

Although there were few sites with documented skeletal samples (for a compilation of comparable skeletal samples from the Caribbean refer to Table 1), the Tutu archaeological site provided a comprehensive overview of osteological data and demographic information for a similar Ceramic Age sample. A comparison was therefore made to Red House demographics indicating the age and sex distribution (Tables 22-23).

Table 22. Adult burials recovered from the Tutu site by sex and age (based on Sandford et al., 2002) correlated with Red House site age categories.

Tutu Burial #	Sex	Age	Red House Age Category
26	F	17-21	Adolescent / Young Adult
4	F	18-25	Young Adult
16	F	35-45	Middle Adult
31	F	35-45	Middle Adult
23B	F	35+	Middle Adult
2	F	40-50	Middle-Older Adult
3	F	40-50	Middle-Older Adult
5	F	40-50	Middle-Older Adult
19	F	40-50	Middle-Older Adult
13	F	40-55	Middle-Older Adult
1	F	45-55	Middle-Older Adult
10	F	45-55	Middle-Older Adult
13A	F	45-55	Middle-Older Adult
29	F	45-55	Middle-Older Adult
30	M	35-45	Middle Adult
33	M	35-45	Middle Adult
21	M	40+	Middle-Older Adult
38	M	45-50	Middle-Older Adult
9	M	45-55	Middle-Older Adult
12	M	45-55	Middle-Older Adult
36	I	40-50	Middle-Older Adult
40	I	Adult	Adult

Table 23. Juvenile burials recovered from the Tutu site by age (based on Sandford et al., 2002) correlated with Red House site age categories.

Tutu Burial #	Sex	Age	Red House Age Category
15	N/A	0-0.5	Infant, 0-1 yr
18	N/A	0-0.5	Infant, 0-1 yr
23A	N/A	0-0.5	Infant, 0-1 yr
24	N/A	0-0.5	Infant, 0-1 yr
34	N/A	0.5	Infant, 0-1 yr
7	N/A	<1	Infant, 0-1 yr
41	N/A	1.5	Young Child, 1-6 yrs
22A	N/A	1.5-3	Young Child, 1-6 yrs
11	N/A	1-2	Young Child, 1-6 yrs
27	N/A	<2	Young Child, 1-6 yrs
22B	N/A	4-5	Young Child, 1-6 yrs
32A	N/A	5	Young Child, 1-6 yrs
28B	N/A	5-7	Young Child, 1-6 yrs
6	N/A	5.5-7	Young Child, 1-6 yrs
39	N/A	8	Older Child, 7-12 yrs
20	N/A	9	Older Child, 7-12 yrs
28A	N/A	<10	Older Child, 7-12 yrs
8A	N/A	15	Adolescent
8B	N/A	15	Adolescent
25	N/A	N/A	N/A

The oldest individuals noted in the Red House sample were classified as 'older adult' while 70% of the individuals in the Tutu sample were aged between 40-50 or 40-55, an age range that crosses what is suggested by Buikstra and Ubelaker (1994) to be two age ranges, middle adult (35-49) and older adult (50+). As can be seen by this comparison to the Tutu sample (Table 22), capturing the "right-most tail of the age distribution" (Hoppa and Vaupel, 2002:1) presents a challenge, not only to the Red House site, but to other Caribbean sites as well.

Pathological Conditions

Overall, 35 individuals exhibited some form of pathological condition. Of these 29% (10) were female, 37% (13) were male and 34% (12) were of indeterminate sex. Although it was not possible to narrow the age ranges for adults further, certain observations about health could still be made. As might be expected, young adults exhibited the least number of pathological conditions, in part because "as we age, our exposure to disease and trauma increases" Buzon (2014:63). Osteoarthritis is the most common joint disease found in the archaeological record (Jurmain and Kilgore, 1995; Roberts and Manchester, 2007a; Rogers and Waldron, 1995; Waldron, 2009) and is second only to dental disease in pathological conditions seen in skeletal remains (Waldron, 2009:26). While most cases of osteoarthritis were observed in middle aged or older adults two cases were observed in young adults (A-CSNE-1-2 and A-NPC-5-1) and one was observed in a young-middle aged adult (B-RFA-8-2). However, it was interesting to note that while only two cases of Schmorl's nodes were observed, both cases were found in the remains of young adults (A-CSNE-1-2 and A-G43-1-2a). Interestingly, one of the young adults (A-CSNE-2-1) exhibited both Schmorl's nodes and osteoarthritis.

Common stress-related cranial vault pathologies associated with anemia include cribra orbitalia (lesions on the orbital roof) and porotic hyperostosis (lesions primarily affecting

parietal and occipital bones) (Ortner 2003). While traditionally attributed to iron deficiency anemia, current research suggests that porotic hyperostosis and cribra orbitalia may often be the result of hemolytic and megaloblastic anemias brought on by nutritional deficiencies or infectious disease (Walker et al., 2009; Larsen, 2015). Walker et al. (2009) reference hematological studies indicating that iron deficiency alone is not capable of inducing the proliferation of red blood cells necessary to trigger the extreme expansion of marrow responsible for such hypertrophic lesions. In addition, in some cases lesions characteristic of cribra orbitalia have been associated with non-anemic conditions including survey, rickets and trauma related hematomas (Larsen, 2015). Subperiosteal inflammation then, as opposed to marrow hypertrophy, becomes responsible for extensive bleeding ultimately resulting in highly vascularized orbital bone.

Indicators of non-specific stress including cribra orbitalia and porotic hyperostosis were noted in several adult age cohorts. One young adult (A-CSNE-1-2) exhibited both cribra orbitalia and possible porotic hyperostosis, two middle adults (A-CSNE-201 and B-RFA-7-2a) exhibited porotic hyperostosis, one middle-older adult (A-G38-2-1a) exhibited cribra orbitalia and one older adult (B-RFA-5-2) exhibited porotic hyperostosis.

Infectious disease has a myriad of etiologies including bacterial infection and infection following traumatic injury, may be present throughout the skeletal system and is expressed along a spectrum of severity (Larsen 2015). Waldron (2009) notes that most infectious diseases leave no trace on the skeleton. Indicators of non-specific infection were mainly noted in individuals classified as middle adult or older adult with seven cases of periostitis and two cases of osteomyelitis observed. In this sample infection rates in skeletal elements available for analysis ranged from 1.75% (humerus) to 17.02% of the sample (tibiae). However, in this sample most

observations of infection were noted in the lower leg bones, and were most prevalent in the tibiae.

Carious lesions can be found both on the crown of the tooth and in the periapical space (Waldron, 2009). Bacterial fermentation is accelerated by the consumption of a carbohydrate (sugar and starch) rich diet, which is reflected in the lower incidents of carious lesions in hunter gatherer cultures when compared to agricultural groups (Hillson, 2008; Larsen, 2015; Turner, 1979). In addition, plaque (bacteria) build-up on the teeth can lead to inflammation of the gums and periodontal disease, which when left untreated may lead to a loss of collagen, the support network between the tooth and the gum (Larsen, 2015). Over time the alveolus is depleted and the tooth can no longer be supported resulting in pathologic exfoliation (antemortem tooth loss). Unsurprisingly, antemortem tooth loss increased with age and was the pathological condition noted most often, with 65% of individuals who exhibited antemortem tooth loss ranging in age from middle-older to older adults. Although not pathological in nature, one other interesting dental trait noticed in the Red House sample was the possible congenital absence of both maxillary and mandibular third molars in three individuals, and the congenital absence of mandibular third molars in one individual. This trait was only recorded at one other site, Judith's Fancy. However, given the lack of detailed dental information available for comparison it is possible that other Ceramic Age Caribbean populations may have also exhibited this trait.

Cohen (1992), Goodman (1993) and Goodman and Martin (2002) suggest that multiple indicators of stress and disease provide the most comprehensive overview of individual health. In this sample, only five adult individuals ranging from middle adult to older adult (A-G38-2-1a, B-RFA-5-2, A-CSNE-2-1, A-NPC-2-3 and B-RFA-8-1) exhibited four or more antemortem conditions. Stature can also be a useful measure in investigating the health status of a population

(Byers, 1994; Mummert et al., 2011;Watts, 2011). However, the limited number of individuals with complete long bones available for analyses (eight males and four females) reduced stature's usefulness within this sample.

While the juvenile sample is small it is still quite informative. The largest age cohort is represented by the young child range (1-6), which includes 62% of all juvenile remains recovered. This age range spans the weaning period, a time of transition from breast mild to solid food. Although different cultural groups practice different weaning patterns, in general the onset of weaning may occur as early as six months of age and is not likely to last longer than the eruption of the first adult molar at approximately six years of age (Lewis, 2007:100-102). The introduction of solid food offers the growing child both additional nutrition and the potential for ingestion of pathogens and bacteria through poor sanitation and cultural practices such as parental pre-chewing of the child's food (Lewis, 2007). It is possible that the high mortality rate in the young child cohort within this sample is related to weaning stress. Lewis (2007) points out that skeletal indictors of stress, which may be related to weaning increase in children between the ages of two and four years. In addition, one individual (A-G43-1-4b) within this group exhibited periosteal reactions on the shafts of both tibiae. One older child (A-G38-2-SIP) exhibited several indicators of non-specific stress including, a LEH to the permanent upper right central incisor (tooth #8), cribra orbitalia and porotic hyperostosis and also exhibited a large occlusal carious lesion to the lower left deciduous first molar (tooth L). Although no other pathological conditions were noted on the juvenile remains recovered, the very fragmentary and incomplete nature of the remains must be taken into account when assessing the health of the youngest members of this sample.

Cultural Indicators from Skeletal Remains

In addition to evaluating the overall health of the sample, indicators of cultural behaviors and personal interactions provide important contributions to interpretations of past lifeways. Within the Red House sample there were several interesting cultural indicators including dental wear, artificial cranial modification and bilateral asymmetery, as well as possible indications of both caregiving and interpersonal conflict.

In this sample one individual, a female (B-RFA-8-1), exhibited grooving to the right maxillary central incisor (#8). Four radiocarbon dates were calculated for this individual placing her as early as AD 990 and as late as AD 1155. The use of teeth as tools is well documented (Lorkiewicz, 2011; Mickleburgh, 2007; Molnar, 2011). Additionally, Lorkiewicz (2011) points out that females frequently exhibit grooves to their incisors and canines and suggests that pulling string for yarn production or weaving through their teeth may have caused the grooving. Molnar (2011:683) attributes anterior occlusal grooving to working "willow strand, fibers, and sinews" and points out that such grooves have been documented in a variety of geographic locations across multiple time periods.

Although little research has been conducted specifically on lingual surface attrition of the maxillary anterior teeth (LSAMAT), a dental wear pattern introduced by Turner and Machado in 1983, it was interesting to note this pattern of wear in the Red House sample. When adjusted for the actual number of anterior teeth recovered, the occurrence rate for LSAMAT was quite high (56.5%). Non-occlusal lingual wear consistent with a LSAMAT wear pattern of the maxillary incisors was also observed at the Tutu site (Larsen et al., 2002; Mickleburgh, 2014), Anse à la Gourde (Hoogland, 2010; Mickleburgh, 2014) and Lavoutte (Hofman et al., 2012). Further, Bullen's (1970) case study describes a wear pattern that sounds similar to LSAMAT but no

images are available for comparison. Winter et al. (1989) also describe a similar wear pattern, but again no images are available for comparison.

The most extensive coverage of LSAMAT is found in Turner and Machado (1983) and Mickleburgh (2007). Turner and Machado (1983) associated this wear with a higher incident of dental caries, possibly due to processing a high carbohydrate food substance with their teeth. While a high carbohydrate diet can be associated with a higher incidence of dental caries, Mickleburgh (2007) reports varying degrees of correlation in her analysis of two sites with incidents of LSAMAT. Mickleburgh (2007) reports multiple incidents of LSAMAT from the Anse á la Gourde site on Guadeloupe as well as the Tutu site on St. Thomas. While Mickleburgh (2007) found that the relationship between LSAMAT and a higher incident of dental caries was supported in the Tutu sample, she found any possible association to be unclear in the Anse á la Gourde sample. Mickleburgh (2007) also points out that LSAMAT has been interpreted as a form of non-masticatory dental wear although the "activity or activities which caused LSAMAT is as yet unknown" (2007:18). Of the five individuals who exhibited LSAMAT (A-CSNW-2-1, A-G38-2-1, A-NPC-3-1, B-RFA-7-2a and B-RFA-8-2) at the Red House site only one (A-G38-2-1) exhibited dental caries. However, this low rate of dental caries in relation to LSAMAT may reflect the fragmentary and incomplete nature of the remains recovered from the Red House site. Interestingly, radiocarbon dates were available for all five individuals who exhibited LSAMAT. All radiocarbon dates placed these individuals in the later cultural periods. Overall dates ranged from AD 1025-1380, although the three radiocarbon dates calculated for individual B-RFA-8-2 varied more than the others. While all the dates for four individuals and two dates for one individual (B-RFA-8-2) placed the remains in the post-Saladoid, possibly Arauquinoid/Guayabitoid, culture series (~AD 630-1300) one of the three sets of dates acquired

for B-RFA-8-2 (AD 1370-1380) placed this individual in the possible Mayoid culture series (~AD 1300-1750). This may suggest that individuals of these later cultural groups engaged in a non-masticatory activity that the earlier Saladoid group did not.

In addition to behaviors such as the use of teeth as tools, which inadvertently leave traces in skeletal remains, some practices such as artificial cranial modification are intended to modify observable features. Artificial cranial modification can be either unintentionally or intentionally induced. Some forms of unintentional cranial modification include the use of tumplines to carry heavy loads, crib or cradleboard positioning or even the repeated use of tight hair ribbons or other decorations for the head and hair (Tiesler, 2014). The origins of artificial cranial modification can therefore be difficult to discern. In addition, there are post-depositional factors such as compression and fragmentation that can complicate interpretation. In this sample both examples of possible artificial cranial modification (A-CSNE-2-1 and A-CSNW-4-2) are highly fragmented. Burial A-CSNE-2-1, a middle age adult dating to AD 1280-1325, experienced post-depositional compression, which makes evaluation of artificial cranial modification during life difficult. Burial A-CSNW-4-2, an older adult male dating to AD 230-380, is represented by a partial cranium, which appears to have some frontal flattening. However, the remains are too fragmentary to make a firm assessment of artificial cranial modification.

In cases where the remains are complete enough to make a cautious assessment of artificial cranial modification it is important to begin an interpretation of its significance based on a cultural framework for the practice in the specific region being studied. Teisler (2014) points out that the practice of artificial cranial modification is a reflection of choices made by adult individuals in a child's life, as children cannot choose to have the procedure performed for them. Reasons for shaping a child's head range from utilizing the modification as an indicator of

belonging, either to a family or social group, to adhering to culturally specific expressions of beauty (Tiesler, 2014:25-26). In addition, artificial cranial modification may indicate ascribed status, conferred by the adult upon the child. Teisler suggests that in Mesoamerica finding artificial cranial modification in both males and females indicates that "patterns of head shape point much more to equality in the head treatment of boys and girls rather than distinction" (2014:26). However, to reach this conclusion it is first necessary to know whether all children were subjected to the process, or if only select boys and girls were. Head shaping in both boys and girls may also be a reflection of the non-gendered identity of babies in Mesoamerica, where children do not follow gendered paths until later in life (Teisler, 2014). Furthermore, van Duijvenbode (2012) suggests that a low prevalence of artificial cranial modification within Arauquinoid societies in Suriname (a coastal region of South America) may be due to its use as a form of "social status differentiation or the expression of small scale group identity" (2012:11).

Although artificial cranial modification is one of the most universal biocultural signatures found in the archaeological record, with cases of artificial cranial modification recorded across the world (Tiesler, 2014), and cases which may even predate anatomically modern humans (Trinkaus, 1982; Tiesler, 2014), it is not possible to attribute a specific intention or meaning to its implementation in the Caribbean. In a direct reflection of the limited osteological information available for pre-contact Caribbean populations in general, there are few published studies documenting the practice of artificial cranial modification in this region. In fact, Tiesler in her exhaustive book length treatment of the subject of artificial cranial modification entitled in part "*Pre-Columbian Mesoamerica and Beyond*," discusses the Caribbean region through accounts in colonial sources and points out that "Mentions of cranial modification are not numerous; however, it can be deduced from the time span of chronicles and travel accounts that the tradition

was enacted among native islanders and survived for a long time after Conquest" (2014:101). This is followed by only three accounts spanning less than two pages (101-102) of artificial cranial modification in the Caribbean region including one account from the Lesser Antilles (Martinique), one account from the Greater Antilles (La Hispañola) and one account from Costal Guyana. Within the Caribbean archipelago, artificial cranial modification is noted more often in the Greater Antilles and South America including areas such as Jamaica (Santos et al., 2014), Suriname (van Duijvenbode, 2012), Peru, (O'Brein and Stanley, 2013) and Argentina (Imbelloni, 1950).

While the specific intentions or meaning behind the practice of artificial cranial modification very greatly and are often region specific, certain universals apply. The practice creates a tangible link between biology and culture. Tiesler (2014:23) point out that artificial cranial modification is "biologically conditioned, as it can only take place while the baby's skull is malleable." In general, the fontanelles of the cranial vault close and the bones of the calvarium harden and begin to fuse by the third year of life (Scheuer and Black, 2000; Tiesler, 2014) thereby limiting the time available to achieve the greatest level of modification. Viewed against the backdrop of developmental stages, this practice may also take its place along a continuum of "universal manifestations" reflected in a variety of rites of passage (Teisler, 2014:24). Despite the cross-cultural diversity observed in specific rites of passage, the overarching theme includes milestones of development and transition from birth through multiple life stages to death.

Artificial cranial modification was rarely noted in the comparative samples evaluated. Mild flattening of the mid-frontal aspect of the cranial vault was noted at the Hillcrest site (Drewett, 1991), which was attributed to artificial cranial modification. However the form is not defined and no images accompany the article. In addition, two burials were noted at the Judith's

Fancy site with descriptions (flattened frontal and fronto-occipital cranial deformation), which are likely cases of artificial cranial modification. However, once again no form of cranial deformation is defined and no images accompany the study.

Placing the four examples of artificial cranial modification (A-CEP7-1, A-G43-1-3a, A-G43-2-1 and A-NPC-2-3) in a cultural framework is difficult given the limited information available. However, the three males (A-CEP7-1, A-G43-1-3a and A-G43-2-1) and one female (A-NPC-2-3) may offer some clues to their position within this sample. Radiocarbon dates for the adults who exhibited artificial cranial modification range from AD 340-425, the earliest Saladoid cultural period, to AD 1370-1380, representing later post-Saladoid cultural periods. Although, both individuals who exhibited modified tabular forms of artificial cranial modification (A-G43-1-3a and A-G43-2-1) were radiocarbon dated to the earliest cultural period, while the individuals who exhibited oblique tabular (A-CEP7-1) and tabular erect (A-NPC-2-3) forms of artificial cranial modification were radiocarbon dated to the later post-Saladoid periods. This diversity in sex and time periods is not unexpected, as the practice of artificial cranial modification has been observed in all time periods and both sexes. However, the form of modification appears to have changed over time in the Red House sample. In addition, as mentioned above, Tiesler (2014) suggests gender in artificial cranial modification may be a unifying practice in early childhood. However, understanding the role of artificial cranial modification within a given culture is dependent upon an understanding of which children, and how many children, within a population were subjected to the process. Overall, while limited in scope such interpretations contribute to a developing understanding of the Red House sample.

In addition to artificial cranial modification, other forms of skeletal remodeling also offer information regarding cultural behaviors. Jurmain (1999) notes that mechanical factors influence

the shape, density and remodeling properties of bone and Kennedy (1989:155-156) points out that musculoskeletal activity markers represent a form of boney response to plasticity under pressure that is not "attributable to disorders of disease, metabolism, biochemistry, hormonal and enzymatic imbalances, or neuronal and vascular disorders." Kennedy (1989) also notes, that when observed on skeletal remains these biomechanical markers may be attributable to specific lifeways. Larsen (2015) proposes that asymmetry of the long bones, and the humerus in particular, has both a genetic and functional component. However, it is the functional component that he suggests allows differing levels of asymmetry to used in interpretation of past populations' activities. Wolff's law explains the forces that affect bone remodeling, stating that remodeling occurs in the direction of functional demand and as such is recognized as a functional adaptation (Larsen, 2015). Larsen (2015) also points out that studies of stone tools utilized by early hominids suggest that a right-handed dominance existed for humans throughout most of the Pleistocene and that all extant human populations continue to express higher levels of right-handed dominance. As Jurmain (1999) notes, such mechanical factors then influence the shape, density and remodeling properties of bone. Observations of bilateral asymmetry can therefore be useful in the inference of activity patterns.

Within this sample, three individuals (A-CSNW-4-2, A-G43-1-3a and A-NPC-6-1) exhibited bilateral asymmetry of the right arm. Thomas (2011) points out that inferences about different subsistence based activities are most often based on the midshaft diameter of the humerus. Unfortunately, of the three individuals in this sample expressing humeral bilateral asymmetry only one (A-G43-1-3a) was recovered with a single complete humerus. Therefore, measurements could not consistently be taken at midshaft. In order to capture the greatest degree of bilateral expression from the fragmentary humeri several measurements were taken at a

variety of locations in both right and left humeri. The greatest medial/lateral width of the larger shaft was located and compared to the corresponding location in the opposite shaft. These measurements indicated a 4.2 mm, 9.2 mm and 5 mm increase in the diameter of right humerus over the left (A-CSNW-4-2, A-G43-1-3a and A-NPC-6-1, respectively). In addition, A-CSNW-4-2 exhibited a 3.8 mm increase in the diameter of the right ulna over the diameter of the left ulna and A-G43-1-3a exhibited a 4.1 mm increase in the same. Similar asymmetry was noted in one other skeletal sample (Tutu site, Sandford et al., 2002) and in one case study (Bullen, 1970).

While not enough information is available about the cultural practices of the Red House sample to infer a specific activity as the causative factor, some basic interpretations can be formed. Bilateral asymmetry was observed in both males (A-CSNW-4-2 and A-G43-1-3a) and females (A-NPC-6-1) within this sample; therefore it may not be related to a division of labor. However, this may also be an artifact of the small and fragmentary sample size. While all three individuals were middle to older adults, most activity related cortical thickening occurs earlier in life. Thomas (2011) identifies a study of bilateral asymmetry in professional tennis players reviewed by Ruff et al. (1994) which found that by age eight, most professional tennis players experienced no further increase in asymmetry of the playing arm. This suggests that the more advanced chronological age of the three individuals does not have bearing on the cause of their asymmetry. Radiocarbon dates were available for all three individuals placing them firmly in the earliest subset of this sample, which corresponds to the Saladoid culture series (~BC 500-AD 600). The most interesting observation is that of the nine individuals placed in the Saladoid period by radiocarbon dates, 33% exhibited humeral bilateral asymmetry. However, of the remaining 66%, only one skeleton (A-G43-2-1) was complete enough to evaluate for bilateral asymmetry. Thus, 75% of the individuals radiocarbon dated to the earliest period, who could be

evaluated for bilateral asymmetry, exhibited it. This allows a very cautious suggestion that those individuals living during the Saladoid period and interred at the Red House site engaged in an activity that later or descendent groups either did not engage in, or modified how the activity was performed. However, much larger sample sizes and more complete skeletal remains will need to be evaluated before such inferences can be confidently made. Interestingly, Bullen (1970) observed bilateral asymmetry in the case study she presented from Grande Anse, St. Lucia, which also dates to this early period (AD 600). Asymmetry of the upper limbs was also noted at the Tutu site (Sandford et al., 2002), although it varied by side. The sex of individuals who exhibited asymmetry is not noted. Unfortunately, radiocarbon dates were not associated with the individuals who exhibited bilateral asymmetry at the Tutu site. It would be interesting to see if they also dated to the earlier occupation period at that site.

In addition to observations of cultural modifications to the skeleton, such as artificial cranial modification and assessments of cultural based activities (using teeth as tools and bilateral asymmetry), which allow interpretation of individual behaviors, other interpretations can be made regarding interpersonal relations. These interpretations can take the form of inferred assistance to individuals who suffered from disease and illness, but may also suggest periods of interpersonal violence.

There are many assumptions that go into interpreting what level of disability creates a functional deficit large enough to require support from other members of a group (Tilley and Oxenham, 2011). Assumptions regarding perceived disability, pain and tolerance levels and the personal need or desire for assistance are difficult to make without a cultural understanding of the population. For these and many other reasons the interpretation of caregiving has recently experience a fair amount of academic debate (Tilley, 2015). Dettwyler's (1991) article, *Can*

Paleopathology Provide Evidence for Compassion? created what Tilley (2015:43) defines as a "paralyzing effect on archaeological research into health-related care." However, Tilley (2015) argues that by utilizing more cross-case associations and applying a "bioarchaeology of care" methodology, inferences regarding the potential need for care and its provision within the cultural context of a given group can be made (Tilley, 2015; Tilley and Cameron, 2014). Tilley also discusses the scarcity of case studies in which the possibility of caregiving is considered and provides a list of 38 archaeological cases (2015:13-26) that propose the individual under study likely received care from their group members.

Within the Red House sample there were several individuals who may have received assistance from other members of the group. Care may take the form of preferential access to softer or more nutritious food, lightened workloads or actual caregiving such as medical treatment. There were five older adult individuals (A-CSNW-4-3, A-CSNW-4-4, A-NPC-1-1, A-NPC-1-3a and A-NPC-2-4) and one middle-older adult (A-G38-2-1b) who were identified by the antemortem loss of 15 or more teeth from the recovered dentition as edentulous or nearly edentulous. Several case studies identified by Tilley (2015) indicate the need for caregiving based on reduced masticatory ability (Buquet-Marcon et al., 2007; Lebel et al., 2001; Lordkipanidze et al., 2005, 2006). One individual within the Red House sample (A-G43-2-1) exhibited a healed displaced fracture to the left radius resulting in a shortened shaft, which may have resulted in abnormal function, while another individual (A-CSNW-4-4) exhibited a displaced midshaft fracture of the right humerus. Additional case studies have also suggested that fractures, particularly malaligned fractures, may have resulted in the need for caregiving (Lessa, 2011; Lovejoy and Heiple, 1981; Lubell et al., 2004; Schultz 2006). Tilley (2015:23) quotes Lessa (2011) who discusses the length of time necessary for remodeling and healing as "based

on modern clinical care [fractures] minimally take between three to four months" suggesting that in early populations recovery time may have been longer. It is important to note that while at least eight individuals within the Red House sample may have relied upon the caregiving of others this is a very preliminary assessment. Due to the lack of research directed specifically at interpretations of caregiving, the examples provided by Tilley (2015) and utilized above vary widely in time and place. Provisions for caregiving are intrinsically linked to the individual's environment (Tilley, 2015). A thorough application of the bioarchaeology of care method of analysis should be considered at a later date to refine the interpretation of care within the populations from which this sample is derived.

While indications of caregiving offer one perspective on interpersonal relations, other forms of interaction also occur within and between populations. When interpreting the possibility of interpersonal violence both antemortem and perimortem trauma must be considered. Overall, the level of antemortem trauma was fairly low in both the Red House site (11.7%, with only 7 cases noted in the MNI of 60) as well as in other Caribbean samples evaluated. In particular, antemortem trauma was noted as low in the Tutu sample (Sandford, et al, 2002) with one confirmed healed fracture and six possible fractures of the radius, ulna and/or femur. Bullen (1970) notes one fracture (to the distal right fibula) in her case study. Hofman et al., (2012) note four instances of fractures including the femur, radius and metacarpal as well as a lumbar vertebra. However, they do not indicate whether these fractures represent four individuals or if some individuals had more than one fracture. Fitzpatrick et al. (2009) note trauma in the remains of five individuals including the clavicle, humerus, ulna, radius, femur and fibula. Further, the distribution of fractures among individuals is not noted, nor is it noted if they represent antemortem or perimortem fractures. Bullen (1970) reports on one case of a fractured tibia from

the Erin site. Interestingly, while perimortem BFT indicative of interpersonal violence, which mostly likely resulted in death, was noted in one adolescent male from the Red House sample (A-CEP7-1), no other cranial trauma (neither antemortem nor perimortem) was noted in the other Caribbean samples evaluated. In addition, although no form of perimortem trauma was specifically noted in the comparative samples reviewed, it is important to recognize that in most of the studies trauma was not defined as either antemortem or perimortem.

In the Red House sample, with the exception of one individual who could only be aged as an adult, all cases of healed fractures were observed in middle-older and older aged adults. The seven instances of healed antemortem trauma noted within this sample may represent evidence of direct trauma and may possibly reflect violent interactions. Of particular interest is a healed depressed fracture above the left orbit of an older male individual (A-NPC-7-1), which is consistent with blunt force trauma and more than likely represents an episode of interpersonal violence.

Three individuals, a male (A-CSNW-4-2), a female (B-RFA-7-1) and one individual of indeterminate sex (A-G56-1-2), exhibited healed transverse fractures of metacarpal shafts that may represent violence. According to Galloway (1999), fractures to the metacarpals can be the result of direct blows to the hands and can also occur when striking an object with a closed fist resulting in a transverse fracture of the 4th and 5th metacarpal (often referred to as boxer's fracture). In addition, one female individual (A-G38-2-1b) exhibited fractured ribs. There was one instance of fractured long bones, a slightly displaced midshaft fracture of the humerus (A-CSNW-4-4) consistent with direct trauma, but not necessarily interpersonal violence.

When interpreting antemortem and perimortem skeletal trauma observed in the Red House sample that is consistent with direct trauma, it is important to consider that these fractures

may be the result of interpersonal violence that occurred within or between cultural groups. For example, oral traditions indicate that at the time of contact young Arawak warriors from two rival tribes participated in an annual battle at Port of Spain, which was also known as Port of Spayne, Puerto de España, Conquerabia, Cumucurapo or Mucurapo at different times (Basil Reid, 2016, personal communication). These battles may represent a form of cultural continuity from the pre-contact period. Harrod et al. (2012:64) point out that "in intra-group conflict, non-lethal violence is similar to lethal violence in that the desired outcome of confrontation is to gain status or resources through the submission of the other individual(s)." Multiple lines of evidence are useful in interpretations of non-lethal violence and ethnographic sources can offer a model to "reverse-engineer the osteological and forensic evidence" (Harrod et al., 2012:65). While it is not possible to determine if these instances of direct trauma represent intra or inter-group violence, the oral traditions regarding inter-tribal violence provide an opportunity to further investigate the possibility that the antemortem injuries observed in the Red House sample reflect potential inter-group warfare.

Burial Practices

Examining the burial practices of a population takes into account all the previous information gathered regarding the group's lifeway. Are all segments of the population represented? Are there differential burial positions, alignments or offerings left as grave goods? How do these factors reflect the individual's life or place within the living population? Mortuary rituals encompass all aspects of the memorialization process and while many forms of memorialization have changed over time certain common themes such as the variability of burial position, alignment and the offering of grave goods are observed across different burial complexes.

Interpretation of burial practices, particularly through comparative analysis, may lead to a better understanding of social behavior, material culture and cultural ideals (Rakita and Buikstra, 2008). Many of the studies from which information was drawn for comparative purposes were archaeological, as opposed to osteological, in nature. As such, far more information could be extracted regarding burial practices and mortuary behavior than could for osteological comparison. Overall, burial practices were quite diverse comprising primary, secondary and commingled burials, a pattern echoed at the Red House site. Further, burials at the Red House site did not reveal formalized patterns in burial position or alignment. However, important information was identified which contributes to an understanding of the Red House sample's burial practices.

To put this information in context it is important to remember that a comprehensive analysis depends on understanding the representativeness of the burial population. Concerns raised by the osteological paradox, the fragile nature of juvenile remains and the possibility of differential burial practices must be considered. Because many juvenile remains were recovered from faunal assemblages and time constraints prohibited a full examination of all faunal assemblages, the true extent of the juvenile burials at the Red House site is not know. However, several juvenile burials were identified within the same mortuary complex as adult burials. This pattern of both juvenile and adult burials was observed in most of the comparative samples evaluated. Exceptions include the Heywoods site (Drewett, 2004), Hope Estate site (Baetsen, 1999), the Smoke Alley site (Versteeg et al., 1993), La Pointe de Grande Anse (Van Den Bel and Romon, 2010), the Chancery Lane site (Drewett, 1991) and the Hillcrest site (Drewett, 1991), which represent only adult burials.

Burial position at the Red House site was quite variable ranging from tightly flexed to extended burials. Unfortunately, many positions were unobservable due to the disturbed nature of the remains. In addition, the use of the term "crouched" in may comparison studies is applied to both a sitting position as well as a flexed position placed either on the side or the back, which complicated comparative analysis with other skeletal samples. Interestingly, one individual in the Red House sample was buried in a semi-flexed prone position. The only other burial observed in this position was found at the Hope Estate site (Baetsen, 1999).

Overall, alignment at the Red House site was quite variable with a bias for alignment along a variation of the N-S or S-N axis. This pattern was also noted by Fitzpatrick et al. (2009:260), who report that in 19 burials excavated at Grand Bay, Carriacou "burial and facial orientation are variable with a slight preference for burials oriented along a N-S or S-N axis." Two sites are noted to be exceptions to this bias including the Lavoutte site (Hofman et al., 2012) in which 90% of the burials faced either E, NE or SE and the Heywoods site in which most burials were aligned along a W-E axis and only one burial was noted to be aligned along the S-N axis. In the Red House sample, of those burials in which alignment could be observed, 48% of the burials were aligned along a variation of the N-S axis and 48% were aligned along a variation of the S-N axis, with the remaining 17% of burials aligned along either the E-W or WNW- ESE axis. Variability with a lack of a clear pattern was also noted at the Anse à la Gourde site as well as in the Greater Antilles at the Maisabel site in Puerto Rico (Reid, 2015:47).

The most unique burial within this sample was found in a shallow pottery bowl. Dating to AD 1220-1295, Burial A-G38-2-SIP represents an individual between 6-8 years of age at the time of death. In addition to a unique interment style, this individual was buried with two

phyllite beads and a phyllite pendant. Gillott (2009) reports on several burials from Puerto Rico in which infants were either buried in or under a pottery container. In his examination of this practice Gillott (2009) suggests that the use of bowels as interment vessels is an investment of resources and that it is limited to only a few locations in the Caribbean (Puerto Rico and the Virgin Islands) and should therefore be evaluated with even greater care.

This survey of comparative skeletal samples supported the use of bowl burials in the Virgin Islands and the nearby island of Anguilla; however, interestingly, bowl burials were also quite prevalent at sites in Aruba. Sites with cases of bowl or urn burial noted in the northern Lesser Antilles included Tutu (Sandford et al., 2002), Aklis (Doran, n.d.), Sandy Ground (Crock, 2000) and Golden Rock (Versteeg et al, 1992). Bowl burials found at sites in Aruba included Santa Cruz C (Van Heekern, 1960), Santa Cruz D (Van Heekern, 1960), Savaneta (Van Heekern, 1960), Seroe Noka (Van Heekern, 1960) and the Tanki Flip site (Versteeg and Rostain, 1997).

Grave goods were rarely encountered at the Red House site and the most significant grave goods were associated with juvenile burials. This pattern was also seen throughout the Caribbean and is particularly noted at the Golden Rock site (Versteeg, 1993). During his review of infant 'baby bowl' burials Gillott (2009) points out that in the Greater Antilles grave goods are the exception rather than the rule in both adult and juvenile burials. Due to the disturbed nature of the Red House site caution should be applied in interpreting individual burial assemblages. However, in at least 11 adult burials and 3 juvenile burials it is likely that the artifacts found in association were placed there at the time of interment (Reid, 2015). In particular Burial A-CEP7-2, a young child between 3-4 years of age at the time of death, was found with several worked stone beads in association with the mandible and neck area.

While the analysis of burial patterns focuses heavily on the final deposition and interment of human remains, Charles (2008) argues that approaching the analysis of mortuary rituals as inherently centered on the death and memorialization process is limiting in nature and recommends a more holistic approach to the study with an attempt to "see what is (and was) there" (2008:16). Investigating the primary and secondary nature of burials as well as considering clues such as charcoal fragments in un-cremated remains can expand our interpretation of the lifeways of the early populations from which this sample is derived.

Many of the skeletal remains recovered at the Red House site are incomplete and interpreting the burials was complicated by an attempt to differentiate between site disturbance and manipulation of burials. Cultural practices documented at other Caribbean sites such as manipulation of the skeletal remains (Hoogland, 2010; Hoogland and Hofman, 1993; Hoogland and Hofman, 2013) suggest that skeletal elements may have been removed after decomposition and reinterred elsewhere. Several sources discuss manipulation of primary burials at sites such as Kelbey's Ridge 2 (Hoogland and Hofman, 1993, 2013; Mol, 2014), Golden Rock (Versteeg and Schinkel, 1992) and Anse à la Gourde (Hoogland, 2010). Manipulation at these sites was noted to take the form of the removal or rearrangement of skeletal elements. In some cases skeletal elements were reinterred in another burial within the complex. Hoogland (2010) also notes that manipulation could include not only the remove and secondary deposition of bones, but also the intentional fracturing of skeletal elements.

Charcoal and ash were often noted in the burial pit at sites such as Heywoods (Drewett, 2004), Kelbey's Ridge 2 (Hoogland and Hofman, 1993, 2013), Anse à la Gourde (Hoogland, 2010), Golden Rock (Versteeg and Schinkel, 1992) and Tanki Flip (Versteeg and Rostain, 1997). Residual charcoal and ash may be attributable to multi-stepped memorialization

processes. Hoogland (2010) cites historic sources, which describe burning the decedent's perishable belonging at the edge of the open burial pit. Versteeg and Schinkel (1992) also note the burning of the decedent's property.

Evaluating these cultural clues can help develop interpretations of what once 'was there' (Charles, 2008). Hoogland and Hofman (2013:461-462) describe a six-stage mortuary ritual from the Kelbey's Ridge site in which the primary interment of a 5 year old child was combined with the secondary interment of the cranium of a 3 year old child. Following this an adult male was added to the grave. The burial pit was left open for a period of time with a fire burning at the edge of the grave. It is interesting to note that in at least three instance fragments of charcoal were recovered along with the skeletal remains from the Red House site. It is also interesting to note that all three examples of charcoal were recovered from burials in the Rotunda Fountain Area and all date to the post-Saladoid cultural periods.

Interpretations of burial practices are one aspect of an osteobiographical approach to understanding past lifeways. This life-history approach to skeletal analysis goes beyond the laboratory, "expanding the analytical and interpretive scale from the grave outward to understand this person's context in life and death" (Stodder and Palkovich, 2014:1). Within the Red House sample there were several interesting individuals for whom portions of an osteobiography could be built. Burial A-CEP7-1 represents an adolescent male between the ages of 15-18 years of age at the time of death. Interestingly, this is the only individual who exhibited perimortem trauma. While less than 25% of this individual's skeletal remains were recovered, certain cultural indicators were available for analysis. This individual was one of only four individuals who exhibited artificial cranial modification. He also exhibited dental caries. In addition, this individual was recovered from a commingled burial. Based on

observations of BFT he also likely engaged in interpersonal violence, which mostly likely resulted in his death. As one of only four individuals who exhibited artificial cranial modification, Burial A-CEP7-1 may have held a different status than others within his population. Particularly as artificial cranial modification was observed in only 21% of the cranial vaults, which were complete enough for evaluation. Burial with a second individual (A-CEP7-2), may also suggest an association between the two individuals.

The second individual recovered from this burial (A-CEP7-2) represents a juvenile between 3-4 years of age at the time of death. This individual was buried with the most significant grave goods recovered from a burial at the Red House site including worked beads and a quartz crystal. Mortuary practices are performed by those left behind following the death of a group member. Therefore the inclusion of items such as those recovered with Burial A-CEP7-2 are reflections of memorialization practices, which may indicate ascribed status conferred by members of the group upon the decedent.

Another juvenile burial (A-G38-2-SIP) represents an individual between 6-8 years of age at the time of death. This individual exhibited several pathological conditions including dental caries and non-specific indicators of stress consistent with cribra orbitalia, porotic hyperostosis and linear enamel hypoplasias. Grave goods, which included two phyllite beads and a phyllite pendant, recovered from this burial suggest an elevated status within the group. In addition, the burial itself was significant as this was the only bowl burial encountered at the Red House site. As Gillott (2009) notes, the use of bowels as interment vessels is an investment of resources.

When evaluated at the individual level each of these juveniles represent individuals who may have been valued within their cultural group. Taken at an aggregate level, these burials

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suggest that juveniles may have held a place of significance within their cultural group. While these are not fully developed osteobiographies, they do provide a foundation for future research into the lifeways of the youngest members of these early populations.

Comparing burial practices at the Red House site to other Ceramic Age Caribbean samples identified commonalties such as bowl burials, the inclusion of grave goods with juvenile burials and the inclusion of at least some juvenile burials in the general burial sample. This allows a tentative interpretation of an inclusive population who did not exclude juveniles as other, or less than adults. However, it is important to note that many of the sites evaluated reflect the incomplete nature of the studies available for analysis and may not necessarily be fully representative of all burial practices. It will be through the continued evaluation of such cultural patterns in conjunction with osteological studies that further insight regarding these early populations will be achieved.

CHAPTER SIX: CONCLUSIONS AND FUTURE RESEARCH

Overall, the Red House site is a rich resource for researchers interested in the Caribbean's pre-Columbian mid to late Ceramic Age populations. The information presented in this thesis represents the results of the first analysis of a large mid to late Ceramic Age, pre-contact indigenous skeletal sample from Western Trinidad. The island's unique geographic location created a "natural gateway for human migrating, exchange and diffusion of culture" Boomert et al. (2013:1). In addition, the insular nature of the Caribbean island system afforded the opportunity to visualize interactions between the populations from which this sample is derived and their environment and revealed subsistence strategies that included a diet heavily based on marine resources but supplemented with estuarine, riverine and terrestrial foods including peccary, agouti and deer. Thus, the Red House sample enjoyed a diverse food supply from a variety of sources. It is against this framework of a unique island environment that the above osteological analysis achieves its greatest value, providing a basis for comparisons to be made by future researchers working with populations from similar environments. By incorporating general demographic information, presenting an overall assessment of health conditions including evidence for both antemortem and perimortem trauma with an assessment of burial patterns, general interpretations regarding the lifeways of the unique populations from which this sample is derived have been suggested.

Although the overall purpose of this research was to present the results of a bioarchaeological analysis of the Red House sample, three additional areas of research were identified for further study. These areas included an evaluation of the type of dental wear observed, an overview of artificial cranial modifications and an analysis of burial practices found within the sample. In addition, a comparison to other mid to late Ceramic Age samples regarding

dental wear, artificial cranial modification and mortuary practices was planned. The results of this research indicate that some members of the Red House sample exhibited a unique form of dental wear (LSAMAT) expressed by pronounced flat wear on the anterior lingual surface of the maxillary incisors. Investigations into this form of dental wear have been reported as ongoing. Therefore, the Red House sample makes a significant contribution to this underreported area of study. Cranial modification was the second area of planned investigation. While it was not possible to attribute a specific intention or meaning to the use of cranial modification in the Caribbean, the four examples and two possible examples of cranial modification found within this sample are similar to forms found in other areas of northern South America, and also lend themselves to further investigation as additional examples of cranial modification are found in the Caribbean.

Finally, while burials at the Red House site did not reveal formalized patterns in alignment or burial position, the majority of burial alignments did follow a variation of either the N-S, or S-N axis. Although similar findings were reported by Fitzpatrick et al. (2009), the variation in alignments may be too extensive to be significant at this time. The most noteworthy burial within the Red House sample was that of a 6-8 year old child (A-G38-2-SIP). This child, buried in a pottery vessel with two phyllite beads and a phyllite pendant, represents a unique form of burial rarely encountered in the Lesser Antilles. This is the first account of a bowl burial from Trinidad and therefore adds to the limited information regarding this type of mortuary behavior in the southern Lesser Antilles.

In addition to the three main areas identified for further investigation, another significant finding revealed through this research is based on the observation of change over time. Although the sample was aggregated, certain cultural indicators were observed in different

cultural periods. Interestingly bilateral asymmetery was only observed in the earliest, Saladoid, cultural period, while LSAMAT was only observed in the later, post-Saladoid cultural periods. This allows the very cautious interpretation that individuals in the early period were engaging in an activity that later groups either did not engage in or modified in function. A similarly cautious interpretation can be applied to LSAMAT suggesting that later groups utilized their maxillary incisors in a way that earlier groups did not. Interestingly, although artificial cranial modification was seen in all time periods, the type of modification appears to have changed over time. Both individuals who exhibited modified tabular forms of artificial cranial modification radiocarbon dated to the earliest cultural period, while the individuals who exhibited oblique tabular and tabular erect forms of artificial cranial modification were radiocarbon dated to the later post-Saladoid periods. Taken together these cultural modifications indicate a change in behaviors over time.

In 1951 Washburn called for a reassessment of how physical anthropologists analyze and synthesize osteological information, arguing that the field needed a "New Physical Anthropology" (1951:298). His paper was the catalyst for physical anthropologists to move from the purely descriptive to engaging scientific methods in the development of a more thoughtful, integrated, holistic approach to the interpretation of skeletal remains. Although Washburn (1951) was talking primarily about "primate evolution and human variation" (1951:298) in many respects it is a synthesis of the new with the old that is most necessary in future studies of Caribbean skeletal samples. It will be important to not only provide descriptive information, but to also take that information and contextualize it within the geographical, social and physical environments that past populations lived in. However, in doing so it will be necessary to maintain sight of the significant role the descriptive plays in allowing cross site

comparisons to be made. In some cases emphasis has been placed on interpretation at the expense of description and documentation. Throughout this thesis an attempt has been made to provide both the descriptive information necessary for future researchers to build from, as well as the contextual information required for the development of interpretations leading to a more perceptive understanding of past lifeways.

Future areas of research identified through this study include investigations into the occurrence of bilateral asymmetry in Saladoid period populations. Another important area for future research focuses on developing interpretations of juvenile lifeways in early Amerindian cultures. In addition, the limited nature of studies focused specifically on caregiving in past populations suggests an area of further research for individuals with antemortem conditions within this sample. The four-step bioarchaeology of care approach advocated by Tilley (2015) and Tilley and Cameron (2014) could be applied to a number of these individuals. Through such an analysis additional interpretations regarding the necessity and likelihood of caregiving could be made. Another possible area for future research includes extending the comparison of skeletal samples from only those in the Caribbean archipelago to similar island systems in other geographic areas. Finally, a multilingual approach to the literature would allow assessment of studies that have not been published in English, but which may contain osteological data useful for comparison with the Red House sample.

Overall, the osteological analysis presented here identified a minimum number of 60 individuals and provided a biological profile for each individual, evaluated antemortem conditions, perimortem trauma, cultural modifications and burial patterns. Through this assessment a preliminary interpretation of lifeways has evolved providing a significant contribution to the limited osteological data available for such samples in the Caribbean. Further,

by utilizing modern standards of skeletal analysis, this research addresses the concerns raised by Laffoon and DeVos (2011), who pointed out that while excavation of skeletal assemblages utilizing modern techniques and standards are rare in the Caribbean archipelago, even fewer such investigations have been undertaken in the Lesser Antilles. It is hoped that the research documented in this thesis will provide a solid a foundation for future research in this fascinating area of study.

APPENDIX A:
DATA COLLECTION FORMS

The Data Collection Forms can be found on page number 208 in the file *Appendix A.pdf*."

APPENDIX B:
ADULT SKELETAL REPORTS

The Adult Skeletal Reports can be found on page number 254 in the file *Appendix B.pdf*."

APPENDIX C:
JUVENILE SKELETAL REPORTS

The Juvenile Skeletal Reports can be found on page number 444 in the file *Appendix B.pdf*."

APPENDIX D:
REVIEW OF DATA FROM COMPARABLE CARIBBEAN
ARCHAEOLOGICAL SITES CONTAINING HUMAN BURIALS

St. Thomas

Tutu Village Site

The Tutu Archaeological Village site represents two main occupation periods, the first dates to approximately AD 65-900 and the second dates to approximately AD 1150-1500 (Righter, 2002). Archaeological excavations at this site are the result of rescue archaeology undertaken to mitigate cultural loss caused by construction of a new shopping mall. From this accidental discovery and rescue operation came the most holistic investigation of a Ceramic Age settlement in the Virgin Islands (Righter, 2002). This cross-disciplinary approach resulted in the best osteological documentation and evidence yet identified from a Caribbean sample for comparison to the Red House sample.

A total of 42 individuals were excavated from the site. Of these, 27 individuals were radiocarbon dated. Although overall site dating indicated a time range between AD 1150-1500, burials for which radiocarbon dates were available ranged between AD 450-1535 (Sandford et al., 2002). Overall, 22 burials represent the remains of adults (individuals aged 16 and older) and 20 burials represent the remains of juveniles (individuals aged 15 or younger) (Sandford, et al., 2002). Sex was not estimated for individuals assessed as juveniles. All but two adults could be assessed for sex, resulting in 14 individuals classified as female and 6 individuals classified as male.

Sandford et al. (2002) note a marked sexual dimorphism in the Tutu sample. Males were both more robust and taller than females with male mean stature averaging 158.20 $^+/_-$ 3 cm (62.28" or 5' 2$^1/_3$" $^+/_-$ 1.18") and female mean stature averaging 149.30 $^+/_-$ 4.70 cm (58.78" or 4' 10 3/4" $^+/_-$ 1.85"). Asymmetry of the upper limbs was also noted, although it varied by side. The sex of individuals who exhibited asymmetry is not noted.

A wide variety of antemortem conditions were noted in the analysis and include dental pathologies (dental caries, LEHs and dental wear), possible examples of metabolic stress (cribra orbitalia and porotic hyperostosis), generalized inflammatory reactions including osteoarthritis, as well as bilateral asymmetry of the upper limb and healed examples of antemortem trauma (Sandford et al., 2002). In most cases it is the presence of an antemortem condition that is noted; however, in this study the authors highlighted the fact that artificial cranial modification was absent in this sample.

Dentition within the Tutu sample exhibited a variety of antemortem conditions including calculus, dental caries, enamel defects, wear and attrition. However, assessments of antemortem tooth loss and periodontal disease were not conducted due to the "highly variable preservation of maxillary and mandibular alveoli" (Larsen et al., 2002:231). Within this sample 65.2% of adults exhibited dental caries while only two juveniles exhibited the same. Females exhibited a higher rate of carious lesions (64.3%) than did males in this sample (57.1%). Enamel defects in the form of LEH were observed exclusively in maxillary central incisors, maxillary canines and mandibular canines. Larsen et al. (2002) note a low prevalence of LEH in the Tutu sample with the prevalence for females lower (14.3%) than that found in males (42.9%). A variety of wear patterns were observed in the Tutu sample including occlusal surface wear, non-occlusal lingual wear consistent with LSAMAT, non-occlusal labial wear and extramasticatory occlusal wear (Larsen et al., 2002). Occlusal wear was consistent with sand and grit incorporated into the diet during food preparation. Larsen et al. (2002) point out that this is common in coastal and island environments, particularly in Caribbean populations utilizing grinding stones for food preparation. They also suggest that non-occlusal lingual wear (LSAMAT) may be the result of food preparation through stripping the edible portion with the incisors, much as modern

populations strip artichoke leaves with their maxillary teeth. Because there is rarely

corresponding wear on the mandibular incisors the authors suggest that the object was pulled

between the maxillary teeth and the tongue. Additionally, the occurrence of carious lesions in

association with lingual wear leads the authors to believe that this wear pattern is related to

processing carbohydrate based plants for consumption. Larsen et al. (2002) also note two

individuals (Burial #s 13 and 33) with non-occlusal labial wear. Although the type of wear noted

is similar to wear caused by labret use, when caused by a labret, wear is most often noted in the

lower lip. Additionally, Larsen et al.'s (2002) analysis of the groves suggests that it is more

likely associated with plant processing. However, they do caution that studies with additional

samples will be necessary to refine this interpretation. Other forms of non-masticatory wear

included occlusal surface grooves, which were observed in the dentition of two individuals.

Larsen et al. (2002) speculate that the grooves were caused by preparing fibrous plants such as

tubers for use in manufacturing cordage or the processing of similar material.

Inflammatory responses included "simple periosteal reactions to more dramatic

presentations" (Sandford et al., 2002:222). Many of these reactions are attributed to treponemal

infections, with 15 individuals exhibiting inflammatory lesions consistent with treponema. A

very detailed account of the location (bone) and type of inflammatory response is provided with

several tables and images in the authors' assessment of these pathological conditions. Metabolic

conditions (cribra orbitalia and porotic hyperostosis) were also noted in six adults (Burial #s 3,

9, 12, 13, 13A and 31) and four juveniles (Burial #s 6, 8A, 8B and 23A). Arthritic and

degenerative joint changes were extensively noted throughout the sample. Changes, expressed by

extensive osteoarthritic lipping, spiculation, porosity, eburnation and exostoses were noted

particularly within the synovial joints of the scapula/humerus and humerus/ulna and

humerus/radius. Although not all individuals exhibiting arthritic and degenerative joint changes were listed by burial number, burials 9 and 12 were highlighted as exhibiting the most extensive expression of this condition. These burials represent two of the most robust males within this sample. Interestingly, the authors note that adult females do not express the same level of joint deterioration, instead exhibiting minor amounts of porosity and lipping. Three individuals (Burial #s 3, 13 and 31) exhibited button osteomas to the cranial vault (Sandford, et al., 2002).

Indications of trauma were rare in the Tutu sample (Sandford, et al., 2002). No perimortem trauma was noted and only one female (Burial 23B) exhibited a healed complete fracture (bone not noted), although six individuals (Burial #s 1, 2, 3, 5, 10 and 19) exhibited possible healed fractures. The authors indicate that the radius, ulna and/or femur were the skeletal elements most often involved, but do not identify which possible fractures were associated with which burial. Therefore, an assessment of male vs. female prevalence in possible cases of trauma could not be made.

Burial positions were variable, although most individuals were buried in either a flexed or tightly flexed position (Sandford, et al., 2002). Alignment also varied with 17 individuals buried along a variation of either the N or NE axis, eight individuals buried along a variation of either the E or SE axis, four individuals buried along a variation of either the S or SE axis and with only one individual (Burial 29) aligned along a W axis. Interestingly, two juvenile individuals (Burial #s 15 and 24) were buried in pottery bowls, while three other juvenile individuals (Burial #s 7, 18 and 27) were found associated with pottery fragments, although it was not possible to determine whether or not the pottery represented a bowl burial (Sandford, et al., 2002). Overall, most burials were single burials although three double burials were identified (Burial #s 4/7, 8A/8B and 22A/22B). In each case the burials contained juvenile remains. Burial 4/7 contained

the remains of a young adult female (Burial 4) approximately 18-25 years of age at death and an infant (Burial 7) less than a year old at death. Burial 8A/8B contained the remains of two adolescents approximately 15 years of age at death and burial 22A/22B contained the remains of one child between 1.5-3 years of age at death and a second child between 2.5-5.5 years of age at death (Sandford, et al., 2002). Grave goods were associated with 15 burials (6 juvenile, 9 adult) and were most often associated with the Saladoid cultural period. Four of the juvenile burials containing grave goods (Burial #s 7, 15, 18 and 24) represent individuals less than one year of age at death. The remaining juvenile burials included one young child (Burial 27) less than 2 years of age at death and one older child (Burial 39) approximately 8 years of age at death. The adult burials containing grave goods were primarily associated with the early Saladoid period. Eight of the adult burials (Burial #s 3, 4, 10, 13, 13A, 21, 23B and 36) were associated with the earliest period (AD 450-969), while the ninth adult burial (Burial 40) was not dated. In addition, the authors note that while all but one of the adult burials (Burial 16) associated with the earliest period contained pottery in the form of grave goods, none of the adult burials associated with the later period were buried with pottery (Sandford, et al., 2002).

St. Croix

Aklis

The Aklis site dates to the late Saladoid period, approximately AD 600 (Doran, n.d.). Two burials in a state of extremely poor preservation were excavated following erosion caused by hurricane Hugo (1989). The remains were sent to Dr. Doran at Florida State University for analysis. Although not a published report, this analysis was significant as the skeletal remains were originally recovered inside a "large, 18-19 inch, boat shaped ceramic vessel" (Doran, n.d.).

All skeletal elements recovered for individual 1 were highly fragmentary. Following reconstruction sex and age assessments indicated an adult male at least 50 years of age at death.

All skeletal elements recovered for individual 2 were highly fragmentary. Following reconstruction sex assessments indicated a probable female. Following reconstruction sex and age assessments indicated an adult female between 18-50 years of age at death.

Judith's Fancy

The Judith's Fancy site dates to approximately AD 400-450 (Winter et al., 1989) and is defined as a special activities site, although the activities remain undefined. Four disturbed burials were excavated and analyzed (Winter et al., 1989).

Burial A represents a flexed burial. Age and sex assessments indicate an adult female at least 30 years of age at death. Dental wear was noted to be slight to moderate, with scores based on Smith (1984) ranging between 2-4. In addition, lingual wear was observed on both central incisors. The author suggests some form of processing activity is responsible for this wear pattern. In addition, flattening of the frontal bone is noted although no mention of possible artificial cranial modification is made and no images accompany the study.

Burial B represents a greatly disturbed burial precluding an observation of burial position. Age and sex assessments indicate an adult male at least 25 years of age at death. Dental wear was noted to be slight to moderate, with scores based on Smith (1984) ranging between 3-4. Interestingly, congenital absence of the mandibular 3rd molars is noted. In addition, flattening of the frontal bone is noted although no mention of possible artificial cranial modification is made and no images accompany the study.

Burial C represents a flexed burial lying on the back. Age and sex assessments indicate an adult female at least 35 years of age at death. Antemortem tooth loss was noted to teeth #s 22,

24, 25, 27, 29, 30 and 31. Wear was noted and the right 1st premolar (#28) was scored a seven based on Smith (1984). In addition, lingual wear was observed on both central incisors. The author suggests some form of processing activity is responsible for this wear pattern. Interestingly, a fronto-occipital cranial deformation (cephalic index of 86) is noted although no mention of possible artificial cranial modification is made and no images accompany the study.

Burial D represents a flexed burial of postcranial remains only. Age and sex assessments indicate an adult male at least 25 years of age at death. Grave goods consist of a diorite peltoid stone.

Anguilla

Rendezvous Bay

Hoogland and Hofman (2013:456) identify Rendezvous Bay as a late Ceramic Age site contributing to the overall knowledge of mortuary ritual for this period. However, they do not provide a reference for this site. Unfortunately, the only two references located offered little information. Dick et al. (1980) includes Rendezvous Bay in the first documented archaeological survey of Anguilla, but notes only that it is "[a] very large Indian site, with mounds still visible" (1980:36). Fortunately, Dr. Crock from the University of Vermont was able to provide a brief note regarding past work and additional remains recovered during salvage excavations at Rendezvous Bay (John Crock, PhD., personal communications, 2016). He notes that very little osteological work has been done with the remains recovered from Anguilla, and that no publications have focused on the osteology of the Island. All recently recovered remains represent flexed adult burials; however, that is all the information available, as their work has not yet been published.

The Sandy Ground site dates to the late Saladoid period, possibly as early as AD 300, with several periods of occupancy occurring through AD 1200-1500. The site may represent one of (along with Rendezvous Bay) the first ceramic period occupancies on the island (Crock, 2000). Two burials were fully excavated and Crock (2000:93) notes, "other skeletal material [was] recovered from disturbed contexts at the site." One of the excavated burials represented the bowl burial of an infant with radiocarbon dates placing the burial between AD 615-890. In addition to the bowl burial, an adult burial was also excavated. This individual was buried in a flexed position with radiocarbon dates placing the burial between AD 1045-1390 (Crock, 2000).

St. Martin

Hope Estate

The Hope Estate site dates to the late Saladoid period, approximately AD 600 or later (Baetsen, 1999) and is mentioned in three sources: Bonnissent and Richier (1995), Baetsen (1999) and Hoogland and Hofman (2013). However, reconciling the data is somewhat complicated. The earliest study (Bonnissent and Richier, 1995) identifies nine burials. However, the second study (Baetsen, 1999) identifies five burials, with only three excavated as of the study date, while the last source, Hoogland and Hofman, 2013, includes only a brief mention of the site as a burial assemblage dating to the early Ceramic Age. It appears as though Baetsen (1999) is discussing a subset of burials from the earlier nine burials Bonnissent and Richier (1995) describe. This possibility is suggested, as the biological profiles developed by both appear to have some overlap. However, Baetsen (1999) does not place his observations in context by discussing or referencing the earlier work of Bonnissent and Richier (1995), although he does mention that these burials are part of a larger cemetery complex that was destroyed during the

development of the Hope Estate property. Both report that the burials were located in the northeastern part of the site and both reference a partial excavation by Haviser in 1988. Further complicating the matter, Bonnissent and Richier's (1995) study is written almost entirely in French, with only the abstract available in English. Taking these factors into consideration an overview of the burials is provided based on Baetsen's (1999) study and that information which could be discerned from the abstract, tables and images provided in Bonnissent and Richier's (1995) study.

Baetsen (1999) discusses fieldwork undertaken in 1993, which uncovered five burials. Of these, three were excavated, although two of the three were partially excavated between 1987-1988. Two of the burials were flexed (Features 011 and 018), while one was buried face down (Feature 027). Baetsen suggests that this position may indicate that the individual "had fallen or been thrown on the ground" (1999:250). Grave goods were only found with one burial (Feature 018) and consisted of a late Cedrosan Saladoid bowl and dish along with a "spoon-like implement" (Baetsen, 1999:249) and five shells. The biological profiles developed included one probable female between 50-59 years of age at death (Feature 011). Baetsen (1999) notes that while morphological traits of the cranium and pelvis are consistent with a female classification, the mandible exhibited clear male characteristics, although he does not identify which characteristics. The second individual (Feature 018) was also classified as a probable female between the ages of 35-47 at the time of death. The third individual was classified as a male between the ages of 35-44 at the time of death. This was the only individual for whom a stature could be calculated resulting in an estimated living stature of 164 cm (64.57" or 5' 4 ½"). Pathological conditions noted included possible fusion of several vertebrae based on the authors' personal communication with Jay B. Haviser (1993), which could not be confirmed, arthritis of

(undefined) vertebrae (Feature 011) and the abscess of one molar (Feature 018). The

information available from Bonnissent and Richier's (1995) study includes identification of nine

burials, with orientations ranging generally from N-NW to S-SE. Biological profiles include four

females (ages: 35-47, 50-59, 30+. 30+), three males (ages: 35-44, 25+, 30+) and two of

indeterminate sex (one age only, 20+). Three individuals from Bonnissent and Richier's (1995)

study appear to correspond to Baetsen's (1999) burials. Burial 1 from Bonnissent and Richier's

(1995) study, a male between the ages of 35-44 at the time of death appears to overlap with

Baetsen's (1999) Feature #027 in age, sex, stature and burial position (Bonnissent and Richier,

1995:265). Burial 2 from Bonnissent and Richier's (1995) study appears to overlap with

Baetsen's (1999) Feature #018 in age, sex, burial position and pathological condition (molar

abscess). Burial 3 from Bonnissent and Richier's (1995) study appears to overlap with Baetsen's

(1999) Feature #011 in age, sex, burial position and pathological condition (arthritis). Both

Baetsen (1999) and Bonnissent and Richier (1995) identify these as primary burials. Further,

Bonnissent and Richier (1995) provide stature estimates for four additional burials: individual 5

(female) was assessed with an approximate living stature of 150-153 cm or 59.01"- 60.2" (4' 11"

- 5' ¼"). Burial 7 (female) was assessed with an approximate living stature of 156-159 cm or

61.42"- 62.6" (5' 1 $^1/_3$" - 5' 2 $^2/_3$ "). Burial 8 (male) was assessed with an approximate living

stature of 162-168 cm or 63.78"- 66.14" (5' 3 ¾" - 5' 6"). Burial 9 (male) was assessed with an

approximate living stature of 165-168 cm or 64.96"- 66.14" (5' 3 ¾" - 5' 5"). Burials 5, 7 and 9

are described as "foetale" or flexed, while burial 8 is described as "decubitus dorsal" or supine

(Bonnissent and Richier, 1995:265).

Saba

Kelbey's Ridge 2

The Kelbey's Ridge site dates to the late Ceramic Age, approximately AD 1350-1450 (Hoogland and Hofman, 2013). Seven burials (MNI=10) were excavated at this site, of which two were identified as composite burials containing the remains of both an adult and a child buried together. In addition, one burial was identified as the secondary interment of two children added at a later date to an adult primary burial (Hoogland and Hofman, 1993; Hoogland and Hofman, 2013). The biological profiles developed provide only of age and sex (where determined) and included one adult female (F148) with no age listed, one adult female (F132) approximately 50 years of age at death, one adult male (F068) approximately 50 years of age at death, one infant (buried with F148) approximately a few weeks old at death, one juvenile (F337) approximately two years of age at death, one juvenile (buried with F068) approximately five years of age at death, one juvenile (F313) approximately 12 years of age at death, a second juvenile (F166) approximately 12 years of age at death and one set of disarticulated remains (F149) attributed to a juvenile approximately five years of age at death (Hoogland and Hofman, 1993). In addition to the burial listed above, Hoogland and Hofman (2013) identify an additional juvenile approximately three years of age at death also interred with burial F068.

Five of the burials are associated with a structure and where noted burial positions are flexed (F166, F068) and orientations are provided "either with the head to the north-east (F132, F313 and F337) or the south-west (Fo68 and F148)" (Hoogland and Hofman, 1993:170). The authors draw particular attention to the burial practices at this site as they represent more complex mortuary rituals than those associated with early Ceramic Age burials. In addition, Kelbey's Ridge 2 is the only site with evidence of cremation in the Lesser Antilles (Hoogland

and Hofman, 1993; Hoogland and Hofman, 2013). Both the composite burials and the secondary interment represent juveniles and adults who are likely two generations removed from one another (Hoogland and Hofman, 1993; Hoogland and Hofman, 2013). Further, several cases of manipulation of skeletal remains are noted. For example, the right humerus associated with juvenile burial F337 was missing. Hoogland and Hofman note "[s]ince the skeleton is well preserved the humerus was certainly removed on purpose" (1993:170).

Most striking is the multistage mortuary ritual which Hoogland and Hofman (1993, 2013) describe involving burials F068, F149 and the cranial fragments of a juvenile, approximately three years of age at death. After the original interment of F068, a fire was burned in close proximity to the grave leaving remnants of charcoal and soot on the floor of the burial pit (Hoogland and Hofman, 1993; Hoogland and Hofman, 2013). Following this stage they note the removal of the right hand (bones not noted) and left leg (femur, tibia and fibula), as well as the 3rd through the 7th left ribs from burial F068 and observe that the cremated remains of a child, approximately five years of age at death, were placed in the space where the ribs were removed. Based on a taphonomic signature (an oval cluster) they feel the remains were originally encased in a cloth, which has since deteriorated. At some point additional cremains representing cranial fragments of a juvenile, approximately three years of age at death, were also added to the burial. Following the interment of the cremains, the authors suggest that the right hand was replaced over the cremains and three of the ribs that had been removed were placed next to it. Finally, the lower leg bones (tibia, fibula and patella) were reinterred in a generally anatomically correct position; however, the femur was retained. Mol (2014:180) notes that "[t]he open pits or removed bones served to materially anchor (part of) the deceased community member within the social networks of the living."

Further research led Hoogland and Hofman (1993, 2013) to identify the cremains associated with the five year old juvenile as part of burial F149. They base this assessment on the lack of duplicate elements between the identifiable fragments of cremains and the skeletal elements recovered from burial F149 as well as the absence of transverse fracture lines which would indicate that the bones were burned while still fleshed. These observations indicated that F149 was at first interred in a single burial, but later a selection of skeletal elements were exhumed, cremated and reinterred with burial F068 (Hoogland and Hofman, 1993). Additionally, based on early colonial sources, they authors believe that the cranium of the three year old juvenile had been retained, possibly in a container in the household, until both three year old's cranium and the skeletal elements exhumed from burial F149 were cremated and added to the burial of F068.

St. Eustatius

Golden Rock

Pre-Columbian features at the Golden Rock site, including postholes and midden material, date to approximately AD 600-900 (Versteeg et al., 1993). A total of 11 burials, including two post-contact period burials were excavated. Overall nine pre-Columbian burials were recovered. This study was more comprehensive than most and provided information by burial with the results of their osteological investigation included as an appendix. The pre-Columbian burials recovered are summarized below in a similar order.

Burial B1 represents a flexed burial aligned along the W-E axis. Sex and age assessments indicate an adult male between 55-60 years of age at death. Stature was calculated at 160cm or 63" (5' 3"). In addition, six different Harris lines were observed in the long bones. The authors suggest these may represent seasonal crop failures (Versteeg and Schinkel, 1992).

Burial B2 consisted of skull fragments only. The only osteological data available for this individual indicated that the remains represented an adult male.

Burial B3 represents an extended burial aligned along the NW-SE axis. Sex and age assessments indicate an adult female between 23-40 years of age at death. Stature was calculated between 153-158cm or 60.23-62.2" (5' ¼" – 5' 2¼"). Porotic hyperostosis was observed on the cranial vault and was noted as "severe" (Versteeg and Schinkel, 1992:244).

Burial B5 represents a semi-flexed burial aligned along the NW-SE axis. Sex and age assessments indicate an adolescent-young adult female approximately 18 years of age at death. Stature was calculated between 163-168cm or 64.2-66.14" (5'4 ¼" – 5' 6").

Burial B7 is the upper burial in a burial pit containing a second burial (B8) separated by 5cm of soil, which represents an extended burial aligned along the SW-NE axis. Sex and age assessments could not be conducted due to poor preservation and the authors recommend caution in their assessment of this burial as an adult individual.

Burial B8 is the lower burial in a burial pit containing a second burial (B7) separated by 5cm of soil, which represents an extended burial aligned along the SW-NE axis. Sex and age assessment indicate a female individual 37-47 years of age at death. Stature was calculated between 160-166cm or 63" – 65.4" (5' 3" – 5' 5½"). Extensive carious lesions were noted and the authors suggest that this may have been due to high carbohydrate foods such as sweet potatoes, tropical fruits and manioc. Grave goods consist of a shell tool recovered from the thorax area. In addition, charcoal and ash were noted in both burials. The authors suggest that this is a result of "ritual burning of goods of the dead" (Versteeg and Schinkel, 1992:176), although it is unclear if this means grave offerings or the belongings of the dead. However, they continue and suggest that the remains of the fire were then spread in the grave.

Burial B9 represents a tightly flexed burial aligned along the NE-SW axis with a pottery bowl inverted over the burial. This burial was radiocarbon dated to between 80 BC and AD 880. Age assessment indicated an individual approximately 14 years of age at death. Sex and stature were not assessed. Grave goods consisting of a shell tool and coral were recovered from the thorax area. In addition, ash and charcoal were also noted in this burial.

Burial B10 consisted of only fragments of unidentified alveolar processes with teeth. The authors suggest that either the removal of the remaining skeletal elements or poor preservation account for the minimal recovery. However, although few skeletal elements were recovered, grave goods included two conch shells and three pottery vessels.

Burial B11 consisted of only fragments of a juvenile skull including deciduous teeth, and long bone fragments. The authors again suggest that either the removal of the remaining skeletal elements or poor preservation account for the minimal recovery. However, this burial contained the largest collection of grave goods included three shell plaques, 84 quartz and shell beads, as well as two pottery vessels.

Smoke Alley

Only one reference to the Smoke Alley site was found. Versteeg et al. identify their 1993 paper as the first presentation of data from the Smoke Alley site. Although the purpose of the study was to present a comparison of the relative merits and drawbacks of large-scale excavation versus surveys, limited osteological information could be gathered from the paper and accompanying photographs. Two burials were located at the site, both associated with a midden. Radiocarbon dates from human bone place the burials between approximately AD 1000-1160. Based on images provided, Burial F 50 (Versteeg et al., 1993:156) appears to be buried in a flexed position aligned along a S-N axis. No further information was located concerning these

burials; however, it is important to note them in this overview in an attempt to present as much data as possible concerning these early Caribbean populations.

St. Kitts

Bloody Point

Hoogland and Hofman (2013:455) identify Bloody Point as one of a handful of sites representing the largest burial assemblages known for the later phase of the early Ceramic Age. However, the reference they cite, *Report on the Excavations at Bloody Point, St. Kitts* (Farr, 1996), was not available through any inter-library loan source. Laffoon (2012) provides slightly more information identifying the site as contemporaneous (AD 600-900) to the Golden Rock site on St. Eustatius. He also notes that "several burials were excavate" (2012:115) and that burial positions encountered were both flexed and extended and that both single and multiple burial features were noted. Laffoon (2012) also cites Farr (1996) as his source.

Guadeloupe

Anse à la Gourde

The Anse à la Gourde site holds great potential as a comparative skeletal population; however, osteological data for all skeletal remains were not available for comparison. Leiden University and Archaeological Service of the Direction Régionale des Affaires Culturelles of Guadeloupe (DRAC) excavated the site between 1995 and 2001. Two main occupation periods were identified at the site, AD 500-700 (first occupation) and AD 900-1400 (second occupation) (Laffoon, 2012), with an overall date range of AD 450-1420 (Hoogland et al., 2010). However, all radiocarbon dated burials fall between the range of AD 1020-1410 (Hoogland et al. 2010). A total of 83 burials were excavated and the archaeology of the site has been documented in a thesis, several research papers and a book chapter (Beets et al., 2006; Hoogland et al., 2010;

Laffoon and deVos, 2011: Morsink, 2006). Although an full osteological analysis of the remains is not available, Hoogland et al. (2010) provide an overview of the age and sex distribution. In addition, some observations of mortuary practice have been published (Laffoon, 2012) and are useful in comparison to the Red House sample.

Hoogland et al.'s (2010) book chapter offered the most information on the skeletal population for this site. Although primarily focused on mobility and exchange, some osteological data and information regarding mortuary practice could be extrapolated to assist in a comparative analysis. An MNI of 93 was calculated for the 83 burials encountered (Hoogland et al., 2010). He also notes that most of the remains represented adult individuals with only 11% of the remains assessed as juvenile, which the author feels may indicate differential burial practices. (Hoogland et al., 2010). Of those individuals for whom sex could be assessed, 38% were male and 62% were female. Hoogland et al. (2012) also suggests that the bias toward females in the burial population may reflect either a higher female mortality rate or the possibility that males died in distant locations due to trade or warfare. Burial clusters containing three to 10 individuals per cluster were observed, and that the clusters are all associated with house structures (Hoogland et al., 2010; and Laffoon, 2012). Hoogland et al. (2010) note that both primary and secondary burials were identified, as were both individual and composite burials. He also reports that burial position varied from seated and semi-seated to extended. Males in particular were more likely to be buried in a seated or semi-seated position. Hoogland (2010) suggests this may indicate that they were originally seated on a stool, which later decomposed. Interestingly, Hoogland et al. (2010:153) note that mortuary behavior included the "removal, intentional fracturing, and secondary deposition of bones, as well as the interment of skeletal remains of an additional individual in a grave and the displacement of bones within the context of the grave."

However, he does not indicate how interpretation of these behaviors came about, or if the burials were disturbed during later site activities. Ash was recovered from several places both in the burial pit and on the ground above it. Hoogland et al. (2010) cite historical documents, which identify ceremonial fires burning at the edge of a grave with an elderly female relative attending the fire. In addition, these sources suggest that perishable items belonging to the deceased were burned in these ceremonial fires.

Two other interesting mortuary practices were noted, the identification of postholes placed around the grave of some burials and the use of pottery vessels to either cover the opening of the burial (50-60 cm wide plates), or bowls placed over the face of the deceased. Grave goods included twenty-one *Strombus* pebbles (all found in one burial), a flint core, greenstone clets (2), and shell beads, which are interpreted as belonging to a some form of adornment either on a piece of clothing or as an ornament. Unfortunately for the sake of comparisons, Hoogland et al.'s (2010) chapter does not correlate the age or sex of the individual with the associated grave goods. However, they do note that based on strontium isotope analysis fourteen individuals were identified as non-local including three adults for whom sex was indeterminate, four adult males and three adult females. Grave goods were found in association with eight of the non-local individual's burials (two of indeterminate sex, one male and five females) and included shell and coral artifacts, lithics, and a shark's tooth with a perforation hole. Most interesting was an apron or belt made of over 1,000 *strombus* beads. Hoogland (2010) points out that no similar artifacts were recovered from the burials of individuals identified as local to the area.

La Pointe de Grande Anse

The La Pointe de Grande Anse site dates to approximately AD 650-1600 (Van Den Bel and Romon, 2010). Although primarily an archaeological site report lacking osteological

information such as biological profiles and observations of pathological conditions, Van Den Bel and Romon (2010) do provide useful information regarding mortuary practices. A total of 16 burials were excavated; however, five of the burials were fragmentary and incomplete due to poor preservation and site disturbances. Guadeloupe is a volcanic island and the high acidity in the soil leads to poor preservation of osseous material (Van Den Bel and Romon, 2010). In addition, only adult burials were encountered, suggesting that juveniles were buried in another location. Of the 16 burials, seven are considered primary burials. Burial alignment varied although it was more difficult to discern alignment along an axis based on the authors description of burial alignment as "6 directed towards the north, 1 to the south, 1 to the south-east, 1 to the south, 2 to the west and 1 towards the north-west" (Van Den Bel and Romon, 2010:8). Several burials contain commingled remains. Burial 33 is a double burial; however, the authors note that the burials took place at different intervals with the second individual interred after the first was fully decomposed. Thus allowing bones from the first individual to be displaced and commingled with the second individual.

The most interesting contribution this study makes to the overall analysis is the authors' observations regarding burial customs. They note that primary burials are the most common in the Lesser Antilles and describe the burial process. According to Van Den Bel and Romon, (2010) in general, once the deceased was buried the burial was normally left undisturbed. However, they also note that following decomposition it was not uncommon to have the burial relocated to a secondary interment or to remove some skeletal elements and leave others. The authors generally attribute this type of mortuary behavior to late Ceramic Age sites. They suggest that this practice accounts for some of the incomplete burials but also recognize that colonial era activities disturbed several of the burials. In addition, they suggest that some of the

disarticulation noticed in the burials may be the result of the body being prepared for burial by being gathered or wrapped in a perishable material such as a hammock or basket. As the perishable material decomposed, it created a space within the burial environment, which allowed the skeletal elements to disarticulate and appear to have been moved.

St. Lucia

Grande Anse

Bullen (1970) provides a case study of an individual burial from Grande Anse, St. Lucia. The adult female was found in a flexed position with associated grave goods reflective of the Saladoid cultural period including a burnished bowl painted with a red color and another undecorated, shallow bowl. Radiocarbon dates from a similar same strategic level (5.5'-6') in the "same general area" (Bullen 1970:45) dates to approximately AD 490 $^+/.$ 80, although Bullen (1970) suggests the burial depth (4') is more reflective of an AD 600 date.

The biological profile developed for this individual by Bullen (1970:47) indicates an adult female, although no age range other than "fully mature" based on eruption of the third molars is given. Stature is calculated utilizing the formula provided by Genovés (1967) and indicated this individual was approximately 151.1 cm or 59.5" (4' ll½") tall in life. Bullen (1970) makes note of the short, broad skull morphology (huperbrachycranic calculation 87.9). She also notes parietal bossing and a slight flattening at the back of the skull. However, the accompanying image shows no indication of artificial cranial modification. Dental pathology including antemortem tooth loss and apparent periodontal disease expressed by alveolar resorption along with dental caries in the lower right M1 and M3 (#s 1 and 3) and an abscess associated with the upper left canine (#11) is noted. In addition Bullen notes, "the slight overbite had smoothed the lingual surface of an upper shovel-shaped incisor" (1970:54). Unfortunately, there are no

pictures of this tooth as it would be interesting to compare it to the LSAMAT wear pattern. Bullen (1970) also notes several other pathological conditions including a healed fracture with signs of infection to the distal aspect of the right fibula and indications of osteoarthritis which are more pronounced on the right side of the body, including the right ulna, right tibia and right sacroiliac joint. Interestingly, she also notes bilateral asymmetry of the muscle attachments and shafts of the right humerus, ulna and femur. Further, the right femur has a distinct curve to the shaft when compared to the left femur. Bullen (1970) suggests the bilateral asymmetry may be due to using a stick as a staff to compensate for the healed fracture of the right fibula. However, she offers an alternate hypothesis based on ethnographic observations of contemporary South American indigenous populations who sit in a hammock on their left leg, pushing off with their right leg and spinning thread with their right hand.

Lavoutte

The Lavoutte site is a late Ceramic Age site dates roughly to the period between AD 1000-1500 (Hofman et al., 2012; Hofman and Hoogland, 2009). Erosion, always a problem in coastal areas, was accelerated at this site due to storm damage (hurricane Dean, 2007) and construction activity. A 2009 site visit noted human burials eroding from the sand and rescue archaeology was undertaken between 2009-2010, to safely excavate the site and remove the remaining burials (Hofman et al., 2012). Due to exposure, many of the skeletal remains were damaged and others were lost. Overall 45 graves (MNI 49) were excavated during the 2009-2010 season, and three graves (MNI 4) were excavated by the University of Vienna in the 1980s, resulting in an overall MNI of 53. The majority of the remains were highly fragmented and in poor-very poor condition (64.2%). This complicated the biological profile and the information available for comparison is limited. However, in spite of these challenges, a great deal of useful

information was acquired during their analysis of the skeletal population. Hofman et al. (2012) suggest that the overall profile, taking into account age and sex, indicates an accumulation of burials occurring naturally over time. They note minimal recovery of juvenile remains and suggest that this may be due to differential burial practices. The authors also note that 32.7% (16 of 49 individuals) exhibited some form of skeletal pathology including, one case of yaws (treponematosis), osteoarthritis and non-specific infection. In addition, activity related musculoskeletal stress markers were noted to the humeri of adult individuals, with 16.3% of the overall adult population and 43% of the male adult population exhibiting such markers. Unfortunately, it is not noted if these were expressed through robusticity at muscle insertion points alone or by bilateral asymmetry in cortical thickness.

Trauma was also noted in the population and included a compression fracture of the femoral neck, a fractured lumbar vertebra, a fractured radius shaft and a fractured metacarpal shaft. The authors suggest that these types of fractures are often related to demanding physical activity, although they do note that the radial fracture was more likely due to a fall or direct trauma. Dental pathologies were also evaluated and in addition to an overall high degree of dental wear and dental caries in the population, they found a higher incident of dental caries in females than they did in males (17.53% and 15.17% respectively). Further, they noted a LSAMAT wear patterns in 13 adult individuals of both sexes. The authors discuss Turner and Machado's (1983) argument that LSAMAT is masticatory based, but also point out that the lack of this wear pattern in juvenile dentition could support the teeth as tools interpretation as a causative factor.

Along with an assessment of the skeletal remains Hofman et al. (2012) also provide an overview of mortuary practices. In this case the researchers observed a level of uniformity to

burial patterns with orientation consistently (90%) facing E, NE or SE. Burial position is often

noted as 'seated' or reclined and semi-flexed to tightly flexed. Based on a taphonomic analysis

(which is not defined) the authors identified several burials in which the burial pit was left open

during decomposition resulting in displacement and disarticulation of the skeletal elements

"outside the body volume" (Hofman, et al., 2010:219). While they note that most burials (42 of

45 burials) represent primary interments, they identify three burials as secondary burials, and

four secondary interments of skeletal elements with primary burials. The authors also note that

grave goods were rarely encountered, although they do not identify what percentage of graves or

how many graves contained grave goods.

Barbados

Several burial sites were identified in Barbados. Drewett (1991) reports that although

human remains were recovered from four sites (Greenland, Mawell, Brandos and Chancery

Lane) prior to1985, comprehensive recording of the burials was not performed. Of these, only

remains from the Greenland site were preserved. Unfortunately, he does not site the studies or

reports (however incomplete they may be) on the early work from these sites. He does offer

some observations about the Greenland and Hillcrest sites, noted below. Drewett (1991) also

reports that between 1985-1991 23 burials were excavated from eight sites; however, he does not

identify these eight sites. However, his survey of the work done at three sites (Chancery Lane,

Hillcrest and Silver Sands) during this period provides information for each burial. Of particular

interest are Burial #s 2 and 3 from the Hillcrest site. Both individuals are noted to exhibit mild

flattening of the mid-frontal aspect of the cranial vault. This flattening is attributed to artificial

cranial modification, likely due to "cradling practices, either by binding or boarding (Drewett,

1991:171). In addition to these sites, a later publication by Drewett (2004) provides information

regarding the Heywoods site, a post-Saladoid cemetery complex for which a complete excavation was conducted.

Chancery Lane

Radiocarbon dates based on shell and charcoal date the site to between AD 180-380 (Drewett, 1991). Four adult burials were recovered including one probable female, two probable males, and one individual for whom sex could not be assessed.

Burial 1 represents a disturbed adult burial, which was poorly preserved and incomplete. Although alignment could not be determined, it is possible the head was aligned toward the south however, this interpretation was made based on disturbed postcranial material, as the skull was not recovered.

Burial 2 represents a flexed burial aligned along the N-S axis. Sex and age assessments indicate (based on robusticity) indicate a probable male in his mid-20s at the time of death. Although the posterior dentition exhibited minimal wear, the incisors are noted as "well worn down" (Drewett, 1991:169), which is interpreted as an indication of cultural activity.

Burial 3 represents a possible extended burial aligned along the N-S axis. Sex and age assessments indicate (based on robusticity) indicate a probable male in his mid-20s at the time of death. The teeth are noted to have the same wear pattern as that observed in burial 2.

Burial 4 represents a flexed burial aligned along the N-S axis. Sex and age assessments indicate a probable female individual, based on cranial morphology (although this individual exhibited a narrow greater sciatic notch) 45-55 years of age at death. Although no dentition was recovered, antemortem tooth loss was noted in the mandible.

Drewett (1991) notes that multiple burials were found at both sites, including the burial

of an adult male represented by a set of disarticulated bones. In addition, a commingled burial is

noted at the Hillcrest site containing the bones of "two crouching females, one in a sitting

position" (Drewett, 1991:169), which were interred with the remains of an adult male likely in

his 30s at the time of death. The description of the 'crouching' females illustrates the use of this

term for both seated burials and what would generally be termed flexed burials based on

standardizations provided by Sprague (2005) in which the individual is flexed and lying on either

their side or their back.

Heywoods

The Heywoods site represents a post-Saladoid cemetery, which was fully excavated

between 1995-1999 (Drewett, 2004). The total burial population is not noted and Drewett's

(2004) chapter concerns only 10 burials located in the northwest corner of the area excavated

during the 1998-1999 field season. Unfortunately, poor preservation limited the analyses of age

and sex, although it was noted that all the burials represented adult individuals and that both men

and women were represented. Mortuary practices of note include the absence of any juvenile

remains and the grouping of burials in clusters. The individuals included in the clusters are

interpreted as those belonging to a "kin group but perhaps of equal status " (Drewett, 2004). In

addition, all burials were flexed and the author suggests they were buried in hammocks. Further

most burials were aligned along the W-E axis. The only grave goods noted were two stone beads

found with the burial of an adult male and adult female who was oriented at a 90° angle to the

male individual's feet placing her along the S-N axis. This double burial was outside the main

burial cluster. This location and the presence of grave goods is interpreted as a possible

matrimonial couple of higher ranking. Drewett (2004:221) asks the question, "Do these burials perhaps represent the village chief and his wife?" although he does not make a firm determination of this possibility.

Hillcrest

Radiocarbon dates based on a shell axe date the site to approximately AD 870 (Drewett, 1991). Three adult burials were recovered including one male and two females. As noted above Burial #s 2 and 3 exhibited mild flattening of the mid-frontal aspect of the cranial vault attributed to artificial cranial modification.

Burial 1 consists only of a skull. Sex assessment, based on morphological features of the cranium and mandible, indicates a probable female. No maxillary teeth were available for assessment due to poor preservation; however, the mandible was fully edentulous. The author suggests an age of 30 years or greater based on the edentulous nature of the mandible, but cautions that a younger age is possible.

Burial 2, which was not fully excavated, represented a partially disarticulated burial. Sex and age assessments indicate a male aged 30 years or greater at the time of death. Antemortem tooth loss was noted to be extensive with sockets for only three maxillary teeth and four mandibular teeth remaining.

Burial 3 represents a flexed burial aligned along the NW-SE axis. Sex and age assessments indicate a female approximately 25-35 years of age at the time of death. Carious lesions are noted in two molars and one incisor (tooth #s not noted). In addition, arthritic lipping was noted to the lumbar and some thoracic vertebrae.

Silver Sands

Radiocarbon dates based on the right femora of burials 3 and 4 date the site to between AD 950-1300 (Drewett, 1991). Ten burials were identified; however, only seven burials were fully excavated. Two burials (#s 7 and 8) were not excavated, as it is believed they date to the post-contact period based on observed coffin nails. In addition to the burials, isolated skeletal elements were recovered from 10 different contexts. Although the information available from the isolated assemblages is limited and varied, of note is a deciduous canine complete with the root through which a suspension hole had been drilled. This was the only skeletal element recovered from that particular context, and no other information is available.

Burial 1 represents what the author identified as a "crouched" burial (Drewett, 1990:173). However, this term is used for both flexed burials as well as seated or semi-seated burials (as defined by Sprague, 2005); therefore, the actual burial position is unclear. Alignment was identified as along the NW-SE axis. Sex and age assessments indicate a male approximately 25-35 years of age at the time of death. A parrot fish jaw was also recovered and may represent a burial offering (Drewett, 1990).

Burial 2 represents an extended burial. Alignment was not noted. Sex and age assessments indicate a female approximately 17-25 years of age at the time of death. Carious lesions were noted in six molars and two molars were lost antemortem (tooth #s not indicated). Possible grave goods include four fragments parrot fish jaw and a dog tooth exhibiting modifications (not defined). The author cautions that these may represent burial offerings or may have been inadvertently introduced to the burial as the grave was filled in.

Burial 3 represents an extended burial. Alignment was not noted. Sex was assessed as a probable male. Age was noted as uncertain based on minor tooth wear (suggesting a younger

adult) in conjunction with arthritic lipping of the vertebrae (suggesting a somewhat older adult). Pathological conditions include a "thickened' right tibia (Drewett, 1990:173) and a healed, slightly displaced mid-shaft fracture of the left humerus. Grave goods include a conch shell disc recovered from the right shoulder as well as parrot fish bones.

Burial 4 represents a burial identified as crouched and alignment was not noted. Sex and age assessments indicate an older male individual. The mandible was fully edentulous, and slight arthritic lipping was noted to the vertebrae (which vertebrae are not noted) A conch shell disc was recovered from the right shoulder and likely was placed there on purpose as the conch shell disc recovered from Burial #3 was found in the same location.

Burial 5 consists only of the right lower leg and foot bones, the left foot bones and isolated cranial fragments.

Burial 6 represents a disturbed burial containing only a few skeletal elements including the cranium, right ulna, os coxae and foot bones. No age or sex assessments were available. It would appear that if the cranium and os coxae were recovered age and sex assessment could have been conducted, so perhaps these elements were highly fragmented, although they are not noted as such.

Burial 9 represents a burial identified as crouched; however, the accompanying figure and more detailed description indicate this was a flexed burial (as defined by Sprague, 2005). Based on the stratigraphy the author suggests that this individual dates to the late Amerindian occupation or may date to the post-contact period. Sex and age assessments indicate an adult male approximately 25-35 years of age at the time of death. Stature was estimated to be between 158.73 -164.43 cm or 62.49-64.74" (5' 3½" – 5' 5¾") Pathological conditions noted include arthritic lipping to the vertebrae and what appears from the description provided, "a rounded and

pitted swelling…with two sinus apertures" along with "irregular zones of inflammatory new bone, with further sinus openings," (Drewett, 1991:174) to be osteomyelitis perhaps due to a fracture of the left humerus, which was noted by x-ray. In addition, joint inflammation expressed as erosive destruction was noted to the left to the humeral head.

Burial 10 was not fully excavated and is thought to represent a juvenile burial based on the fragmentary cranial elements and fragmentary clavicle recovered.

Carriacou

Grand Bay

The Grand Bay site dates to approximately AD 390-1410 (Fitzpatrick et al., 2009). Overall, 19 burials have been excavated from the site; however, a detailed osteological analysis is not available for these remains. Fitzpatrick et al. (2009) do provide a summary of the excavations from which some basic osteological information as well as information regarding burial practices can be extrapolated.

Most burials represented primary burials although there a slight preference for N-S or S-N alignment, burial alignment was variable. Burials were noted to be flexed, either is a seated position (several were noted to be leaning to the side) or lying on the back. Thirteen adults, four juveniles and burials in which the remains were either not fully excavated or fragmentary were identified. Of the adult remains that could be assessed for sex one was assessed as possible female, five were assessed as female and two were assessed as male. One set of juvenile remains aged between 14-15 years of age at death was assessed as male and one set of juvenile remains aged between 10-14 years of age at death was assessed as a possible male.

Trauma was noted in the remains of five individuals. However, whether the trauma was antemortem or perimortem was not noted, nor was trauma correlated with individual burials,

precluding the ability to assess the prevalence of trauma in male or female individuals. The types of trauma noted include fractures involving multiple different skeletal elements including the clavicle humerus, ulna, radius femur and fibula. Few pathological conditions were noted although two juveniles exhibited periostitis on the posterior aspect of multiple ribs. In one case periostitis extended from the ribs to the sternum.

Aruba

Santa Cruz C

Van Heekern (1960) reports that the burial of a "human embryo" (1960:108) was recovered under an inverted pottery urn by De Josselin De Jong in 1923. This site is undated.

Santa Cruz D

Van Heekern (1960) also reports on three burial excavated by De Josselin De Jong in 1923. The first burial consisted of an urn containing two smaller pots and a human skull. The second burial consisted of an adult individual with an inverted pottery vessel inverted over the skull. The third burial consisted of a small urn with only a few undefined skeletal elements. In addition, a skull was excavated from between these two urns, which the author suggests may have originated in the third burial urn. This site is undated.

Savaneta

Van Heekern (1960) also reports that a nearly complete burial urn was uncovered during road construction in 1951. He notes deer antlers and a millstone, but does not note if it actually contained human remains. The find is undated. In addition, Van Heekern (1996) also reports on a second burial urn, recovered by K.J. Van Gaalen in 1956, which contained the remains of a

human skull and a perforated shell bead. He identifies this as a secondary burial; however, it is also undated.

Seroe Noka

Van Heekern (1960) also reports that two burial urns were recovered in 1953 from the Seroe Noka site. One urn contained the commingled remains of between three and four individual and a fragment of a griddle, which is identified as a secondary burial. The site is undated and the field, which was approximately 300 meters square, was bulldozed at a later date.

Tanki Flip

The Tanki Flip site has been radiocarbon dated to approximately AD 950-1250 (Saunders, 2005). Versteeg and Rostain (1997) report on seven burials (MNI 15) excavated during the 1994-1995 field season. In addition, they note that E. Boerstra's 1977 excavations uncovered a "large number of individuals" (Versteeg and Rostain, 1997:315) and excavations by M. Kersten in 1989 and F. Croes in 1993 revealed two additional individuals. However, Versteeg and Rostain (1997) note that these excavations were not analyzed by a physical anthropologist, the data were not fully published and the preliminary reports are no longer available.

There are several interesting distinctions regarding the burials excavated during the 1994-1995 field season (which are summarized by burial number below). First, all burials with the exception of one adult burial (F 2556) utilize pottery vessels. Further, nearly as many juvenile remains were recovered (7) as adult remains (8) and in addition to the pottery vessels, with the exception of two infant burials (B 836 and B 2559), all burials contained additional grave goods.

Burial F 836 represents the fragmentary remains of an infant likely around 40 weeks of age at death. The burial was covered by an inverted pottery vessel.

Burial F 2559 represents the fragmentary remains of an infant likely around 40 weeks of age at death. The burial was also covered by an inverted pottery vessel.

Burial F 2556 represents a flexed burial aligned along an E-W axis. Sex and age assessments indicate a male between approximately 33-45 years of age at the time of death. Grave goods consist of two shell beads, which had not been perforated.

Burial F 1701B represents the fragmentary remains of three individuals represented by poorly preserved bone fragments and 20 teeth. The burial included a young child approximately 4-6 years of age at the time of death, an adolescent / young adult approximately 17-25 years of age at death and an adult likely 40 years or older at the time of death. The remains were found below two burial urns. Unlike the other burials containing pottery vessels, these urns were upright with a smaller urn situated inside a larger urn. In addition to the urns, grave goods included two shell beads, which had not been perforated, one perforated shell bead a small black stone and a quartz bead. Charcoal was also recovered from the burial pit.

Burial F 1702 represents the burial of a small child approximately eight years of age at death. A large urn with a corrugated rim was placed upright above this burial. Grave goods included two shell beads, which had not been perforated, a quartz stone and four shell fragments. Charcoal was also recovered from the interior of the burial urn.

Burial F 1702A represents the commingled burial of the postcranial remains of a small child (younger than eight years of age at death) and the cranium and fragmentary mandible, including dentition, of an individual likely at least eight years of age at death. A large urn with a corrugated rim was placed inverted over this burial. However, comparison of the dentition found with the postcranial skeletal elements recovered in burial F 1702A to the dental elements recovered from Burial F 1702 suggest that the cranium and all dental elements belong to the

individual in Burial F 1702. Grave goods included a perforated circular schist bead and two shell beads, which had not been perforated. Charcoal was also recovered from the burial pit.

Burial F 1822A represents the commingled remains of five adults and two juveniles. All skeletal remains were recovered from two urns, with a smaller urn inside a larger urn. The burial is identified as a secondary burial based on the neatly organized long bones placed into one section of the urn. Overall, the authors identify four adult males, one aged between 33-45 years of age at death and two aged approximately 25-35 years of age at death, and one adult female. Age assessment could not be conducted for one male or for the female individual. One set of juvenile remains was aged as less than 2 years of age at death, while the other set of juvenile remains was aged to be approximately 10-12 years of age at death. Grave goods included shell artifacts, a bead, which had not been perforated, a Sturdy Perforator (no further detail was provided by the author), and a highly polished diabase axe.

Curacao

Koraal Specht Rock Shelter and Hato

Van Heekern (1960) reports that A.D. Ringma's unpublished notes describe human skeletal remains from these sites, although no other information is available.

Bonaire

Site of the Kralendijk School Project

In 1976 a skeleton was unearthed during construction of a MAVO school in Kralendijk (Tacoma, 1980). The remains were sent to the Anatomical Institute of the State University of Utrecht for analysis. Radiocarbon dates indicate the remains date to AD 760 $^+/\_$ 25 years. Age and sex assessments indicate an adult male approximately 40 years of age or older at the time of death based on cranial suture closure and symphyseal surfaces (Tacoma, 1980).

Trinidad

Erin

The only information available regarding the Erin site comes from Bullen's (1970) case study from the Grande Anse site on St. Lucia. Here she compares a single Saladoid period burial excavated from the Erin site and on display at the time at the National Museum and Art Gallery in Port of Spain, Trinidad to her case study from Grande Anse. Bullen (1970) based her assessment on personal observation and information provided on the interpretive exhibit label from the museum. Bullen aged the individual as a "young person" (1970:59) based on limited dental wear and partially fused epiphyses (which epiphyses are not noted). Bullen (1970) also assessed sex as female based on wide greater sciatic notches and small mastoids. A healed fracture to a tibia (side not noted) was recorded. The Erin burial was found in a flexed position lying on the right side and is as one of eight burials found at the site, but due to the fragile nature of the burials, this was the only one that could be recovered (Bullen, 1970). The burial was noted at a shallow burial depth (2'), to which Bullen (1970) attributes the poor preservation of the remains. Two pottery vessels, indicating some Saladoid style features were included as grave goods. No other biological or burial information was available in Bullen's (1970) comparison.

SAN-1 - Manzanilla

Radiocarbon dates place the SAN-1 site on the east coast of Trinidad between AD 350-1400, with two main occupation periods, the Saladoid Late Palo Seco (AD 350-650) and the Arauquinoid Bontour period (AD 650-1400) (Altena, 2007). The main focus of Altena's (2007) study is an analysis of the mortuary practices observed at the site, therefore there is little osteological information to be utilized for comparative purposes. Unfortunately, all the sources Altena (2007) cites as providing more information on the burials are unpublished, including two

unpublished field reports (Altena 2004, 2005), and one unpublished master's thesis (Baetsen, 2003). Laffoon (2012:105) notes that 21 burials have been fully excavated; however, the resources he cites have not become available to date. Therefore, all skeletal information is based on Altena's (2004, 2005) articles.

Overall, 43 burials including both adult and juvenile individuals were identified; however, Altena (2004, 2005) notes that only 14 were full excavated. Based on time constraints and the fragile nature of the skeletal remains an additional seven burials were partially analyzed *in situ*. Further, time did not allow complete documentation for every burial, and as such, not all burials were assessed for age and sex. Both primary and secondary interments were observed. Manipulation of burials, including the removal of bones from one location with replacement in another location was also documented

A total of five burials were dated to the Palo Seco period. Interestingly, these burials were associated with a midden as opposed to a house structure as the later Arauquinoid burials were. Most burials associated with this period were aligned along a variation of either the N-S or S-N axis, although one burial was aligned with the E-W axis.

Burial F 98 represents an extended burial aligned along the SSE-NNW axis. Sex and age assessments indicate an adult male.

Burial F 99 represents an extended burial aligned along the SSE-NNW axis. Sex was not assessed and age assessments indicate an individual at least 15 years of age at the time of death.

Burial F 127 represents an extremely flexed burial aligned along the S-N axis. Sex was not assessed and age assessments indicate an individual approximately 8 years of age at the time of death.

Burial F 131 represents an extended burial aligned along the NW-SE axis. Sex was not assessed and age assessments indicate an individual at least 15 years of age at the time of death

Burial F 199 represents a flexed burial aligned along the E-W axis, which was not completely excavated. Sex was not assessed and age assessments indicate an individual at least 15 years of age at the time of death.

A total of sixteen burials were placed within the Arauquinoid period. All 16 burials were associated with a house structure. The author notes that the center posthole, which is often considered the axis mundi, contained the secondary burial of both a male and female. Given the importance of this location (Altena, 2007) suggests they may have belonged to someone of higher social standing.

Burial F 7 represents a tightly flexed burial aligned along the N-S axis. Sex was not assessed and age assessments indicate an individual approximately 7 years of age at the time of death.

Burial F 8 consists of a secondary interment of a cranium and long bones. Sex was not assessed and age assessments indicate an adolescent or young adult. Grave goods included a rectangular *Strombus gigas* shell plaque

Burial F 17 represents a "seated" (Altena, 2007:309) burial aligned along the E-W axis. Sex and age assessments indicate an adult female. Displacement of the skeletal elements is noted and attributed to the burial pit being left open during decomposition. Potential grave goods include stone placed below the cranium shoulder, vertebrae and right elbow.

Burial F 18 represents a semi-flexed burial aligned along the NE-SW axis. Sex was not assessed and age assessments indicate an individual at least 50 years of age at the time of death.

Burial F 32 represents a semi-flexed burial aligned along the SW-NE axis. Manipulation of the skeletal remains was noted as "mainly to remove the long bones and cranium" (Altena, 2007:309). No age or sex information was provided.

Burial F 67 represents a flexed burial aligned along the SE-NW axis. Manipulation of the skeletal remains was noted as "mainly to remove the long bones and cranium" (Altena, 2007:309). No age or sex information was provided.

Burial F 78 represents a tightly flexed burial aligned along the N-S axis. Sex and age assessments indicate an adult female approximately 25 years of age at the time of death. Grave goods include two large flat stones located under the cranium.

Burial F 111 represents a burial in a "seated or flexed position on the back" (Altena, 2007:309). Sex and age assessments indicate an adult male approximately 24 years of age at the time of death. Grave goods include two large flat stones located under the cranium as well as under the arms. The author notes that the grave was not filled in until after the decomposition process and attributes the dislocation of the cranium, mandible and leg bones to the lack of fill dirt.

Burial F 117 represents a "seated" (Altena, 2007:310) burial aligned along the NW-SE axis. Sex was not assessed and the author places the age as a young adult, although it is noted that the humeral epiphyses were unfused. However, it is likely this individual would have been classed as an adolescent or younger based on age cohorts applied to the Red House sample. In addition, mortuary practices involving manipulation of the skeletal elements are noted by the absence of the skull and both humeri.

Burial F 126 represents a seated burial aligned along the NE-SW axis. Sex was not assessed. Age assessments indicate an individual approximately 12 years of age at death.

Burial F 138 was not completely excavated and consists of a likely secondary interment of two individuals. Sex and age were not noted.

Burial F 180 has not been fully excavated and represents a bundle of ribs, long bones along with two crania and mandibles placed above the pelvic area of Burial F 185.

Burial F 185 has not been fully excavated and represents an extended burial aligned along the N-S axis. In addition to the primary burial, additional ribs, long bones, two crania and mandibles were placed above the pelvic area (Burial F 180). Further, Burial 206 represents an isolated cranium placed face down near the metatarsals of the primary burial.

Burial F 197 represents a "seated" (Altena, 2007:309) burial aligned along the N-S axis. Sex was not assessed and age assessments indicate an individual approximately 3-4 years of age at the time of death. Grave goods include a crystal pebble, a pendant crafted from a conch shell and shaped like a jaguar tooth. The author notes that due to the undamaged nature of the remains and their location in a posthole, it is possible that this burial represents an offering.

Burial F 206 has not been fully excavated and represents an isolated cranium placed face down near the metatarsals of the primary burial of Burial F 185.

Coastal Venezuela

Venezuela was an area of interest for comparative populations as "this geographic area at the base of the Peninsula of Paria may well have been a point of departure of the Saladoid people into the Caribbean" (Bullen, 1970:59). Versteeg and Schinkel (1992) note that all reported Saladoid burials in Venezuela have been primary burials lacking any type of grave goods. In addition, they discuss the connection of these burials to middens, but caution that there may be an inherent bias to the way archaeological investigation have been conduced as most are focused on midden areas. Bullen (1970:59) also provides some interesting clues pointing out that "A

recent find of skulls and long bones associated with Saladoid pottery at Careúpano in

Northeastern Venezuela…[which] are reported to be of small-sized individuals with

brachycranic skulls. This sounds so strikingly similar to the emphasis on relatively small stature

and pronounced brachycranic skull form of the St. Lucian find that careful comparative study of

this material is warranted."

Unfortunately, there were no site studies available in English in the mainstream literature.

The only burial information available came from Rouse and Cruxent's (1963) review of

Venezuelan archaeology. The authors frequently refer to both midden burials and urn burials in

passing. However, as a comprehensive overview of archaeology and pottery typology, no

detailed information was provided regarding the urn burials.

Coastal Guyana

Barabina Shell Mound

The lowest levels of the Barabina Shell Mound date to the approximately 4015-2165 BC.

However, skeletal remains recovered near the surface of the mound are believed to be Ceramic

Age (Williams, 1981). Human remains were identified in all excavation units; however, only five

burials were fully excavated at the time of Mickleburgh's (1981) study, and no further

information was available.

One burial was located in Zone i (no burial number) and represents the primary burial of

an individual lying on the back in a flexed position. Age and sex assessments indicate an adult

female. Although noted as a likely Ceramic Age interment, the recovery of a European artifact

from the mound may suggest either disturbance or a later post-contact date for the burial.

Burial B-1 (zone iic) represents a flexed burial. Age assessments indicate young child

approximately two to four years at the time of death.

Burial B-2 (zone iid) represents the primary burial of an individual lying on the back in a flexed position. Age and sex assessments indicate an adult female.

Burial B-3 (zone iid) represents the commingled burial of two adults with individual (B-3) in a flexed position overlaying the lower burial (B-4). Sex was not determined.

Burial B-4 (zone iie) represents the commingled burial of two adults with individual (B-4) in a tightly flexed position below the upper burial (B-3) and resting partially in sterile soil. Sex was not determined.

Coastal Suriname

All available osteological data for this region is drawn from Tacoma's (1963) volume on the physical anthropology of Amerindians of Suriname. Most of the skeletal material he studied was collected during a time when anthropometric studies of the skull were the focus of many scientist's research. Therefore, the information available is often limited to cranial measurements. Given the lack of available cranial measurements for the Red House sample, this limits the usefulness of Tacoma's (1963) study to the overall analysis. However, his study is still significant and may offer future opportunities for comparison should more complete skeletal remains be recovered. The collection studied by Tacoma (1963) was comprised of crania collected from multiple sites in Suriname. However, radiocarbon dates were only provided for one site (Nickerie), therefore the others were not included in this comparison as they could not be placed as originating from a Ceramic Age population.

Nickerie

The Nickerie site was radiocarbon dated to approximately AD 1050-1250. Most skeletal remains recovered were represented by a cranium or cranium and mandible only.

Burial 0394 represents an extended burial aligned along the E-W axis. Sex and age assessments indicate an adult male between his mid 40s and mid 50s at the time of death.

Burial 0388 represents an extended burial and alignment was not noted. Sex and age assessments indicate an adult male at least 30 years old at the time of death. In addition, the occipital is noted to be "rather flat" (Tacoma 1963:111).

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