THE EXCAVATION AND ANALYSIS OF PREHISTORIC CARIBBEAN REMAINS:

A BIOARCHAEOLOGICAL CASE STUDY OF A PREHISTORIC FEMALE FROM NEVIS, WEST INDIES

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Chris Keith

APPROVED FOR THE DEPARTMENT OF ANTHROPOLOGY

SAN JOSE STATE UNIVERSITY

May 2014

Dr. Marco Meniketti	Department of Anthropology
Dr Elizabeth Weiss	Department of Anthropology
Dr. Charlotte Sunseri	Department of Anthropology

ABSTRACT

THE EXCAVATION AND ANALYSIS OF PREHISTORIC CARIBBEAN REMAINS:

By Chris Keith

In the summer of 2011, the remains of a 1000 year old indigenous Caribbean woman were discovered buried on a beach near White Bay, Nevis, West Indies. The following summer, a team of excavators and osteologists, including the author, returned to Nevis to excavate and analyze the remains with the intention to learn as much as possible about the remains and, through proxy, the people to whom they belonged. We felt that through our investigations of the life of this woman, whom we dubbed Taoüa, we would be able to extrapolate this information more broadly to the people living in the Caribbean during the Ostionoid period (circa 800-1150 Common Era, or CE). The research done on these remains is important since there is little known about migration patterns of the Caribbean people during the Ostionoid era, and there is much confusion about who was living where, and when, during this large swath of time. Beyond the wider academic appeal, there is much interest in Carib life by the modern Nevisians; in fact, this research was done in conjunction with the Nevisian Historical and Conservation Society (NHCS) and current Nevisians are eager to learn about the prior inhabitants, the history of the island, and what it meant to be a prehistoric Nevisian. The following paper is a catalog of the events of that trip, including excavation and analysis. A complete and detailed background of Caribbean prehistory will also be discussed in order to understand the cultural context of this individual. An additional literature review of osteological material will be undertaken to help draw correlations to the bony features we found on

Taoüa and what activities, diet, and pathologies with which she may have been affected.

Finally, the paper will conclude with a discussion of the analysis and the literary research.

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First and foremost, many thanks should go out to the woman we have named "Taoüa," as her true name is lost in time. Without her life and death, none of this would have been possible. I would also like to thank the people of Nevis, especially Evelyn Henville of the NHCS. We were extremely grateful for the interest, care and respect Ms. Henville and all of the people of Nevis showed towards us, our project and towards Taoüa.

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To my wonderful wife. She knows.

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Chapter 1

Introduction

In 2011, prehistoric remains dating to approximately 1050CE were found on the island of Nevis, in the Lesser Antilles of the Caribbean. The radiocarbon date returned from a sample placed these remains within a period of Caribbean history hotly debated by experts: archaeological, osteological, historical and ethnographic data from this period are rare, conflicting, and varied (Allaire 1980, 1997a, 1997b; A. Bullen and R. Bullen 1975; Davis and Goodwin 1990; Haviser 1997; Keegan 2000, 2007; Rouse 1964, 1977; Wilson 1989). The Caribbean was devoid of human population until 5000 years ago, when indigenous Americans from the mainland Americas made the first known migration to the Caribbean; these migrations from Central and South America continued for thousands of years, and the remains discovered on Nevis likely belong to one of the very last pre-Columbian migrations in the western hemisphere (Allaire 1980; Davis and Goodwin 1990).

For the purposes of this research, I am using the term "Carib" to ethnically and culturally describe one of many indigenous peoples living in the Caribbean during the Ostionoid era, 800-1150CE. There have been many migrations of different peoples into the Caribbean over the millennia, and Nevis itself has been occupied by several of these cultures. While this debate provides a context to the scholarly contributions of my project, my hope is that with new research data from Taoüa, archaeologists will be able to understand the prehistoric Caribbean better, as well to understand more about the lives of

its inhabitants. In order to do this, it is important to understand at least some of the extensive pre-Columbian period of the Caribbean, beginning with the first inhabitants seen in the archaeological record.

As stated above, the populating and dispersal of human ethnic groups in the Americas has long been a debated topic among scholars. Everything from when humans first came to the American continents to how they came and what routes they took is disputed (Allaire 1980, 1997a, 1997b, 2008; A. Bullen and R. Bullen 1975; Davis and Goodwin 1990; Rouse 1977; Wilson 1989, 2006). Within this debate lies a secondary debate concerning settlement and migratory patterns of human ethnic groups within the Caribbean. Where did these people come from? Who were they, and what were they like? Even how many ethnic groups there were and when the specific cultures were dominant in the Caribbean are debated (Allaire 1980, 1997a, 1997b, 2008; A. Bullen and R. Bullen 1975; Davis and Goodwin 1990; Wilson 1989, 2006). Scholars, historians and archaeologists, such as Louis Allaire, Samuel Wilson, Dave Davis, R. Christopher Goodwin, and Irving Rouse, have long argued over these various questions and the presented evidence and while much has been learned, there is still much more debate over how the Caribbean came to be populated over the centuries (Allaire 1980, 1997a; Davis and Goodwin 1990; Rodriguez 1997; Wilson 1989, 1997, 2006).

What is known is that there have been several large migrations into the Caribbean, from early settlers starting around 4000-3000 Before Common Era (BCE) to the Carib and Arawak (or Taíno) inhabitants at the time of European contact in 1492 CE (Wilson 1989, 1997; Allaire 1980; 1997). These cultures have been categorized by the material

technology associated with archaeology sites; for instance, the first documented inhabitants of the Caribbean are known as the Casimiroid people, after the stone tool technology associated with the time period (Allaire 1997a; Wilson 1989).

The Casimiroid toolkit consists mainly of large blades and cores and is the only known tool technology seen in the Caribbean until approximately 3000-2500BCE (Allaire 1997a; Wilson 1989). Although it is known that the Casimiroid people originally migrated from the American continents, it is unknown whether they originated in northeastern South America or from the east coast of Central America; this being said, the strongest evidence supports a migration hypothesis originating off the coast of Belize, with lesser support for a migration from the coasts of Venezuela and Columbia (Allaire 1997a;Rouse 1964; Wilson 1989). Rouse (1964) states that the earliest known remains closest to the Caribbean are in Western Venezuela, just outside the Caribbean zone and thus postulates a South American origin for the early Caribbean inhabitants. However, more recent archaeological evidence supports the former theory as opposed to the later (Allaire 1997a; Davis and Goodwin 1990; Keegan 2000; Haviser 1997; Wilson 1989). Additionally, current radiometric dates point to Hispaniola, the island upon which the nations Haiti and the Dominican Republic currently exist, and Cuba as being the first islands occupied by settlers nearly 6000 years ago (Allaire 1997a).

Archaeologists typically divide the southern tip of North America to central South America into three different cultural areas: (1) the Mesoamerican Area, namely Mexico, Belize, and the rest of northern Central America; (2) the Intermediate Area, including southern Central America, the Columbian lowlands, and parts of the coasts of central and

west Venezuela; and (3) the Caribbean Area, encompassing all of the West Indies, the Bahamas, eastern Venezuela and parts of central Venezuela and the Guianas, also known as the Orinoco Basin region (Allaire 2008). The West Indies can be further divided into the Greater and Lesser Antilles and, finally, the Lesser Antilles can be broken down even further into the Leeward Islands, those of the northern half of the island chain, and the Windward islands, those of the southern half of the chain (Keegan 2000; Wilson 1989). Additional archaeological evidence suggests a later migration from the southern part of the Caribbean Area, namely the Orinoco Basin, through Trinidad and up through the Lesser Antilles (Keegan 2000; Wilson 1989). However, this first migratory expedition in the Caribbean seems to have occurred by a migration pattern known as island hopping, that is, essentially a process by which seafaring cultures colonize islands in an archipelago by sailing short distances from island to island (Wilson 1989).

As mentioned previously, the Casimiroid culture was the only known culture in the Caribbean for the first 1000 years of human habitation (Allaire 1997a; Wilson 1989, 1997). Between 3000 and 2500BCE, there begins to appear a second tool technology, different enough for archaeologists to conclude that this was a wave of second settlers from a different culture (Wilson 1997). This culture is known as the Ortoroid culture, and its people can be clearly traced to a South American descent, likely from the Intermediate Area, through the dominant tool technology used at settlement sites (Allaire 2008; Wilson 1989). The Ortoroid technology consists of ground stone tools, such as axes and pestles, as well as tools made from animal bone and shell - both materials absent in the Caribbean archaeological record prior to this (Allaire 1997a).

While the Casimiroid and Ortoroid cultures were preceramic and subsisted primarily by foraging, fishing and some hunting, they had clearly separate mainland antecedents and were two distinct and separate cultures that developed within a specific temporal and spatial context (Allaire 1997a).The Ortoroid technology could be clearly traced through the Caribbean and is named after one of the first archaeological sites to discover the tool, named Ortoire, on Trinidad and from Trinidad, back to mainland South America (Allaire 1997a; Wilson 1989). As the Ortoroid technology is distinctly different region of this area and it seemingly completely replaces all evidence of Casimiroid technology within a few centuries, it is safe to assume that this represents a complete replacement of the earlier inhabitants of the Caribbean (Wilson 1989).

According to Wilson (1989), the Ortoroid people were hunter-gatherers who built settlements close to resource sites, such as conch shells used to make adzes in canoe manufacturing, in order to improve access to materials frequently utilized Additionally, this culture quarried, knapped, and traded chert for use in tools and jewelry, allowing archaeologists to track the cultural influence of the Ortoroid people throughout the Caribbean based on tool technology (Wilson 1989). Early Caribbean archaeologists argued that around 1000 BCE, the Caribbean generally, and the Lesser Antilles specifically, were abandoned for 500 years which would explain both the lack of change in Ortoroid tool and settlement styles (Wilson 1989). However, new evidence clearly establishes Ortoroid habitation of Cuba, Hispaniola and at least some parts of the Lesser Antilles until 500 BCE (Wilson 1989).

Around this time, a new people known as the Saladoid culture appears in the archaeological record (Allaire 1997a; Haviser 1997; Keegan 2000; Righter 1997; Wilson 1989, 1997). Unlike the Casimiroid and the Ortoroid cultures, the Saladoid people were agriculturalists who utilized a ceramic technology that undergoes several different stylistic changes identified with different time periods (Davis and Goodwin 1990; Keegan 2000; Wilson 1989). These subseries within the overall Saladoid series will be discussed in more detail further on in this thesis.

The Ceramic Age in the Caribbean loosely ranges from 500BCE until 1500CE or later, and the early Ceramic Age is loosely categorized as ranging from 500 BCE to 500CE (Haviser 1997). Haviser (1997) further divides the early Ceramic age into two shorter temporal ranges: 500-0BCE and 0-500CE. The Saladoid ceramic technology completely pervades the entire Caribbean archaeological record by around 200BCE and is the only ceramic technology in the archaeological record for the entire early Ceramic age, excluding the subseries of Saladoid technology (Allaire 1997a; Haviser 1997; Keegan 2000; Wilson 1989). These new immigrants also represent another paradigmatic change in the Caribbean: according to the archaeological record, the Ortoroid people were completely replaced by the Saladoid ceramic culture within a century or two of contact (Allaire 1980, 1997a, 2008; Haviser 1997; Wilson 1989).

The Saladoid technology can be traced back to the coasts of northeast Venezuela and Cuba and tended to follow settlement patterns similar to those of their mainland antecedents for the first 500 years of their occupation of the Caribbean (Haviser 1997). This entails settlements that are built near freshwater resources, with tillable soil but still

maintaining a coastal location (Haviser 1997). However, the settlement strategies and housing construction of these early inhabitants seem to indicate a very mobile population scattered thinly throughout the Antilles (Haviser 1997). This pattern changed in the later part of the early Ceramic age when village construction, material artifacts, and social patterns began to resemble those typically associated with more settled populations (Allaire 1997a; Haviser 1997). Settlement strategies and housing construction of the pre-Columbian Caribbeans will be discussed in more detail in subsequent sections of this thesis.

Eventually, the Saladoid technology is seemingly replaced by the Ostionoid technology, which was in turn replaced by the Sauzoid series around 1050-1100 CE (Allaire 1980; Keegan 2000; Wilson 1989). Both the Ostionoid and the Sauzoid ceramic series appear to have originated from the Orinoco Basin and the modern-day nation states of the Guianas, and in prehistory were known as Kalina (Allaire 1980; Wilson 1989). According to Davis and Goodwin (1990), the people who emigrated to the Caribbean islands referred to themselves as the Kallinago and eventually was translated into "Carib" by the Spanish chroniclers who followed shortly after Columbus.

Allaire (1980) argues that the island Kallinago culture is so closely related to the mainland Kalina that it supports a massive migration into the Lesser Antilles as recently as the end of the Sauzoid ceramic series around 1200CE. Thus, the Carib inhabitants encountered by European settlers in the 16th and 17th centuries were relatively recent inhabitants themselves (Allaire 1980). However, other archaeologists disagree with Allaire's conclusion and recent archaeological evidence points to a longer continuation of

the Island Carib culture, possibly as far back as 800 CE (Davis and Goodwin 1990; Keegan 2000; Wilson 1989 and 1990). These arguments will be discussed in detail in the "Historical Background" portion of this thesis, in the context of determining which culture the remains discovered on Nevis belonged. This discussion of the prehistoric phase of the Caribbean Islands is to prepare the reader for the heart of this paper: the case study of the skeletal remains of an indigenous inhabitant of Nevis.

Nevis, West Indies

Nevis is a small island nation, approximately 93 km² and is one of the Leeward Islands of the Lesser Antilles, West Indies (EncyclopediaoftheNations.com). Dr. Marco Meniketti of San José State University's (SJSU) anthropology department has been operating archaeological sites on Nevis for nearly two decades, frequently staffed by university students as part of a field school. In 2011, Dr. Meniketti operated one such field school, excavating an ongoing historical plantation site, named Bush Hill after the original plantation. I was a student crew member there to learn the basics of archaeological field work in a realistic setting.

On one of our days off, Dr. Meniketti took the crew on a tour of the island's prehistoric sites, mostly focusing on the southeastern coast of the island where the highest concentration of indigenous Caribbean settlements had been located (personal communication, Marco Meniketti 2011; Wilson 1980). While traversing the path between Hichman's Beach and White Bay, Claire Dansereau Auerbach, a staff member with a specialization in human skeletal analysis, saw what later turned out to be an

extremely shallow human burial. We expected that the burial was of prehistoric origin, mostly due to its proximity to multiple archaeological and osteological sites, including an excavation of one of the largest Carib Indian villages known, by Southampton University in 1996, and an excavation of a large shell midden by Samuel Wilson (Morris et al. 2001; Wilson 1980). We did not use the cranium at that time to assess the age of the burial, due to exposure to the surface and highly abrasive sand storms.

What Auerbach spotted was a silver dollar-sized patch of parietal bone (one of the skeletal elements that make up the cranial vault) and after a salvage excavation permitted by the Nevis Historical and Conservation Society (NHCS) the following week, it appeared that the cranium was mostly intact. Not only was the cranium well preserved, but there appeared to be a largely intact skeleton beneath the skull, presumably belonging to the same individual. Unfortunately, this initial team was unable to do more than excavate the cranium and do a very preliminary analysis before the skull was prepared for curation.

Since the Bush Hill Field School had an entirely industrial historic focus, we were not equipped to handle the excavation, analysis, and preservation of an entire prehistoric human skeleton. Additionally, we were at first unable to establish contact with the NHCS, the local entity responsible for issuing permits allowing for excavation. Eventually, Meniketti concluded that because the skull was so exposed to the surface, and thus in danger from both the elements and the enormous herds of donkeys that roam the area, that ethically it must be excavated and preserved. Luckily, we were able to

eventually establish contact with Ms. Henville of NHCS, who offered climate controlled curation facilities for preservation of the cranium. The remaining post-cranial elements were buried and covered with an assortment of logs and rocks, both to disguise the excavation from curious humans and to protect the remains from roaming donkeys.

With the exception of a few previous excavations (Morris et al. 2001; Wilson 1989; 2006), White Bay and Hichman's Beach are largely untouched by human development; even the excavations in the area have been relatively limited. Marco Meniketti is one of the premier experts on the history of Nevis, and has been running historic field schools on Nevis for nearly two decades. These field schools focused largely on the plantation industry, and it was on a walk between two of these previous excavation sites that Taoüa was discovered. Nevis has had a long and varied past, both before European contact and afterward. Once considered Britain's most valued New World colony, Nevis had a massive plantation industry supplying much of the world's sugar during eighteenth century and later served as a stopping point in the lucrative slave trade into the Americas (Meniketti 2004). As Nevis has been so continually occupied and contested by Europeans settlers and African slaves since 1628CE, there was always a chance that the skeletal remains excavated by the Bush Hill crew could belong to the historic era-that is, post European contact (personal communication, Marco Meniketti, June 2013). However, with permission from the NHCS, Meniketti was able to obtain a carbon-14 test, ranging from 950-1050CE, well before European contact and shortly before the first recorded use of Sauzoid pottery in the Caribbean. Later radio-carbon tests from post-cranial samples also confirmed this preliminary date.

At the time of the 2011 discovery of the remains (later dubbed "Taoüa" the Carib word for "white stone"), I was already preparing to apply to SJSU's Master's program in Applied Anthropology. The discovery of these skeletal remains provided the perfect opportunity for me to create a research project, focusing on archaeology and bioarchaeology in Nevis. Meniketti immediately agreed that it would be a great project and worked with me upon our return to the US to develop a project that would include a return trip to Nevis to finish the excavation of Taoüa and an analysis of the entire skeleton, all to culminate in my Master's thesis.

When Beta Analytics confirmed our suspicion that Taoüa was from the Ostionoid era, the project became even more important because prehistoric human skeletal remains are not common finds in the Caribbean. Indigenous skeletal remains on Nevis are even more rare and, to the best of my knowledge, no other prehistoric skeleton as complete as Taoüa has been found on Nevis. Furthermore, as my previous introduction into the prehistoric Caribbean indicated, a date range of 1050-1160CE places the remains within a period of history about which little is known, and is greatly contested by Caribbean archaeologists (Allaire 1980, 1997a; Davis and Goodwin 1990; Wilson 1989, 1997). The primary research question of this project is: How does this individual fit into the "human experience?" For instance, what can we learn about this person's life history from the skeletal remains? What was this persons age, sex, stature and health condition? Perhaps most importantly, what can Taoüa tell us about prehistoric Caribbean life? The goal of this paper is to better understand Taoüa and, by extension, her contemporaries in order to further our knowledge concerning past peoples and the evolution of the modern world.

This has required extensive research into the prehistoric Caribbean, as well as research into how human skeletal biology works and what skeletal remains can tell an experienced analyst.

The following historical background section of this thesis will cover what is known of the early indigenous Caribbean people. I will end the historical background with the Caribs, because, as far as I have been able to determine the Sauzoid ceramic series never reached Nevis, or the Leeward islands in general (Allaire 1980; Haviser 1997; Wilson 1989, 2006). This section will also consist of the common lifestyle habits of the indigenous Caribs, such as housing construction or subsistence strategies. Being aware of these habits will help better understand what Taoüa may have experienced in her life. Additionally, habitual activities, such as a daily chores, can leave signs on a person's skeletal system, which can be analyzed and understood by an experienced osteologist (Ubelaker 1989; Larsen 1981; Weiss 2009).

Once a general background on Caribbean life from 700-1100 CE has been established, I will narrow the focus of this paper to the study of Taoüa's remains alone. This section will largely focus on osteological and bioarchaeological sources in order to find and compare studies that are similar or applicable in other ways to Taoüa. I hope to control for bias by limiting my research to populations living in similar environments (i.e. other island-dwelling populations) or subsisting in similar patterns (i.e., coastal fishing populations). Additionally, I will look into studies dealing with skeletal remains

demonstrating similar patterns to Taoüa, in order to garner as much of a comparative basis as possible.

Taoüa's skeletal remains had much to tell us, demonstrating what bioarchaeologists and osteologists call bone remodeling coupled with extensive osteoarthritis, especially in the vertebral column, though recent research has demonstrated that vertebral osteoarthritis is more closely linked to genetics and age, rather than activity (Weiss and Jurmain 1997). This could an extremely physical lifestyle, most likely consisting of daily activities and obviously, we would expect Taoüa to have a rigorous life due to the nature of early prehistoric life (Weiss 2009; White 2001). Studying examples of subsistence strategies similar to the Caribs, living in a similar environment, or displaying a suite of skeletal traits similar to Taoüa will help better establish what it meant to be an indigenous Carib on Nevis 1,000 years ago.

Once a discussion of the relevant literature is complete, I will discuss what methodology was used to excavate and analyze WBS-01 as well as why each methodological path was chosen. This section will include all the metric data from the skeletal analysis, as well as the data collected from excavation of WBS-01 and the information gathered from pedestrian surveys of White Bay and Hichman's Beach. The results from the carbon tests conducted by Beta Analytics will be included in this section. Finally, this paper will conclude by returning to my principal question: what can we learn about this individual from the available data, and what can this tell us about life in the pre-Columbian Caribbean.

Chapter 2: Historical & Cultural Background of Nevis

While the introduction to this paper briefly covered early prehistory of the Caribbean, the following section of the paper will more closely examine the ceramic cultures of the Antilles. More specifically the ceramic technology, settlement and subsistence strategies, and religious or spiritual beliefs of the people occupying the Caribbean during the Ceramic age from 700CE to 1200 CE will be closely analyzed and compared to what was learned from Taoüa's remains and from the surrounding Hichman's Beach and White Bay area (Haviser 1997). I start with a brief introduction into Caribbean ceramics.

The Early Ceramic Age

The majority of prehistoric archaeological artifacts found in the Caribbean are ceramic artifacts; in fact, Irving Rouse, a renowned Caribbean archaeologist, once stated that nearly 90% of the Caribbean archaeological record consists of ceramic objects (Keegan 2000). As mentioned earlier, the first ceramic series seen in the Caribbean is known as the Saladoid series, and it is traced back to a culture off the coasts of northeastern Venezuela emigrating to the Caribbean through Cuba and the Greater Antilles, eventually reaching throughout the Lesser Antilles as well (Haviser 1997; Wilson 1989). The early Ceramic Age (500BCE to 500CE) consists of several different subseries of ceramics enveloped within the overall Saladoid series, all with their own identifiable stylistic traits linked to specific time periods (Allaire 1997a; Haviser 1997). Saladoid ceramics are generally identifiable by a bell shape, and the earliest versions,

known by archaeologists as the Cedrosan Saladoid subseries, are painted a distinctive color pattern known as white-on-red, or WOR (Allaire 1997a). This name essentially indicates that the vessel had a red paint or glaze as a base that then had designs of white glaze or paint on top of the base color (Sutton and Arkush 2009). The stylistic elements of the ceramics created by the Saladoid people are different enough that archaeologists have created a few different subseries of Saladoid technology, generally associated temporally with what archaeologists and historians view as periods of cultural upheaval or transitory phases. These phases are: The Cedrosan-Saladoid subseries, circa 500BCE - 0CE; the Huecan-Saladoid subseries, 0-350 CE; and the Barrancoid-Saladoid subseries, 350-500CE (Allaire 1997a; Haviser 1997; Wilson 1997).

While the Cedrosan Saladoid subseries is not seen in the Caribbean until 500 BCE, its origins can be traced back nearly 1500 years to the Orinoco River Basin near the eastern coast of South America (Righter 1997). Named after its first appearance at the Cedros site on Trinidad, Cedrosan-Saladoid is found through-out the Caribbean, indicating that either the coastal areas of South America and Caribbean were much more densely populated than current archaeological research suggests or that the Saladoid people were much more mobile than previously thought (Allaire 1997a; Righter 1997). Cedrosan Saladoid subseries are identified by both the distinctive WOR paint as well as a zoned-incised crosshatching (ZIC) meant as decoration (Allaire 1997a; Haviser 1997).

Around 350 CE, the Huecan Saladoid subseries begins to appear in the archaeological record, in a mixed context with Cedrosan Saladoid artifacts (Allaire;

Righter 1997). The Huecan Saladoid pottery, which has the typical ZIC patterning but lacks the WOR of the Cedrosan subseries, is thought by many different archaeologists to actually represent a entirely different culture, likely migrated from northern central Venezuela. Others argue that it represents a second migration of Saladoid people into the Caribbean, while still more argue that the Huecan pottery simply represents heterogeneity within the Saladoid culture (Allaire 1997a; Haviser 1997; Reed and Petersen 1999; Righter 1997).

The Cedrosan and Huecan Saladoid subseries continue to be the only two technologies seen until roughly 350 CE, when the Barrancoid subseries appear (Allaire 1997a; Haviser 1997; Wilson 1989). Within 150 years the Saladoid culture largely disappears from the archaeological record in the Lesser Antilles, though influences are still see in some of the Windward Islands until about 800 CE (Allaire 1997a; Wilson 1989, 1997, 2006). Around 350 CE, we see the Saladoid pottery undergoing a change, indicative of a new subseries that became known as the Barrancoid Saladoid subseries after its origins with the Barrancas people of the Lower Orinoco Basin, Venezuela (Allaire 1997a).

While the exact manner by which this technology proliferated into the Caribbean (perhaps as far as Barbados) is unknown, it is clear that it represents a further development in the early Cedrosan style (Allaire 1997a; Haviser 1997; Righter 1997; Rouse 1964; Wilson 1989). More complex and ornately decorated with increased use of modeled incising, Barrancoid ceramic pieces seem to represent a culture with a rich

social and spiritual life, starkly divergent from the simply designed pottery of later Caribbean cultures (Allaire 1997a; Righter 1997; Wilson 1989).

The Barrancoid phase starts to decline about 500 CE, which also marks the end of the Early Ceramic age and the disappearance of Saladoid cultural material from the archaeological record in the Lesser Antilles (Allaire 1997a; Rouse 1964; Wilson 1989). It is important to note that though Saladoid material disappears in the eastern Caribbean, Saladoid culture seems to continue on mainland South America and islands in the Greater Antilles for quite a bit longer (Allaire 1997a; Rouse 1964; Wilson 1989). While Saladoid technology is still seen in the eastern Caribbean ceramics for another 100 years or so, around 600 CE, the archaeological record indicates that a new people had essentially replaced Saladoids in much of the Lesser Antilles; though, as stated earlier some influences are still seen in Troumassoid technology of the Windward Islands during the ninth century (Allaire 1997a; A. Bullen and R. Bullen 1974; Rouse 1964; Wilson 1989). However, there is no evidence of Troumassoid technology spreading beyond the Windward Islands (Allaire 1997a; Davis and Goodwin 1990; Keegan 2000; Wilson 1989). This could indicate that the Troumassoid technology was simply a continued style of the last of the Saladoid people in the Lesser Antilles, especially since Troumassoid technology is not even found on the islands of the Greater Antilles, occupied by the Taino Arawak culture from the eleventh century to contact with Columbus (Allaire 1980, 1997a; Davis and Goodwin 1990). These new people were the *Kalinago* and were emigrating from the Guiyanas just south of Venezuela (Allaire 1980; Davis and Goodwin 1990).

One of the best ways to establish that your hypothesis is correct is to demonstrate that it is not *incorrect*. In other words, by demonstrating Taoüa does not belong to one of these other cultures mentioned, such as the Taino, or the Troumassoid culture, it lends to credence to my hypothesis that Claire belonged to the Carib culture. The date of Taoüa almost certainly means she was not of the Saladoid people, and her location in the Lesser Antilles indicates that she was not of the Taino chiefdoms (Allaire 1997a; Haviser 1997; Rouse 1964; Wilson 1989). As to the Troumassoid culture, there is little archaeological evidence to show that Troumassoid culture reached the Leeward Islands, such as Nevis, where the ceramic technology brought by the Kalinago people seems to have been relatively continuous from 700-1150 (Davis and Goodwin 1990; Wilson 1989). So far, the information gathered seems to lend the strongest support for Taoüa being of Carib origin, rather than any of the other Caribbean indigenous people.

The Late Ceramic Age and the Caribs

The Kalinago people brought with them their own cultural traditions and subsistence patterns, including a new ceramic technology, known by historians and archaeologists as the Ostionoid technology (Wilson 1989). The Ostionoid technology actually seems to be a simplification from the earlier Saladoid ceramics, coupled with a decrease in the actual build quality of the ceramic vessels themselves (Allaire 1997a).The oldest example of Ostionoid pottery is from the Paso del Indio site in north-central Puerto Rico and interestingly enough may seem to date to nearly 600 years earlier than archaeologists previously thought accurate Ramos et al. 2008). However, due to the

rather limited quantities of datable objects found in the same stratigraphic layer, most archaeologists do not accept this early date for the Ostionoid culture (Allaire 1980, 1997a; Ramos et al. 2008; Wilson 1989). Ostionoid ceramic vessels are not only more simplistic than earlier Saladoid counterparts, they also lose the distinctive bell-shape, the ZIC patterning and the WOR distinctive coloring often associated with people of the early Ceramic Age (Rouse 1964). Ostionoid pieces have a generally smooth surface, straight sided or incurving-sided, and are usually painted red - some archaeologists refer to Ostionoid as "redware" for this exact reason (Ramos et al. 2008; Rouse 1964).

Rouse (1964) identifies the immediate successor to Ostionoid pottery as the Chicoid horizon; however, more modern archaeological theories argue that the Chicoid technology, first discovered at the Boca Chica site in Dominican Republic, represents a subseries of the Ostionoid technology (Allaire 1997a; Hofman et al. 2007; Wilson 1997). Most modern archaeologists view the Chicoid and Mellacoid series as representing the plurality of the Kalinago people, in much the same way that the Cedrosan, Huecoid, and Barrancoid technologies all represent the plurality of the Saladoid people (Allaire 1997a; Haviser 1997; Hofman et al. 2007; Lundberg 2003; Wilson 1989).

In 1492 Columbus was informed by the natives of Hispaniola that the eastern islands of the Caribbean, such as the Lesser Antilles, were inhabited by "caniba" (Allaire 1980; Davis and Goodwin 1990). This term was corrupted by successive waves of European settlers and eventually became Carib and was attributed to the inhabitants of the eastern Caribbean, the same culture that replaced the Saladoid people in the Lesser

Antilles (Allaire 1980; Davis and Goodwin 1990). However, Davis and Goodwin (1990) argue that the term caniba is not the origin of the Carib name; in fact, they argue that Carib is a Spanish translation of the Taino word *Kanibna*. This is, in and of itself, a translation of *Kalinago*, the name Caribs attributed to themselves at the time of European contact and essentially means "of *Kalina*," Kalina being the mainland culture to which the Island Caribs trace their origins (Davis and Goodwin 1990). Interestingly enough, Kalina translates into "People of the Bitter Manioc Clan," a name that correlates strongly with the abundance of ceramic vessels used to cook manioc found in association with Ostionoid sites (Allaire 1997a; Davis and Goodwin 1990; Haviser 1997; Wilson 1989).

There is some disagreement among archaeologists and historians as to whether or not the Carib people occupying the West Indies were a continuation of the Ostionoid culture, or whether a separate culture also from the Guianas replaced the Ostionoid culture entirely (Allaire 1980, 1997a, 2008; A. Bullen and R. Bullen 1975). What is relatively clear is that in the Greater Antilles and the Western Caribbean, the Ostionoid ceramics evolved through several different phases (Allaire 1997a, 2008; A. Bullen and R. Bullen 1975; Righter 1997; Rouse 1964, 1977). By 1492 the Greater Antilles were occupied by the Taino culture, a chiefdom-level society identified archaeologically by their ceramic series known as the Chican Ostionoid; however, the history of the Lesser Antilles and the West Indies is quite different than the rest of the Caribbean (Allaire 1980, 1997, 2008; A. Bullen and R. Bullen 1975; Rouse 1964; Wilson 1989).

In the Lesser Antilles, none of the Ostionoid ceramics associated with Taino occupation have been found, though there was the aforementioned Troumassoid culture forwarded by Allaire (1980; 1997a) and A. Bullen and R. Bullen (1975). While the Sauzoid ceramic technology appears to have originated out of the Windward Islands (the southern islands of the Lesser Antilles), just like the Troumassoid culture beforehand, it does not seem to have reached the Nevis (Allaire 1997a; A. Bullen and R. Bullen 1975; Wilson 1989). According to some archaeologists, the lack of evolving ceramic technology could suggest a continued use of early Ostionoid technology and strong cultural connections with the mainland Guyanese Kalina culture up until contact with Europeans in the late fifteenth century (Davis and Goodwin 1990; Wilson 1989). Also, this continuity on Nevis makes it difficult to prove that Taoüa did not belong to the Carib peoples.

According to others the evidence suggests that the Island Caribs occupying the Lesser Antilles at the time of contact were part of a recent and rapid migration from the mainland Kalina culture (Allaire 1980, 2008; A. Bullen and R. Bullen 1975). Allaire (1980, 1997a, 2008) and A. Bullen and R. Bullen (1975) argue that the cultures occupying Lesser Antilles from the eighth century to the twelfth century utilize a ceramic technology that undergoes none of the same changes seen in ceramic technology deserves its own classification as the Troumassoid technology. They state that the introduction of the Sauzoid complex to the Lesser Antilles in the twelfth century supports a proto-historic expansion into the area from mainland Guiana shortly before European contact,

rather than a continued Carib occupation starting in the sixth century CE (Allaire 1980, 1997a, 2008; A. Bullen and R. Bullen 1975).

There are some issues with this argument: first, there is no correlating or proto-Sauzoid technology outside the Lesser Antilles and, though some parallel technology is seen elsewhere in the Caribbean, the lack of a clear antecedent to the Sauzoid technology indicates that it originated in the Lesser Antilles; secondly, many of the Island Carib oral histories recorded by early European settlers speak of a mainland origin to their culture, though the stories frequently changed from island to island so the accuracy of this is debatable; finally, the dearth of available ceramic and other material evidence from the eighth century to the twelfth century provides strong support of little to no occupation of the Lesser Antilles during this period (Allaire 1980, 1997a, 2008; A. Bullen and R. Bullen 1975; Davis and Goodwin 1990).

This last argument is clearly incorrect in the case of the Leeward Islands, as the work Wilson (1989, 2006) and others (i.e. Morris et al.'s 2001 excavation of a Carib Village on Hichman's Beach) have done on Nevis clearly indicates a continual occupation of an Ostionoid-making culture at least until 1000CE. After this period, the archaeological record on Nevis becomes very difficult to understand and it is not clear if there was a continuation of the Ostionoid technology, cultural changes, or perhaps, was at least partially abandoned by the time Europeans reached the New World (Wilson 1989, 2006).

On Nevis, the Ostionoid ceramic series is accompanied by a massive population expansion, as evidenced by the increase in village settlements found all over the island (de Waal 2003; Wilson 1989). Samuel Wilson has conducted many excavations on Nevis over the decades and recorded two Saladoid sites covering roughly 9100 sq. m., as opposed to the 17 Ostionoid sites covering over 98,000 sq. m. (Wilson 1989). Wilson also found that the largest of the sites he worked on, both from the Saladoid people and the Ostionoid people, were located on the eastern side of the Nevis. A few of the sites he worked on were within 100 m. of where Taoüa was buried and, interestingly, Wilson (1989) also found a human burial on Hichman's Beach, very close to where Taoüa was discovered, though dated to the earlier Saladoid period. While there appears to be a previous Saladoid occupation of Hichman's Beach and the White Bay area, Taoüa's proximity to a Carib-Ostionoid era village excavated by Southampton University in 2000, coupled with the AMS radio-carbon date, provides strong support for Taoüa belonging to the Ostionoid people (Morris et al. 2001; Wilson 1989). Finally, the massive increase in archaeological sites all throughout Nevis and especially on the eastern side of the island provide further evidence for a Carib origin for Taoüa (Morris et al. 2001; Wilson 1989).

The Taino culture that Columbus encountered on Hispaniola evolved out of the associated Ostionoid culture but, unlike their ancestors, the Taino was a socially-ranked chiefdom society (Allaire 1997a; Davis and Goodwin 1990). This being said, Allaire (1997a) points out that although there is no material evidence to suggest that the early Ostionoid cultures were chiefdom-level societies, the elaborate decorations and style of the *adornos* pottery is advanced enough to have likely required an apprentice-master style

of education, generally more associated with more socially stratified cultures. However, until further evidence of a more complex-level of stratification can be found, it must be assumed that the early Ostionoid peoples were indeed relatively egalitarian.

Carib Settlement and Trade Strategies

In order to discuss settlement strategies of the later era of the Antilles, it is necessary to briefly cover Saladoid strategies, as much of the later Caribs' strategies represent a continuation of the earlier patterns. As stated previously, the archaeological record from the earliest part of the Saladoid-era represents a culture that preferred a "terrestrially-oriented" settlement strategy: near freshwater sources, arable soil and away from the coast (Haviser 1997; Siegel 1991). In actuality, this view represents what Haviser calls the "conservative strategy" (1997: 66-68); other archaeologists argue that the Saladoid people practiced an "opportunistic"(1997: 66-68) settlement strategy that changed from island to island, leaving no distinctive regional strategy (Siegel 1991).

Haviser (1997) and Siegel (1991) both conducted a thorough analysis of Saladoid settlements throughout the Antilles and found that while there was a preference for farmable land and large bodies of freshwater, there were only a few sites found inland. Haviser (1997) also discovered that the majority of the early inland sites coexisted with another coastal Saladoid settlement on the same island and he hypothesized that there was a possible ceremonial purpose behind these inland sites. Siegel (1991) went so far as to suggest there is no preference between a coastal and inland early Saladoid sites and that the distribution is completely and totally random. This trend continues in later

Saladoid-era sites and, in fact, deepens, with only 3% of the sites studied by Haviser (1997: 67) having been inland. Additionally, some islands in the Antilles, Nevis among them, have a high amount of volcanic soil that is especially good for farming and these islands see higher rates of occupation during the Ceramic era (Petersen 1997). Islands with poor tillable soil had little to no occupation until the later Ceramic era; this is perhaps due to a greater reliance upon marine resources in the late Ceramic era (Petersen 1997).

The Caribs who occupied the Antilles after the Saladoid people mimicked the settlement pattern of their more recent predecessors and lived near coastal areas with good growing soil and easy access to fresh water (Haviser 1997; Wilson 1989). As previously pointed out, islands in the Antilles with poor soil, as is the case with Anguilla, were not occupied until the Caribs reached the area (Petersen 1997). Whether this is due to a greater reliance on marine resources or not is unclear; however, there existed an intra-island trading network that extended all the way back to mainland Guiana (Allaire 1980, 1997; Davis and Goodwin 1990; Petersen 1997; Watters 1997; Rouse 1964; Wilson 1989). The evidence of a wide trade network can be found by tracing the chronological spread of ceramic technology through-out the Caribbean and by tracking materials used to make specific goods (Watters 1997). For instance, Antiguan chert was used by both early and later Ceramic period cultures all throughout islands in the Caribbean, including Nevis, but is only native to Antigua (Watters 1997). In fact, less than 200 meters from WBS-01, there appears to have been a flint-knapping area utilizing Antiguan chert [see Fig. 1] (Meniketti, personal communication, June 2013).

Fig. 1: An inland erosion cut into White Bay's beachfront that had evidence of flint knapping (e.g. sherds, flakes, proto-tools).

Early housing construction of the Caribbean indigenous consisted of small, poorly-built circular huts located around a central pole spread over a wide area and protected from the elements by connecting windscreens (Haviser 1997). Later Saladoid settlements became more sedentary, and their villages began to be constructed around a circular central plaza and this trend was continued by later Carib inhabitants of the island (Haviser 1997; Bartone and Versteeg 1995). The later villages were composed of several larger homes called *malocas* inhabited by multiple families, built alongside smaller huts and other huts designed for working (Bartone and Versteeg 1995). These villages generally also had several small sheds and racks, multiple midden pits, and a few large cooking hearths in a central area; additionally, many of the *malocas* also contained smaller hearths inside (Allaire 1997a; Hofman et al. 2001; Bartone and Versteeg 1995).

These *malocas* were round or oval, ranged from 8 to 12 meters in diameter and were constructed using either a single row or a double of poles, both for the roof and the structure of the *malocas* itself; importantly, there seems to have been a decrease in the size of the *malocas* from the Saladoid period to the Ostionoid period, indicating a possible de-emphasis on communal living in the Ostionoid era (Haviser 1997; Hofman et al. 2001; Bartone and Versteeg 1995). The villages were then placed in a concentric horseshoe design, with the homes creating an empty plaza located centrally within the village (Allaire 1997b; Bartone and Versteeg 1995;Hofman et al. 2001; Keegan 2009).

Hofman et al. (2001) argues that the care put into the construction of these *malocas* is evident through an examination of the poles used: poles were very large and

were frequently dug down into bedrock or reinforced by large stones in order to better protect against dangerous tropical storms and high winds. These villages were well made, indicative of people who meant to stay where they were despite harsh weather patterns; (Hofman et al. 2001; Bartone and Versteeg 1995).Additionally, the early Saladoid villages and many of the later Carib villages (though not all, importantly) were constructed in a very concentric pattern, representing the village as the symbolic center of the cosmological universe for these people (Hofman et al. 2001).

Carib Lifestyle Practices

The lifestyle habits of an average Carib villager would have likely consisted of a combination of daily activities centered around agriculture, pottery and tool production, exploitation of marine resources and deep-sea canoe travel for the purposes of intra-island trade (Allaire 1997a, 1997b; Keegan 2000; Watters 1997). Two of the most labor-intensive common activities would have been housing-construction and farming; this is of note to this paper, as physical and habitual activities may alter an individual's skeletal system (Ubelaker 1989; Weiss 2009; White 2000). Furthermore, maritime trade would have required extensive canoe travel, another activity that would have some impact on the skeletal system (Weiss 2009). Other activities would have included reef-diving for shellfish, construction of traps used to catch fish, and warfare or interpersonal aggression (Allaire 1997b; Petersen 1997). Additionally, woodworking for canoe building and for the purposes of creating sitting stools was a common activity among the Caribs (Allaire 1997).

The Spanish conquerors and settlers recorded the Caribs as a violent, warlike culture known to consume the flesh of the dead; in fact, the word cannibal likely comes from the first name the Spanish heard attributed to the inhabitants of the Lesser Antilles, "caniba" (Davis and Goodwin 1990). However, the only reliable record of the Caribs consuming flesh mention that it was more likely a rare ritualistic event, much the same way some mainland South American cultures practiced cannibalism, rather than something done for sustenance (Allaire 1980; 1997b; Davis and Goodwin 1990; Petersen 1997). The material record tells much the same story, where the only archaeological remains cited as evidence for cannibalism are scattered skeletal remains at several Carib villages; however, there are no signs of cannibalism on these bones, such as knife cuts, percussion marks and pot polish (Myers 1984; Weiss 2009). There appears to be no physical evidence of cannibalism and the literary evidence is suspect (Allaire 1980; 1997b; Davis and Goodwin 1990; Myers 1984).

While there are plenty of accounts written by early European settlers referring to the warlike nature of the Caribs, the reality is that these accounts are largely first based upon accounts given to Columbus by the inhabitants of the Greater Antilles who were frequently in conflict with those who lived in the Lesser Antilles (Allaire 1980, 1997b; Davis and Goodwin 1990). The warlike nature of the Caribs seems to have been blown out of proportion by the early settlers, and was made exponentially worse by the European's habit of referring to any indigenous groups that resisted European advances as Carib (Allaire 1980; Davis and Goodwin 1990; Glazier 1980).

Of course, this is not to say that the Caribs did not engage in warfare whatsoever since there is plenty of evidence of the importance of warfare to the Caribs, as well as evidence of intra-island conflict between the Island Caribs and the Taíno/Arawaks (Allaire 1997b: 182; Davis and Goodwin 1990). There is no evidence to suggest that warfare commonly extend out of the Caribbean, and did not usually involve mainland Guiana as some accounts recorded by Europeans state (Allaire 1997b: 182; Davis and Goodwin 1990). Glazier (1980) argues that archaeologists of the early to middle twentieth century went the opposite direction of the first European settlers arriving shortly after 1492 and seriously deemphasized the role that warfare had among the Caribs. He argues that warfare was "a major organizing principle" behind the Carib society and helped to manage residence, marriage, kinship, politics and helped control the flow of goods throughout the Antilles and Caribbean in general (Glazier 1980: 448). While warfare among the Caribs has been difficult to reconstruct due to the above mentioned issues, but in general, war did seem to be a large motivating factor that involved utilization of natural Caribbean resources (Allaire 1997b; Glazier 1980).

The Island Caribs seemed to have largely preferred the long bow dipped in the sap of the manchineel tree, a highly dangerous plant which is toxic upon touch and produces deadly fruits similar to apples (Allaire 1980; Meniketti, personnel communication, 2011). Other accounts of Carib warfare also mention the use of an incised and decorated war club, known as a *boutou*, a blow gun with poisonous darts and a deadly gas created from hot chili peppers used in ambushes (Allaire 1997b).Additionally, some reports by early Spanish settlers state that many of the Carib women were actually Taino women captured

in combat and forced into marriage to a Carib male, which is supported by the fact that at the time of European contact the Carib women spoke an Arawak language, very different from the male Caribs (Allaire 1980, 1997a, 1997b; Cooper 1997; Davis and Goodwin 1990).

Warfare was also a time for a unique political organization represented the only opportunity recorded where the normally egalitarian Carib people had a true leader (Allaire 1997b; Glazier 1980). Carib villages seem to have been constructed in a manner indicative of an egalitarian society — no one home or house of a villager seemed to be more grandiose than any other, and the homes are positioned in a loose concentric circle around a communal center, as opposed to any single residence (Allaire 1997b; Glazier 1980; Hofman et al. 2001).This being said, it has been noted by seventeenth century European chroniclers living in the Caribbean, such as Father Breton and Charles Rochefort, that during times of war certain leaders were capable of leading warriors from multiple islands in military campaigns reaching all the way back to mainland South America (Allaire 1997b; Glazier 1980).Although the Caribs are traditionally viewed as egalitarian, if warfare is as much of a driving factor as Glazier (1980) believes then there would be very few chances when a war chief *did not* have the authority to take charge.

Glazier (1980) in general indicates several serious problems with the idea of Carib egalitarianism: he argues that there was serious stratification among these cultures, with social milestones surrounding adulthood, fatherhood, becoming a shaman, or becoming a war chief. Perhaps the most telling bit of evidence Glazier (1980) presents is that upon

the death of the war chief, all of his slaves were buried with him. If this is the case, then even the idea of owning slaves lends credence to the Caribs having amore stratified society than traditionally believed. However, the evidence Glaizer (1980) cites is largely based on historical accounts written by seventeenth century Spanish and, in the case of Father Breton, French colonizers and the physical evidence that would lend strong credence to his hypothesis is limited (Allaire 1997a, 1997b; Haviser 1997; Glazier; Petitjean-Roget 1961; Wilson 1989).

Though the Caribs had cotton and were known for their cotton weaving ability, for the most part they wore very little clothing, and stylistically their culture seems to have preferred having straight hair (Petitjean-Roget 1961: 47). Father Breton lived in the Caribbean from 1635 to 1674CE and wrote extensively on the Caribs; his journals and works have been largely translated by Petitjean-Roget (1961:43) and it is through these journals that much of the ethnographic evidence concerning Carib culture in the seventeenth century has been gathered. In these journals, Breton wrote that the Caribs spent much of their free time decorating their bodies with paint and decorated their hair with cotton tufts; specific colors of paint were meant to convey certain messages to others, such as red paint indicating strength, speed, and agility (Petitjean-Roget 1961:47-48). Generally, the Caribs painted a design and the color and style of the body paint seem to change depending upon age, sex and message intended (Petitjean-Roget 1961: 47). For instance, red and black paint seem to have been the predominant colors used and the color red is associated in Carib life with the concept of strength and manliness (Petitjean-Roget 1961).

Also associated with this concept of strength were some forms of bodily mutilation or alteration, a common theme among South American cultures (Petitjean-Roget 1961). One common skeletal alteration seen among Caribs was a flattening of the nasal and the frontal regions that occurred as a result of mothers pressing on the noses and foreheads continually of their children in their early years (Petitjean-Roget 1961). This alteration causes cranial deformation of the right occipital-frontal region (Petitjean-Roget 1961), which is very similar to a type of cranial deformation my team discovered with Taoüa in our own research. Cranial deformation begins very early in life, frequently at birth, so if the observed modification is intentional, it provides strong evidence for a Carib origin of Taoüa, rather than being a kidnapped Arawak women, as some reports document (Allaire 1980, 1997a, 1997b; Davis and Goodwin 1990; Glazier 1980; Petitjean-Roget 1961; O'Loughlin 2004; Weiss 2009)

Carib Religion

The central importance of the village and village life to the Caribs decreases in comparison to the earlier Saladoid peoples, but village life was still an important part of Carib culture, evidenced by generations of burials found at the sites, predominately buried in the late Ceramic era either underneath a *malocas* or in the midden pits near the village (Hofman et al. 2001; Keegan 2009; Bartone and Versteeg 1995). This practice was contrary to the Saladoid era where the dead were buried largely in the central plaza around which the village was built; the Saladoid style was continued by some of the first Caribs to emigrate, but was discontinued in later centuries (Hofman et al. 2001). Later

Carib villages also seem to lose some of the concentric tightness of the earlier settlements, possibly indicating less spiritual significance placed on the village by later Ostionoid people (Allaire 1980; Hofman et al.; Righter 1997).

Coupled with the loss of village concentricity is a change in burial patterns: the earlier Saladoid trend of burying their dead in a central plaza changed to internment underneath the actual *malocas,* other buildings and even middens (Allaire 1997b; Hofman et al. 2001; Keegan 2009; Petersen 1997). It is possible that it represents some sort of ancestor cult or veneration of the dead, but the evidence supporting this hypothesis is inconclusive (Petersen1997; Rodriguez 1997). Reconstructing a Caribbean-wide cosmological conception for the pre-Columbian Caribs presents difficulties due to the lack of archaeological and ethnographic materials available as well as high variation in religious practices and conflicting evidence island to island (Allaire 1997a; A. Bullen and R. Bullen 1975; Petersen 1997; Righter 1997). Most archaeologists are in agreement that the standard Carib religion was less complicated than the earlier Saladoid religions, largely due to the loss of village concentricity and simplified burial practices (Allaire 1997a; A. Bullen and R. Bullen 1975; Petersen 1997; Righter 1997).

Nonetheless, the following section will attempt a generalized description of Carib spiritual life and how it interacted with other social structures, such as political organization and warfare. While many post-Saladoid village sites, especially those located within the Lesser Antilles, maintain a semi-circular horseshoe pattern, the Saladoid concept of the village as a symbolic representation of the universe seems to

have disappeared (Allaire 1997a, 1997b; Bartone and Versteeg 1995; A. Bullen and R. Bullen 1975; Petersen 1997; Siegel 1996). Even the Saladoid *malocas* themselves are representative of this culture's concept of how time and space pass: the central pole of the houses represent an *axis mundi*, or the center around which the universe rotates (Hofman et al. 2001; Siegel 1996). With the advent of Carib culture around 800CE, this emphasis on the construction of the village and the house as representative of the universe decreases as the *malocas* get smaller and the village's dead are now more often buried underneath the homes of living relatives, as opposed to burials being located in the central plaza as was the case with the Saladoid cultures (Allaire 1997b; A. Bullen and R. Bullen 1975; Hofman et al. 2001; Walker 1983).

The Saladoid cultures personified their gods through carved stone totems known as *zemis*, as well as through animal motifs that decorated their ceramics — especially those of the fruit bat and tree frog, which play a significant role in Saladoid origin myths (Righter 1997; Rodriguez 1997). These *zemis*, essentially three-pointed stones, are rarely seen in conjunction with Ostionoid sites though A. Bullen and R. Bullen (1975) did find *zemi* stones and nostril bowls at an Ostionoid site dated to about 1000 CE, both of which are generally associated with Saladoid cultures. However, they do state that this not a common occurrence and likely represented the advent of a new cult or religion arising among the Ostionoid people, as opposed to an established religion (A. Bullen and R. Bullen 1975).

Petitjean-Roget (1961) has probably the most well-informed description of Carib spiritual life to date, largely reconstructed through several dictionaries and texts on Carib language and grammar structure written by the Father Breton and supplemented by other chroniclers writing from the mid to late seventeenth century. One of the most interesting facets of Carib spirituality is linked to a desire for cleanliness: not only did showering occur nearly every day, but there were also guidelines surrounding the proper showering method, such as use of fresh water over sea water (Petitjean-Roget 1961). The idea of cleanliness extended to bowel eliminations, which generally only occurred in sand; on the infrequent occasion that someone does relieve themselves in a garden or food growing area, the area is quickly abandoned (Petitjean-Roget 1961). The Caribs viewed excrement as more than simply unclean; for a Carib, excrement represented a piece of the person from which it originated and must be disposed of properly in order to protect against harmful action (Petitjean-Roget 1961).

Taboos around discarded biological material abound in cultures all across the world and tend to be the most pronounced shamanistic cultures, such as the tribal Azande of central Africa and the followers of Voodoo in modern day Caribbean (Evans-Pritchard 1976; Hurston 1966). The taboo surrounding discarded biological material is quite common among cultures that practice shamanism, as was the case with the Island Caribs (Allaire 1997b; Glazier 1980). Glazier (1980) defines the difference between shamans and priests as the former deriving their power directly from the spirit world, whereas priests get their power from memorizing and understanding a specific body of knowledge. Glazier (1980) is quick to point out that the Carib shaman, or *boye*, does not

truly fit well into either category, as is the case with many shamanistic religions from South America (Glazier 1980).

Part of the difficulty in reconstructing the spiritual beliefs of the Caribs is their belief in the power of names: individuals kept their true names from all but the closest friends and families and the true names of gods and spirit beings were believed to have contained great power and were not frequently shared with others, probably especially true with Spanish chroniclers (Glazier 1980). This has led to some confusion in attempting to reconstruct Carib religion, though it seems that there was concept of a High God as well as many less powerful spirit beings (Glazier).

Demonstrative of the confusion and disagreement surrounding Carib spirituality, Jean-Baptiste Labat, a French clergymen writing from the Caribbean around the late seventeenth century, argued that the god's name is *Akamboüe*; Glazier (1980), who translated many of Labat's writings argues this is almost certainly incorrect since Father Breton defines *Akamboüe* as "carriers of the king." Two other points of debate surrounding Carib religion are the names of two other types of spirits, *Maboya* and *Icheri* (Allaire 1997b; Glazier 1980). Some archaeologists believe that *Maboya* represents an evil deity such as the Christian devil while *Icheri* is a good or helpful spirit, while others, such as Glazier (1980: 449-450), argue that *Maboya* and *Icheri* are not representative of individual spirit beings, but are actually categories of spirits (Allaire 1997b).

The *boye*, as a shaman, had great power within the Carib civilization, serving as a connection to the spirit world, a healer of spiritual maladies, and as a check to the powers

of a war chief since a chief needed the *boye's* support to go to war (Allaire 1997b; Glazier 1980). Glazier (1980) reports that before going to battle, the spirit world must be consulted to ensure victory and, since a war chief was incapable of contacting the spirit world, a shaman was needed before each battle. Interestingly, the wife of the war chief occupies a unique position of power, as she is almost a pseudo-shaman, capable of contacting the spirit world and predicting the future (Glazier 1980). Whether or not this could serve as a loophole in seeking permission to go to war from the spirit world is not known at this time, though it does seem likely. It is important to state here that a war chief could consult as many *boyes* as were available and was allowed to listen to whichever spiritual prediction best supported his own policies (Glazier 1980).

A man became a *boye* through a complex and likely long apprenticeship with an elder shaman; though the exact time frame is largely unknown, shaman apprenticeships from Guiana during the Ostionoid period were recorded to have lasted ten to twenty years. According to Glazier (1980:451), many South American shaman apprenticeships could last ten to twenty years, but he believes it is unlikely that the training period for Carib shamans involved years; however, since we only have recordings from the last few months of a *boye* apprenticeship, there is no way to be sure.

Fortunately, the information that is known of a *boye's* training, is detailed and involves five months of fasting followed by the consumption of a manioc and sweet potato beer called *Ouicou*, tobacco smoke and the summoning of a spiritual familiar to attach to the apprentice (Glazier 1980).

A *boye* apprenticeship would have required the apprentice's family to not only sacrifice food and goods to support their son, but also to pay the senior *boyes* for training their child. The *boyes* were professionals who charged for their services and were well-off within Carib society (Glazier 1980). Of course, due to the financial strain a *boye* apprenticeship placed upon a family, those with the most power and money to start with were the most likely to attempt the shaman route, for instance, sons of current *boyes* (Glazier 1980).The hardship a *boye* undergoes as an apprentice is well worth the payoff in later society, as the shaman was one of the few positions that had a clear and constant high position in Carib life and were the only Caribs capable of controlling the distribution of goods and resources *outside* familial ties (Glazier 1980).

While a chief technically had a high position in Carib society, they were capable of losing their power if there was no need for combat and were only allowed control of goods and resources *within* their family (Glazier 1980). With this sort of power, *boyes* were almost always the richest members of Carib society, even richer than the chiefs and their families(Glazier 1980). Despite the clear stratification of some parts of Carib society, they are still largely considered egalitarian and the concentration of wealth that the *Boyes* could obtain is capable of causing great strain upon a society; in order to relieve some of this pressure, extremely wealthy *boyes* could be forced to redistribute their wealth back to the village (Glazier 1980).

One final note concerning the *boyes* is the fact that although they are technically shamans, the *boyes* do not truly fit easily into either the category of priest or shaman

(Glazier 1980). It seems that pre-contact South American tribes were moving from having a shaman class to a more structured and hierarchal priest class, but most archaeologists believe that this was not occurring among the Island Caribs for four main reasons: 1) no formal religious institutions; 2) no images of their gods 3) no use of prayer and 4) the *boye's* power was derived from direct contact with the spirit world and not as a result of power given to them by another shaman (Glazier 1980).

Glazier (1980) disagrees with several of these statements and supports his argument with several key pieces of evidence, starting with the argument that the Caribs did not have a formal religious institution. While a *boye* ceremony was private and conducted for precise reasons, these ceremonies consisted of congregations composed of all of those who had a stake in the problem at hand. Each of the members of congregation had a part to play and the part was established through tradition, indicating at least a loosely organized religious institution existing among the Caribs throughout time and space (Glazier 1980). As for godly images, though there are few artifacts remaining today with graven images of Carib gods, there are accounts from early European settlers and missionaries such as Father Breton and Charles Cesar de Rochefort, who was probably a Protestant missionary living in seventeenth century Caribbean, that record instances of the Caribs having religious tokens and idols (Glazier 1980: 447-453). For instance, *boyes* in a spirit state were recorded as speaking through cotton figures called *Maymousets* and treating these figures as oracles (Glazier 1980: 452-453). Archaeologically, the problem is that many of these totems were wrought

from materials such as wood or cloth that do not preserve well in the type of climate existing within the Caribbean (Allaire 1997b; Glazier 1980:452).

Glazier (1980) argues that prayer was not necessary for the *boyes* because first, their high god cared little for mortals so no prayer would affect it and the *boyes* represented a direct and solid connection to the spirit world. All offerings and sacrifices to their gods and spirits were done directly through the *boyes* and the Caribs could watch their gods accept or reject offerings through the actions of the *boyes* (Glazier 1980). Additionally, while Caribs did not pray in the western conception of the word, a summoning would occasionally require people to sing and chant praises to the spirit being summoned, very nearly a form of proto-prayer (Glazier 1980). Interestingly, Caribs would not call a spirit solely to praise the being because in summoning a spirit, there is a chance that a *boye* could summon a spirit intending harm to the village (Glazier 1980). This is very likely the explanation behind the lack of prayer seen by the early European colonizers: if prayer is viewed as an attempt to summon a spirit with the sole intention of offering up praise then Caribs would naturally avoid doing so in order to prevent summoning an evil spirit.

Diet

The later Carib inhabitants of the Greater and Lesser Antilles were agriculturalists who subsisted off of manioc for the baking of manioc bread and off of fish and shellfish, as were the Saladoid predecessors (Allaire 1997a; Haviser 1997; Wilson 1989). Protein sources seem mainly to have come from reptiles such as iguanas (*Iguana*) and sea turtles

(*Chelonioidea*), possibly seal (*Pinnipedia*) and even manatees (*Trichechus)*, and largely from rodents, especially the agouti (*Dasyprocta*) rodent; the subsistence on rodents seems to have been on a regional scale and possibly even led to the extinction of certain species of rodents in the Lesser Antilles, like the agouti and orzyomine (*Pennatomys nivalis*) rats (Allaire 1997a; Dukes and Reitz 1993; Wilson 1989).

There is also evidence for consumption of arrowroot (*Maranta arundinacea*), mamey apple (*Mammea americana*), papaya (*Carica papaya*), guava (*Psidium guajava*), sweet potato (*Ipomoea batatas)* and even maize (*Zea mays*), though all to a lesser extent than manioc (*Manihot esculenta*) cultivation (Allaire 1997a; Wilson 1989). Furthermore, the Caribs also utilized a wide range of non-edible plants and trees, such as the Mastic Bully tree (*Sideroxylon mastichodendron*), used in the construction of canoes, and the Manchineel tree (*Hippomane mancinella*), reportedly used by Caribs in warfare (Allaire 1997b; Petersen 1997:122). While the Caribs clearly used many of these plants and trees in everyday life, whether or not they were cultivating these as crops is still debated; some archaeologists argue that there is little evidence to assume these people were actually farming and not simply making use of what was available (Petersen 1997).

This being said, even these archaeologists admit that at least horticulture-style cultivation of manioc and sweet potato was occurring and the preponderance of archaeological evidence supports the agriculturalist hypothesis (Allaire 1997a, 1997b; Haviser 1997; Petersen 1997). Further credence is lent to this theory by the fact that the Caribs utilized several plants and trees native to South America that would have required

domestication and extensive agricultural technologies, such as cotton (*Gossypium hirsutum*), papaya and soursop (*Annona muricata*), though whether the Caribs brought the plants or the Saladoid culture did is not known (Petersen 1997). Additionally, it seems almost undeniable that the Caribs were cultivating cotton, not simply making effective use of wild plants; ethnographically, the Caribs were recorded as being phenomenal weavers and this cotton was used in the creation of hammocks, trade goods and burial wrappings (Petitjean-Roget 1961; Watters 1997).

While the later Ostionoid period seems to have followed a somewhat similar subsistence pattern to the previous Saladoid culture, there are some notable differences such as an increase in the amount of manioc griddles found at Ostionoid period indicates that manioc cultivation intensified, as mentioned previously (Allaire 1997a; Davis and Goodwin 1990; Wilson 1989). Two technological innovations around the cultivation and consumption of manioc occurring during the Carib-dominated era of the Lesser Antilles further demonstrate the importance this particular plant: ceramic manioc griddles evolved feet that allow the griddles to be placed over the fire, as opposed to directly on the flame; and large brewing vessels used to make manioc beer and a manioc-sweet potato beer called *Ouicou* (Allaire 1997a; 1997b; Glazier).

Additionally, Wilson (1980) states that the cabbage palm plant was an important staple to the Caribs in the Lesser Antilles. Trade also served as a source for food for the island Caribs, with the islanders trading goods like salt bricks, cotton, chert, igneous material to use in tempering pottery, and dried fish with mainland South American

cultures for other goods; for instance, the remains of boa constrictors, macaws, parrots, and other birds native to the mainland have been found all throughout the Caribbean and were clearly used by the Caribs as a source of sustenance (Petersen 1997; Watters 1997).

Another substantial dietary difference between the Caribs and the earlier Saladoid people is that Carib populations did not seem to care for land crab as much as their predecessors, demonstrated by the dearth of crab remains from the stratigraphic layer associated with the Ostionoid area, as compared to the layers from the Saladoid era (Allaire 1997a;Petersen 1997; Wilson 1989). While the Caribs subsisted mostly off of cassava and sweet potato, they also utilized marine resources to a much greater extent than the Saladoid people (Allaire 1997b; Petersen 1997). Tellingly, the excavation of the WBS-01 burial also revealed the remains of a rodent, possibly an Oryzomine or rice rat, as well as single vertebrae of an unidentified but very large fish. While it is more likely the rodent remains were the result of taphonomic disturbance, the fish vertebrae was almost certainly buried in context with Taoüa, for reasons unknown.

The previous parts of this paper reviewed what is known about the indigenous of the Caribbean, especially those of the Lesser Antilles a few years before European contact. This was done in order to understand the Carib culture as well as is possible with available evidence, with the hope that this knowledge will help in comprehending who Taoüa was and where she fits into the human experience. This necessary background information will help better explain the bony features we found on Taoüa and will help delineate what day-to-day life would have looked like for Taoüa and other

Island Caribs of the Ostionoid era. The following section of will focus on the osteology of Taoüa, beginning with a literature review of osteological material that may be applicable to my study.

Chapter 3: Recovery Methods

Excavation

The WBS-01 site was conducted in accordance with the Register of Professional Archaeologists (RPA), and supervised by Dr. Marco Meniketti of San José. Both myself and Esmirna Ruiz had prior experience in both archaeological excavation and in handling human remains, while Mehran Mosenian had extensive work in handling prehistoric remains, and was a trained bioarchaeological graduate student. We chose to follow the RPA's guidelines on the advice of Dr. Meniketti.

As a widely accepted standard for archaeological excavation on both a professional and academic level, the use of the RPA's methods was the best option for our project. Additional permission was sought and granted from the NHCS, the Nevisian arbiter for all things historic on the island. We began our excavation by placing a 1m by 1m unit [see Fig. 2], with primary datum a half meter northwest from the datum previously placed by the crew that excavated the cranium the 2011 field season (GPS coordinates of WBS-01: 17°07' 25.1" N; 62°32' 46.9" W). We excavated our at arbitrary levels of 10 cm [Fig. 3] using hand trowels, soft brushes, clay-working tools, and a 1/8in screen mesh to screen soil. We chose 10 cm levels because it is the most universally accepted as an excavation standard for non-specialized units (e.g., we were not excavating something that would have been constructed using imperial measurements, nor did we know the stratigraphic levels that with which we were working). Hand trowels were used because shovels would have been too destructive and anything smaller

than a hand trowel would not have been an effective instrument. Soft brushes and wooden clay working tools were used when in direct contact with bone, in order to prevent accidental damage. All excavated soil was screened through an1/8in mesh, because we were working with small skeletal elements and possibly highly fragmented ceramics.

Fig. 2: WBS-01, facing north before breaking ground

Fig. 3: WBS-01 unit facing north, level 1 before extension. The green arrow points to my teams primary datum, while the red arrow points to the 2011 team that excavated the cranium.

After almost two levels of near-complete sterility, we discovered a portion of what turned out to be a cervical vertebrae, near the southeastern wall of our unit; when, at 19 cm below datum (b.d.), we revealed a protruding humerus slightly further south, it was clear that the orientation of the remains was further south and east than previously thought. This, coupled with soil so culturally sterile it was likely backfill from the

previous 2011 excavation, led us to decide to abandon the northern and western portions of the unit in favor of a 1/2 meter by 1/2 meter extension [see Fig. 4]. The new pit extended 1/2m east and a 1/2m north off of the southern corner of the original unit and it was here that we discovered the post-crania. After we had brought down the extension to level two, the post-crania [see Fig. 5] had been revealed showing that Taoüa had been interred in a very Carib fashion on her left side, oriented east, loosely flexed (Walker 1983). Due to the fragility of the torso (23cm b.d.), we decided to pedestal the vertebral column, ribs, and pelvic assemblage [Fig. 6].

Fig. 4: WBS-01 extension, facing south, top of level 2.

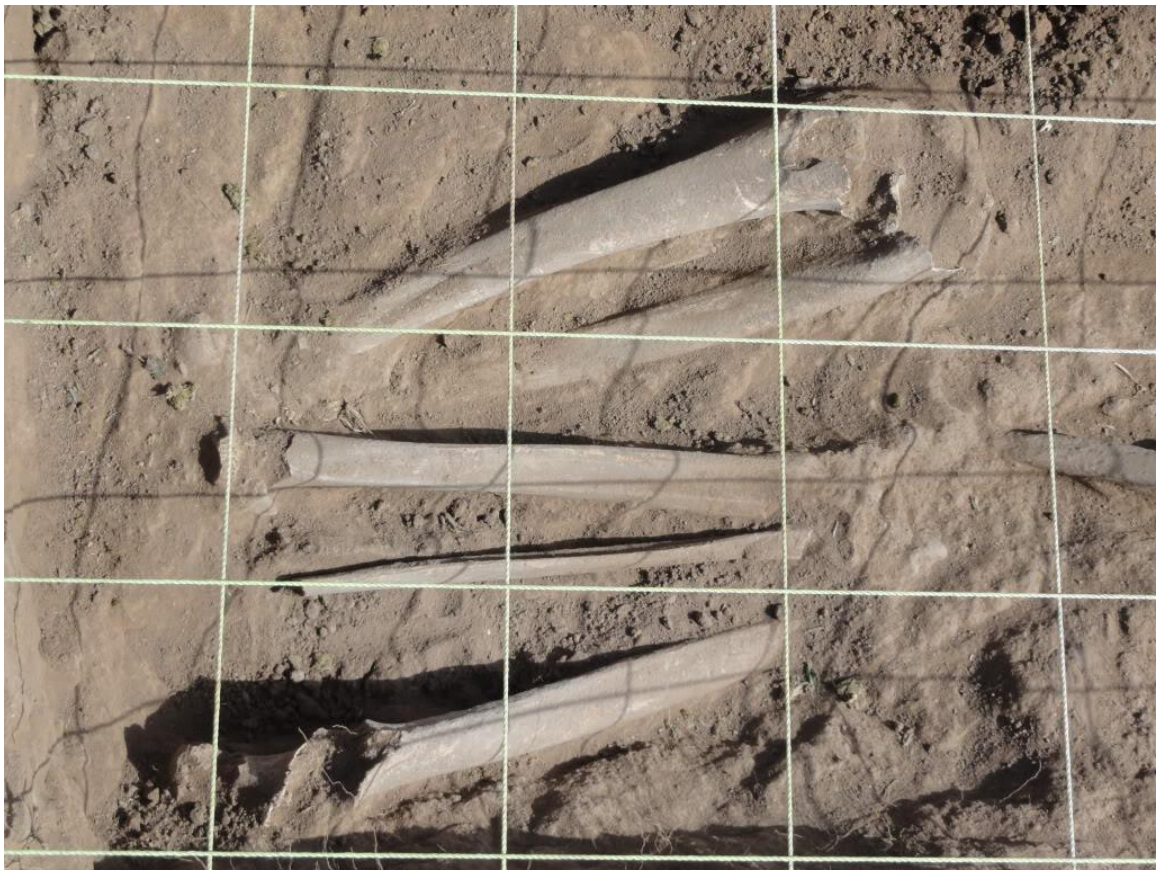

Fig. 5: Post-cranial elements revealed in WBS-01, extension.

Fig. 6: Ribs, vertebra, and pelvic assemblage, pedestaled to preserve the integrity of the remains until we reached a proper lab setting (facing west).

While excavating WBS-01, some people had come out to observe us, and while wandering the area they discovered evidence of two more complete (though severely weathered and exposed) burials. The location of one nearby burial was pointed out by a site visitor and subsequently recorded. This site contained two more human burials, approximately 250m and 275m northeast, respectively, of the WBS-01 primary datum [see Fig. 7].

Fig. 7: Site of a second burial, severely damaged and largely exposed to the surface.

A more structured pedestrian survey was conducted in 2013 by the field school crew of the Morgan Slave Village. Four transects were placed near the primary datum from WBS-01, and a fifth was placed approximately halfway between the second and third burials discovered in 2012. Out of the five transects sent out, only the 0-point transect, on a heading of 20°NE found human skeletal remains. Lauren and Bree discovered half a maxilla and associated cranial fragments of a single individual approximately 197m from the 0-point. The surface remains were scattered over an area of 2-3m and directly behind the remains was a massive cut caused by erosion of the

beachfront, making further travel in that direction impossible. Whether or not there a more complete skeletons located there is not known, but due to the scatter dispersal, highly fragmented remains and the evidence of erosion I would be surprised to discover much more of this particular individual.

Lab Analysis and Storage

After excavation, we transported the remains in acid-free paper bags, contained within large, acid-free cardboard boxes to the sterile anatomy labs located on the campus Medical University of the Americas, Nevis (MUA). These labs, generously offered to us by MUA's Assistant Dean of Students, Dr. Bob Mankoff, were temperature-controlled, and were restricted to use by students and faculty only, or to guests of the faculty, as was the case with my team. We were also provided with additional supplies, such as extra gloves, cleaning tools and measuring equipment, not to mention the wealth of knowledge offered by the faculty and students with specific expertise in biology, dentition, and molecular DNA.

The preservation, cleaning and analyzing of Taoüa's remains were done along guidelines outlined by Buikstra and Ubelaker (1994), and greatly aided by methods established by Bass (2001). Cleaning was done with soft brushes, sponges and water and the washed remains were air-dried for 24 hours. Buikstra and Ubelaker 1994 was chosen on the advice of Dr. Elizabeth Weiss, SJSU, as it is an excellent guide for collecting skeletal data, and one of the most commonly used by bioarchaeologists.

Digital calipers were used in craniometrics and the smaller long bones (i.e., MCs), while an osteometrics board was used to take measurements of long bones. Several grams of skeletal matter, both crania and post-crania, were collected and stored to use in chronological dating and isotopic measurements. The samples were sent into Beta Analytics for accelerated mass spectrometry (AMS) dating and were returned with a date range of 950CE-1050CE. Additionally, we attempted several plaster molds of the mandible for later study, but they were largely unsuccessful, due to unknown reasons. After we completed our analysis, we stored the remains in acid-free cardboard boxes, lined with acid-free paper, all clearly labeled and stored in accordance with Bass and the advice from Dr. Lorna Pierce, who holds a PhD in forensic anthropology and is currently one of the top-rated forensic specialists in the western United States of America. The boxes were then stored in temperature-controlled curation facilities located at the Alexander Hamilton Museum, Charlestown, Nevis Island.

Chapter 4: Osteology: Methods and Results

Introduction

The study of human remains to reconstruct the lifestyle habits of deceased people is generally known as bioarchaeology though the techniques used are common throughout all osteologically-themed sciences (Weiss 2009). By studying and analyzing skeletal materials, it can be possible to discover what people ate, what diseases they had, what serious injuries the studied individuals incurred during life and what these individuals did on a daily basis (Ubelaker 1989; Weiss 2009). Simply by studying dental morphology, bioarchaeologists can determine if a person ate sugary food, tough food, abrasive food, age at the time of death, how long ago a person died and what happened to the remains after burial, and even sometimes how the person died (Bass 2005; Ubelaker 1989; Weiss 2009).

Skeletal material is a living system and is capable of undergoing changes in morphology, reactive of specific environmental pressures (Bass 2005; Weiss 2009). This theory is encapsulated in what is called Wolff's Law, which states that bone remodeling occurs when pressure and force are applied to living skeletal material (Weiss 2009). More exactly, remodeling happens most frequently at sites where muscles attach to bone, called musculoskeletal markers (MSMs), and when those muscles are used daily for specific actions the bone will alter shape at those sites to accommodate force (Weiss 2009). This is due to Newton's 2nd Law, which states that when force is applied to an object, the object will move; if the object is restrained, as is the case with living skeletal

material, "the movement will occur within the object in the form of deformation" (Weiss 2009: 9).

Of course, remodeling does not occur only at MSMs: breakage of bone is an extreme expression of Newton's 2nd Law, where the force applied to the bone was so extreme that the deformation occurred in the form of breakage (Ubelaker 1989; Weiss 2009). Generally, the force applied is milder, so bone will react by depositing extra boney material at MSM sites that see frequent use, so that bone is thicker at these specific sites (Weiss 2009). This allows bioarchaeologists to see which muscles were used the most often by examining the thickness and shape of specific bones, and from there determine what habits would have required daily activation of those muscles (Weiss 2009). While MSM's are useful in reconstructing activity, there are confounding factors such as genetics, environment, body size and age that can change the morphology of a skeletal system and it is important to control for such factors in any study (Weiss 2009; Weiss and Jurmain 2007).

If death occurs through violent means, there is usually some indication of it on the skeletal system (Bass 2005; Weiss 2009; White 2000). However, death through non-violent means (i.e., disease) only occasionally leaves any indication on a skeletal system, which makes determining the cause of death based solely from skeletons difficult (Weiss 2009; White 2000). Additionally, many diseases (i.e., osteitis, an inflammatory infection of bone tissue) can cause marks on bone that appear similar to marks caused by inter-personal aggression or other forms of trauma, such as a fracture (White 2000: 389-390).

When osteologists see indications of disease on an individual's skeletal remains, it is generally assumed that the person survived the disease for at least long enough to have begun healing because bony reaction recurs as a response to trauma or disease (Weiss 2009). However, there are some indicators that osteologists can look for, such as antemortem tooth leaving the dental root extremely vulnerable to blood infection and eventual death of the individual, or systemic skeletal infections, like osteomyelitis, that demonstrate no signs of healing (Weiss 2009; White 2000).

Osteologists and forensic specialists can determine age at the time of death using skeletal material as well, such as dentition, epiphyseal union (fusion of proximal and distal ends of long bones), fusion of the hip bone and occasionally bone length can all be used to age an individual (Bass 2005; Buikstra and Ubelaker 1994; Ubelaker 1989; Weiss 2009). Determining the sex and stature of a skeleton are also well within the capabilities of a trained osteologist (Bass 2005; Buikstra and Ubelaker 1994; Ubelaker 1989; Weiss 2009). The stature, sex and age analysis will all be discussed in detail further on in this paper.

Another important area of bioarchaeology is the study of how the remains of an individual were treated after death; for instance, were the remains desiccated and preserved, as is the case with some indigenous Australians and Melanesians, or were they simply interred into soil wrapped in a cotton fabric, as the Island Caribs of the Lesser Antilles (Pretty and Calder 1998; Walker 1983)? Burial patterns and treatment of the dead is important not only to understand what happened to the remains before interment,

as this may cause confounding factors in later analysis, but also because it helps archaeologists understand how the culture in question views life, spirituality and death (Ubelaker 1989; Walker 1983). Thus, it is appropriate to next discuss how the Caribs treated their dead.

Burial Practices

As with the issues in reconstructing Carib spiritual lives, reconstructing burial patterns of the Carib culture has also proven a difficult task for archaeologists, largely due to the fact that these patterns are extremely variable from island to island (Allaire 1997b; A. Bullen and R. Bullen 1975; Hofman et al. 2001; Walker 1983). Furthermore, the hot, humid environment of the Caribbean is highly detrimental to both tissue and skeletal matter; this, coupled with the lack of extensive postmortem cultural preservation of the dead such as mummification has led to poor preservation of biological material (Bass 2005; Walker 1983; Wilson 1989; Weiss 2009). Finally, extensive erosion of beaches in the Lesser Antilles, has led to the loss of Carib burials and resulted in a large dearth in available osteological material available to study (Wilson 1989).

Additionally, some remains were interred entirely differently, especially in the Greater Antilles (Walker 1983). Sometimes deceased individuals were partially mummified by placing the remains in a basket or wrapping them in a cotton hammock before being placed near or on a fire; the fire would serve to help desiccate the remains and once enough dehydration had occurred, the remains would have been then placed in a small, open pit in a house (Walker 1983). Eventually, these remains would be dug back

up, and the cranium and at least one long bone were removed from the burial and either reinterred elsewhere or used in a ritual of some sort; Walker (1983) argues that this treatment of the dead could very well be seen as treatment for those in different social positions, representing at least early stages of social inequity.

It is important to note here that the practice of wrapping the deceased in cotton and desiccating the body near a fire would serve to at least partially mummify the dead (Pretty and Calder 1998). However, it was likely not enough to combat the detrimental effects of the weather on soft tissue; also, the practice of leaving the dead in an open pit until the majority of biological material decomposed before removing certain bones for secondary purposes would have contributed to a lack of preservation in the Caribbean skeletal record (Walker 1983). Of course, this particular burial practice was rare, and confined to the Greater Antilles; in the Lesser Antilles, there is even less material to study, as there have been no attempts at significant preservation (i.e., desiccation) found by archaeologists or osteologists (Walker 1983).

It has been argued that the change in mortuary practices of the Ostionoid period (circa 800CE) represent a switch from an emphasis on community to an emphasis on the family household unit and the continuation of the familial lineage (Walker 1983). It is argued that this is the first step towards the consolidation of power and the emergence of chiefdoms, and this seems especially accurate in the Greater Antilles, the location of the Taino culture at the time of European contact (Ferguson 1990, 2000; Walker 1983). This is further reinforced by the burial of dead underneath Taino public works, such as a ball

court, and the partial-embalming that the later Ostionoid cultures practiced (Keegan 2009; Walker 1983).

In the Lesser Antilles, the most common form of burial was simply underneath personal homes and no evidence for complex mortuary practices like those seen in other contemporaneous Caribbean cultures has been discovered (Hofman et al 2000; Walker 1983). Still, even this switch to burying the dead underneath the homes of living family members indicates a possible switch to a society with a more centralized base of power (Walker 1983). It is unknown if Taoüa was buried underneath a home, but Morris et al. (2001) did excavate a large communal hut of Carib construction nearby. While Taoüa was very near the coastline when we discovered her, the coastline at her time of death would have been much further out, making it an ideal location for a village. If the Caribs of the Lesser Antilles undergoing a transition from a relatively egalitarian culture to that of a chiefdom then it could go a long way to explaining why archaeologists can find evidence for both egalitarianism *and* a more stratified society (Allaire 1997a, 1997b; Haviser 1997; Petersen 1997; Rouse 1964;Walker 1983; Wilson 1989).

Although Puerto Rico is one of the islands of the Greater Antilles, Walker's 1983 study on osteological remains from the island provide a good comparison for my purposes due to its relative proximity to Nevis and because the remains he studied are from roughly the same period in time as Taoüa, especially since there is very little skeletal evidence from the Lesser Antilles. Walker (1983) found that the remains were commonly sunk into a midden, with little to no burial goods; while the level of erosion at

the WBS-01 unit was too pronounced and we were unable to determine if we were working in a midden or not.

We did not find anything indicative of a midden, but we did find a few limited faunal remains intermingled with the human remains and some shell, coral and red and black pottery fragments in context with Taoüa, as well as a single white button, possibly carved from bone. It is unknown if the artifacts were interred with Taoüa but all, except for the button, were found above the burial; the button was found in mixed context with the remains back at the lab, making it the most likely to be some sort of grave good. The amount of fragments found in the unit is not expected for a midden unit; this could be because Taoüa had been buried underneath a midden originally, but due to erosion said midden has disappeared. It is also a possibility that when Taoüa was buried, the grave was dug all the way *through* the midden and buried in relatively sterile material, which would explain why we found goods atop Taoüa, but nothing underneath (Haviser 1985). It is not possible at this time to either confirm or deny either hypothesis, and both seem likely; however, it is important to point out that Walker (1983) states that burial underneath homes and not in middens was the more common practice for the Caribs of the Lesser Antilles.

Dentition

Taoüa had much of her lower dentition left upon discovery and the analysis of her teeth revealed several interesting keys to her life. Taoüa has dental caries on the buccal side of her lower third right molar, as well as the possible beginning of caries on a lower

left canine [see Fig. 8]. Additionally, the antemortem loss of several teeth could have been due to caries, and the exposure of the dental root could have led to blood poisoning and Taoüa's death, though it was not possible to determine her actual cause of death.

Fig. 8: Taoüa's mandible, right side. Third molar has a significant carious lesion on the buccal side.

Dental caries are defined not as an invasion of microorganisms, but as a disease process that is characterized by bacteria feeding off of sugars from converted dietary carbohydrates; this eventually leads to the "demineralization of dental hard tissue by organic acids" (Weiss 2009: 50). Carious lesions indicate that Taoüa's diet contained at least some food with complex carbohydrates, possibly corn as this was a common food

consumed by the later inhabitants of the Lesser Antilles (Allaire 1997a; Larsen et al. 1991; Walker 1983; Weiss 2009). The presence of carious lesions also provides more evidence of Taoüa being an agriculturalist, as caries tend to increase with the introduction of agriculture (Larsen et al. 1991; Weiss 2009). Of course, with the overabundance of support for an agriculturalist society for the time, some carious lesions are to be expected (Allaire 1997a; 1997b; Petersen 1997, Siegel 1996; Wilson 1989).

Fig. 9: Taoüa's mandible, Occlusal view. Possible carious lesion on left canine.

What was interesting were the levels of lesions since populations with a high subsistence on marine resources tend to have fewer caries even with a significant agricultural subsistence, mostly due to the attrition caused by high levels of sand found in a marine diet (Walker 1983; Weiss 2009). Of course, this does not mean Taoüa did not suffer from attrition as, is clear from the crowns on most of the lower dentition [see Figs 8 and 9, above]. As stated above, bioarchaeologists tend to see lower levels of caries in populations with high levels of attrition, simply because the tooth wears down and leaves no place for sugars to get trapped (Larsen et al. 1991; Weiss 2009).

Bullen (1967) has also noted the presences of carious lesions in other Carib populations and Caribbean tribes from the same time period and points out that the Caribs had been recorded previously as sucking on sugar cane, or using sugar to make a beverage of some form, both of which would have led to caries early in an individual's life. Another possible explanation is the reliance upon agriculture and high carbohydrate plants, especially in light of work revealing an increase in carious lesions in agricultural populations as opposed to hunter-gatherers (Larsen 1981; Weiss 2009). While Allaire (1997a; 1997b) and others (e.g., Bullen 1967; Tremblay 2013; Wilson 1989) question the extent of Carib agriculture, the presence of several carious lesions in a population with severe attrition makes me search for an answer; since Caribs were known to make extensive use of manioc and sweet potato, both of which are extremely high in carbohydrates, it seems that agriculture played an important part in Carib life.

The type of dental wear observed with Taoüa was also reported in Walker's (1983) analysis of several individuals from prehistoric Puerto Rico. He reported high levels of attrition on the occlusal surfaces of the molars and the oblique (interior) surfaces of the incisors for the majority of his population (Walker 1983). Walker (1983) argued that this represents two different patterns of attrition, one seen in both sexes in the Caribbean and one seen largely only in females. The severe occlusal attrition of the molars and the oblique attrition of the incisors represented by both males and females and are both commonly associated the diet high in grit, such as sand (Walker 1983; Weiss 2009). Walker (1983) also states that much of the grit could have come from the consumption of stone-ground maize, which would have contained large amounts of abrasive grit from the grinding process.

Possible indications of sexual dimorphism in lifestyle habits may exist with the lateral attrition of the incisors and canines, as well as attrition between incisors, as this type of wear is only seen with women in the Caribbean and harkens back to female-oriented dental wear seen on mainland South America (Walker 1983). The oblique wear Walker (1983) discusses was represented on Taoüa's dentition, likely indicates the use of her teeth as a tool — a common practice in prehistoric cultures (Weiss 2009). Walker (1983) ties this attrition to the daily activity of processing of plant fibers by threading them through one's incisors in order to create textiles; importantly, this activity is also practiced by the mainland South Americans and was solely the activity of women. Walker (1983) relates that the lateral wear he was studying represented an hourglass

shape; the attrition of Taoüa's incisors looked more ovular in shape, possibly indicating a different way of processing plant fibers [see Figs. 10 and 11].

While the shape of attrition may not be the exactly the same as Walker (1983) discussed, I believe that the severe level of lateral attrition of the incisors is very likely the result of Taoüa using her teeth as a way to mechanically process something, likely a fiber of some sort since this type of cultural modification of teeth is a relatively common activity among prehistoric American cultures (Weiss 2009). While Walker's suggestion that this is possible evidence of sexually dimorphic activities is intriguing and, even likely, given the cultural continuity with the mainland that the Island Caribs maintained, it cannot be said without more individuals whether or not this was the case with the Nevisian Caribs (Walker 1983; Watters 1997). I believe that the asymmetric attrition seen with Taoüa is indicative of activity (i.e. using her teeth as a tool), and not indicative of diet. This evidence could indicate that the Caribs on Nevis did have a substantial marine diet, and were much more reliant on agricultural resources for food.

Fig. 10: Buccal view of lower incisors.

Fig. 11: Oblique view of mandible (right). Notice the lateral attrition between the incisors in both shots.

Cranial Vault

Taoüa's cranial assemblage appeared well preserved when first removed from the burial, but upon cleaning of the skull, it became obvious the temporals, parietals, frontal and occipital bones of the cranial vault, as well as the mandible, were remarkably intact, the majority of the mid-facial region was not. The exceptions were two small sections of maxilla containing a single molar (left and right sides), and less than 5% of the left and

right zygomatics [see Fig 12]. Additionally, portions of the palate existed though largely damaged, and most of the posterior portion of the cranium around the foramen magnum was also intact. This made certain measurements harder to take, most notably inter-orbital and the mid-facial measurements; however, the rest of the cranium was well enough preserved that were able to acquire some cranial measurements.

Fig. 12: Frontal shot, cranium.

The first examination of the cranium displayed clear signs of antemortem deformation to the occipital region and, after cleaning the facial area a little, deformation of the frontal and nasal region was also observed. Cranial modification is a common

practice among global cultures, and especially common in South American cultures; it is generally assumed that cultures practicing cranial modification do so to separate altered individual from others (Petitjean-Roget 1961; Weiss 2009). Additionally, there are cultural practices that accidentally modify the skull, but these practices are only generally considered unintentional if the modification was not the cause of an activity conducted on an infant (Weiss 2009).

For instance, cradle-boarding is a very common method of deformation among hunter-gatherer and early agricultural cultures that involves strapping an infant to a board that hangs from the shoulders of an adult while working or travelling (Duncan and Hofling 2011; Kohn et al. 1995; O'Loughlin 2004; Petitjean-Roget 1961; Torres-Rouff 2002; Ubelaker 1989; Weiss 2009; White 1996). This is considered unintentional because cradle-boarding is not done to cause deformation, it is done to free up the parent's hands for other uses, such as working in the field.

I hypothesize that the modification Taoüa displays is indicative of intentional modification during sub-adulthood, not an accident occurring through cradle-boarding or other habits. In order to test my hypothesis, I will attempt to demonstrate the null: that the cranial modification seen on Taoüa's cranium was a result of accidental modification, trauma or the result of a genetic mutation. I will first discuss how cranial modification is possible, the types of cranial modification; then I will cover to the ethnographic and skeletal accounts of cranial modification in Carib populations; and finally, to the different effects that different methods of modification cause to the cranium and their presence or

absence from Taoüa's cranium. During sub-adulthood, the cranium is what osteologists refer to as being very 'plastic' or malleable; this makes it easy to modify the shape of the cranium when young and is a practice seen in very many cultures throughout time, both intentionally and accidentally (Bass 2005; Duncan and Hofling 2011; Kohn et al. 1995; Torres-Rouff 2002; Ubelaker 1989;Weiss 2009).

Weiss divides cultural cranial modification (intentional or otherwise) into five groups: 1) the simplest type is a flattening of the lower occipital only known as vertico-occipital; 2) Frontal, where only the forehead is flattened; 3) circular, which is caused by swaddling or binding the skull; 4) fronto-occipital, caused by pressure on both the front and the back of the skull - the type of modification that occurs with some frequency in Carib populations; and 5) lamboid, in which the *upper* portion of the occipital region has been flattened, causing the lower portion to slightly protrude (Bullen 1967b; Petitjean-Roget 1961; Ubelaker 1989; Weiss 2009).

While Taoüa does display some upper occipital flattening [see Fig. 14], common in cradle-boarding, she also displays signs of modification in the frontal region [see Fig. 21], indicative of fronto-occipital cranial modification rather than the simpler occipital. Importantly, fronto-occipital modification occurs almost solely through intentional efforts rather than an accidental by product of a cultural practice (Weiss 2009; White 1996). As mentioned above, cradle-boarding is a very common practice among early populations that causes accidental flattening of the upper occipital region; it does not cause

modification to any other portion of the skull — including the lower occipital region (Kohn et al. 1996; Weiss 2009; White 1996).

Further evidence from historical accounts record the Caribs as using slings woven from cotton fabric to carry their young, rather than cradle-boarding (Petitjean-Roget 1961). Since the children would have been hung from a parent's shoulders, accidental cranial modification would not have occurred through this process. Additionally, I was unable to find any other daily practice from indigenous Caribbean and South American tribes that would have unintentionally resulted in the fronto-occipital modification seen with Taoüa [see Fig. 13] (Bullen 1967; Duncan and Hofling 2011; Kohn et al. 1996; O'loughlin 2004; Petitjean-Roget 1961; Ubelaker 1989; Walker 1983; Weiss 2009; White 1996). While Petitjean-Roget does state that modern Carib women were known to carry heavy loads via a forehead strap, he states that this is a modern affectation and that early accounts record the Island Caribs at the time of European contact carrying loads on their shoulders (1961: 49).

Fig. 13: Occipital flattening indicative of intentional fronto-occipital modification.

Fig. 14: Asymmetric orbital region is further indication of fronto-occipital modification.

Petitjean-Roget (1961) also found that a common cultural practice among the Caribs was to push on the nasal and forehead region of a newborn child, as well as the back if the head of a baby while nursing. This was done by mother to create a 'fierce' aspect; in fact, the Caribs even had a name for the practice, *aterabae* (Petitjean-Roget 1961: 48). This type of modification would have placed compressional forces along anterio-posterior planes of the occipital and frontal regions of the cranial vault, possibly resulting in fronto-occipital deformation. In fact, Petitjean-Roget (1961) even mentions that it frequently caused asymmetrical growth of the brow and facial region, which

Taoüa's frontal region also displays [see Fig. 14]. While the asymmetric growth recorded in other instances generally occurs on the right side(Petitjean-Roget 1961), and the deformation in Taoüa's case is on the left, I think that this was almost undoubtedly the source of the observed modification. Fronto-occipital modification was also found to be a common trend at the Puerto Rican Tibes site, dated to the transitional period between the Saladoid and Ostionoid period, roughly 600-800CE (Crespo-Torres 2010). Finally, Tacoma (1985) and Haviser (1985) reported on excavated craniums from the late Ceramic Era on Curacao Island, a few of which displayed fronto-occipital flattening similar to what is seen with Taoüa.

Furthermore, while there is evidence of some trauma to Taoüa's post-crania (specifically, a few broken ribs that had healed), there is no evidence of any facial trauma. Facial trauma rarely occurs accidently and is almost always indicative of inter-personal aggression; furthermore, facial trauma is much more frequent in males, especially the parietals than in females (Jurmain and Bellifemine 1997). Since Taoüa displays no signs of parietal trauma or any other sort of cranial trauma, it is highly unlikely that the deformation was caused by an injury. The final item to consider when examining cranial modification is the presence or absence of what are called wormian bones (O'Loughlin 2004; White 1996).

Wormian bones are what osteologists call superfluous, irregularly formed bones that occur along cranial sutures and fontanelles; they are also frequently referred to as ossicles or sutural bones [see Fig. 15]. There is an ongoing debate among osteologists as

to the exact etiology of wormian bones: the hypothesis with the least support today is that wormian bones are entirely genetically driven and that modification or deformation will neither affect the presence or rate of wormian bones; a second hypothesis states that wormian bones are caused through cultural modification of the cranium and are not determined by genetics; the final hypothesis, and the one that receives the most support is that the presence of wormian bones is genetically determined, but the rate of ossicles are greatly impacted by cranial deformation (Kohn et al. 1995; O'Loughlin 2004; White 1996; Weiss 2009).

Fig. 15: Sagital and lamboid sutures on Taoüa's cranium; Left, small wormian bone located at the apex of the sagital and lamboid sutures; right; large wormian bone located on the lamboid suture.

There have been numerous studies examining post-mortem human remains to determine the effect that cranial modification, both intentional and non-intentional, has on wormian bones (Kohn et al 1995; O'Loughlin 2004; Weiss 2009; White 1996). This research provides strong evidence to support some genetic role in the presences of wormian bones, largely since they are more common in pre-Columbian American populations whether or not cranial modification is present (Bass 2005; Kohn et al. 1995;

O'Loughlin 2004; Weiss 2009; White 1996). That being said, animal studies have indicated that cranial vault modification can have an impact on the rate of wormian bones and that the rate increased after modification began indicating that the formation of these odd bones is indeed effected by cranial deformation (O'Loughlin 2004).

While wormian bones are relatively common in prehistoric American populations (such as Taoüa), several studies looking at cultures found that sutural bones were found in both modified and non-modified; however, craniums that showed fronto-occipital or occipital deformation had a higher rate of wormian bones, especially along the lamboidal suture, as seen in Fig. 16 (O'Loughlin 2004; Weiss 2009; White 1996). Interestingly, O'Loughlin (2004) stated that other studies have found that unmodified craniums had more ossicles than craniums displaying circular modification; she hypothesized that this was because circular modification places compressional force upon the sutures, while fronto-occipital places lateral tensile forces upon the cranium (O'Loughlin 2004).

At birth, the cranium of a *Homo sapiens* is extremely malleable and the cranium does not fuse into more of a single unit until young adulthood; White (1996) and O'Loughlin (2004) argue that cranial modification can cause early fusion of cranial sutures, known as craniosynostosis and that this can lead to an increased rate of wormian bones, (Bass 2005; Ubelaker 1989; Weiss 2009). Additional studies have demonstrated that lamboid wormian bones, as seen with Taoüa, are almost only ever seen in modified craniums, especially those with craniosynostosis and fronto-occipital deformation

(O'Loughlin 2004; White 1996). In fact, not only do modified craniums display more posteriorly-placed wormian bones, they actually display less anteriorly-placed sutural bones than non-modified individuals (O'Loughlin 2004). This indicates that anterior wormian bones are almost entirely driven by genetics, as opposed to posteriorly placed lamboid wormian bones (O'Loughlin 2004).

To conclude, my null hypothesis stated that Taoüa's cranial deformation was the result of unintentional modification, trauma, or genetics. As I was unable to prove any of these qualifiers, the null hypothesis is false. This leaves strong support for an intentional origination of the cranial modification viewed; the likely source of this modification is the Carib practice of *aterabae*, where mothers push on the face of their newborn child and continually on the occipital region when the child is nursing (Petitjean-Roget 1961).

Vertebral Column

The average vertebral column of a human being is composed of, in descending order, 7 cervical (C), 12 thoracic (T) and 5 lumbar (L) vertebrae (Bass 2005; Ubelaker 1989; Weiss 2009). When Taoüa was excavated, we found all but two of the cervical vertebrae (likely C4 and C5, though C3 may be C5). The vertebral column is a common site for osteoarthritis (OA) or degenerative joint disease, which is described as the breakdown of cartilage between adjacent bones of a joint until the bones themselves come into contact with one another (Ubelaker 1989; Weiss 2009). OA can be useful in reconstructing activities of individuals because one of the many ways OA is caused is by

continual use of specific joints, and thus it can tell us a lot about what joints were used in an individual's life on a daily basis for decades (Weiss 2009; Weiss and Jurmain 2007).

However, there is some argument over how OA is developed and some argue that while OA at specific joints, such as upper limbs, can be useful in reconstructing activities, there are too many other influencing factors for OA to be an extremely reliable measure of activity (Weiss 2009; Weiss and Jurmain 2007). There is even a debate as to how to score OA: OA is scored by porosity (pinholes), eburnation (a shininess caused by friction), and lipping (extra bone deposits eventually resulting in joint fusion) (Buikstra and Ubelaker 1994; Ubelaker 1989; Weiss 2009). Some archaeologists argue that porosity is a bad measurement for scoring and should be tossed out all together (Rojas-Sepulveda et al. 2008; Weiss 2009).

The etiology of OA is a topic of hot debate; while repetitive mechanical loading may cause OA, there are other confounding factors to consider, including sexual dimorphism, body size, trauma, age, diet, other pathologies and especially age (Watkins 2012; Weiss 2009; Weiss and Jurmain 2007).

Since I only have a single individual to study, attempting to determine if the pattern of OA on Taoüa's vertebral column is a common among Caribs or just the result of age or biology is not possible. I attempted to compensate for this bias I looked to other osteological remains from the Caribbean's late Ceramic era. Unfortunately, studies of what few remains have been found in the Caribbean largely focus on cranial elements and

either ignore post-crania or do not possess the post-crania (Bullen 1967; Bullen 1969; Haviser 1985; Tacoma 1985; Walker 1983).

Without some sort of comparable sample and coupled with the fact the majority of the OA found with Taoüa was relegated to her vertebral column (one of the areas where OA is impacted by factors other than activity) I am hesitant to make any pronouncements concerning activity based solely on the observed vertebral OA, despite the extensive levels of OA viewed on the vertebral column [see Table 3 for complete analysis and scoring of vertebral OA] (Weiss 2009).

This being said, Taoüa had significant levels of OA on her entire vertebral column, most pronounced in the cervical region along the left side. All of the vertebrae found represented some form of lipping, with 43% reporting what was unquestionably a degree 3, according to Buikstra and Ubelaker [see Table 3] (Buikstra and Ubelaker 1994). Importantly, the pattern of OA shifts to be more uniform as you progress distally down the spine, possibly indicating different causes for OA even in the limited range of the vertebral column. The upper OA seems to be correlated to the left asymmetric growth observed in the frontal region is unknown, though I was unable to find evidence linking the two or any other instances reporting fronto-occipital deformation that also mentions extreme vertebral OA in connection. Additionally, I was unable to find any other studies reporting a similar pattern of systemic asymmetry. Weiss (personal communication, March 9, 2014) stated that cervical OA is more tightly linked to activity

than the lower vertebra, which may be a alternative explanation to the distribution of the vertebral OA.

Other indicators of activity that bioarchaeologists look for can possibly help in reconstructing Taoüa's daily life; for instance, we originally thought we had discovered Schmorl's nodes on a middle thoracic vertebrae though extensive post-mortem damage and antemortem porosity made confirmation difficult [see Fig. 16]. It was later determined that these were almost definitely not Schmorl's nodes, but activities Taoüa would have likely been engaged in (i.e. house construction or agricultural production) could have very well caused just such a marker. Schmorl's nodes are indentations in the vertebral body, commonly found in the thoracic vertebrae and less commonly in the lumbar vertebrae; essentially they represent a herniation of material between vertebrae, often linked with trauma and activity (Rogers and Waldron 1995; Weiss 2009). Though there is some debate as to the exact cause of Schmorl's nodes, more and more evidence is linking it to activities that require repetitive and extreme compression stress, such as carrying heavy burdens, extensive agriculture, or years spent horseback riding (Faccia and Williams 2008; Weiss 2009).

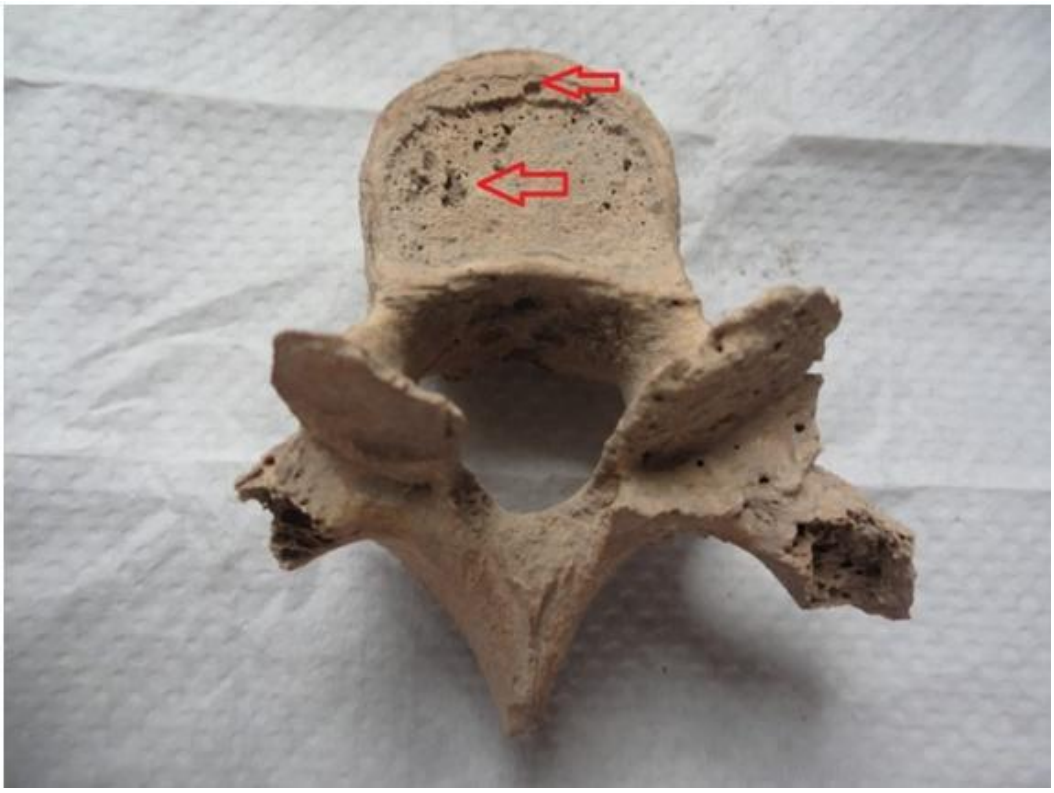

Fig. 16: The arrows point to what we thought at first were Schmorl's nodes, but were later determined as likely not nodes, especially the indentation to which the top arrow points.

Weiss (2009) found in her own comparison study between Quebec nineteenth century prisoners of war and British Columbian Amerindians that the POWs, with far more spine-intensive labor had a greater number of Schmorl's nodes; in fact, the POWs lives before imprisonment often involved 'back-breaking' labor and may have been a reason for the high frequency of Schmorl's nodes (Weiss 2009). There seems to be no correlation to age, sex, or levels of Schmorl's nodes, which means the only known causal factor is activity.

Non-Vertebral Post-Cranial Elements

In general, Taoüa's post-crania displayed signs of an extremely rough life, though, interestingly, no clear evidence of inter-personal violence was found (Ubelaker 1989; Weiss 2009). While some of the ribs may have been broken [see Figs. 17 and 18] the types of trauma generally associated with physical violence between individuals, such as parry fractures (a medio-lateral break along the middle radius or ulna indicative of blocking a blow from a weapon), are not seen.

Remodeling of the sternum and sternal ends of the ribs is frequently linked with activation of the pectoralis major muscle, which attaches at the clavicle, sternum, ribs 1-6, and a few locations on the upper portion of the humerus (Weiss 2009). This type of remodeling is commonly linked with coastal populations, since this muscle is activated by internal arm rotation, horizontal and standard flexion and arm extension: all activities indicative of rowing a canoe on a continual basis. Activity is only one possible cause of remodeling; other factors such as age, trauma, and boney infections can all cause similar types of bone deposition (Weiss 2009; White 2000). Given the fact that the remodeling seen with Taoüa largely occurred at the attachment site for the ribs to the vertebral column, it seems more likely that the primary cause is related to the earlier mentioned OA.

Fig. 17: Left rib, vertebral end. Notice the deformation, likely linked to the original cause of OA.

Fig. 18: Right rib, vertebral end extensive remodeling indicative of extensive use.

As mentioned previously, fishing, canoe-building, naval warfare and maritime trade were all essential to the proper functioning of Carib society, and while males were generally doing the most maritime trade (i.e. warfare or trade), there is no reason to assume that women were not travelling by ocean with some frequency (Petersen 1997; Petitjean-Roget 1961; Walker 1983; Watters 1997). However, most of the remodeling is seen on the medial left side of Taoüa's ribcage, possibly indicative of a pathology or trauma from a fall, especially when considered the extensive OA and remodeling seen on Taoüa's cervical and thoracic vertebrae (Ubelaker 1989; Weiss 2009).

The remaining long bones of Taoüa displayed nothing unusual, though all joints displayed some remodeling indicative of constant use, again to be expected in prehistoric populations (Ubelaker 1989; Weiss 2009). We judged Taoüa to be right handed, as several osteological studies indicate that the metacarpals of the dominant hand were much larger and asymmetric than those of the non-dominant hand (Bass 2005). No signs of breakage, skeletal infection, disease, or malnutrition were seen on the long bones, which could mean that one of two things: generally, when bioarchaeologists see indications of disease or malnutrition on a skeletal system it is assumed that the individual was relatively healthy, since that person was able to recover long enough for the individual's skeleton to heal (Weiss 2009).

Thus, when bioarchaeologists encounter an individual with no signs of disease, it is often assumed that this person probably was unhealthy and died from the first significant disease or pathology encountered (Weiss 2009). However, since Taoüa was quite old when she died, it is hard to assume that she was unhealthy; possibly she encountered very little disease or pathological agents when young, though maybe what killed her was the first severe illness she encountered. The lack of Harris lines on her tibias, or enamel hyperplasia on her teeth, indicate that Taoüa was relatively well-fed and healthy as a child (Weiss 2009). Whether this is also representative of the Caribs in general having extensive food resources, or whether it represents parents feeding offspring at their own nutritional expense is unknown without more remains with which to compare.

Finally, Taoüa seems to have been buried in a loosely flexed position on her left side with her head facing east. There were no substantial grave goods. The site was placed very near a prehistoric Carib village, lending further support to her having been a Carib (Allaire 1997b; Morris et al. 2001). Moreover, Taoüa was buried facing the east; while Walker (1983) provides substantial evidence to show that an eastward orientation is not the norm among the Island Caribs, he does point out that the one orientation not seen in Carib burials is a westward one. This is important because it may represent a continuity to mainland Kalina, where the indigenous inhabitants of South America conceptualized a spiritual world linked to the cycle of the sun (Walker 1983). This means that east, where the sun rises every morning, was viewed as the land of the living and west, where the sun set every evening, was seen as the land of the dead (Walker 1983).

Craniometrics

Taoüa had a cephalic index of roughly 80% (79.93), placing her at the low end of brachiocephalic cranial index; this is not surprising considering the fronto-occipital cranial modification, or the fact that a great many craniums associated with the Caribs have been discovered to be brachiocephalic (Bass 2005; Haviser 1985; Tacoma 1985). Due to the remarkable level of preservation of the vault, we were able to use Bass, Buikstra and Ubelaker to take a the majority of the measurements [see tables 1 and 2]; that being said there was no facial elements preserved, and almost the entire maxilla was gone (Bass 2005; Buikstra and Ubelaker 1994).

Craniometrics Table 1	Measurements (in mm).
Maximum Cranial Length	148.04mm
Max. Cranial Breadth	118.33mm
Bizygomatic Diameter	134.53mm
Basion-Bregma Height	147.68mm
Cranial Base Length	n/a
Basion-Prosthion	n/a
Maxillo-Aveolar Breadth	n/a
Maxillo-Aveolar Length	n/a
Biauricular Breadth	132.9mm
Upper-Facial Height	n/a
Minimum Frontal Breadth	105.25mm
Nasal Height	n/a
Nasal Breadth	n/a
Orbital Breadth	41.09mm
Orbital Height	n/a
Biorbital Breadth	97.88mm
Interor0bital Breadth	n/a
Frontal Chord	n/a
Parietal Chord	117.42mm
Occipital Chord	79.04mm
Foramen Magnum Length	32.8mm
Foramen Magnum Breadth	31.74mm
Mastoid Length	27.6mm
Cephalic index	79.93mm

Mandibular Measurments Table 2	Measurements (in *mm*).
Height of Mandibular Body	2mm
Breadth of Mandibular	14.6mm
Mandibular Length	≈90.3mm
Mandibular Angle	124°
Bicondylar Length	n/a
Minimum Ramus Breadth	30.97mm
Maximum Ramus Breadth	≈39.9mm
Maximum Ramus Height	≈55.02mm
Chin Height	33.17mm

Post-Crania

Vertebral Column Table 3	Osteoarthritis scoring (Buikstra and Ubelaker (1992) used to score OA)
Cervical (C) 1	Lipping extent: <1/3 of body
	Degree of lipping: 1
	Porosity: <1/3 of body, pinpoints/coalesced
	Eburnation: 1 (barely discernable)
C2	Lipping extent: 1/3-2/3
	Degree of lipping: 2-3
	Porosity: 1 (pinpointing), inferior side only
	Eburnation: 2 (polish) <1/3 of body
C3	Lipping extent: 2/3
	Degree of lipping: 3
	Porosity: 3 (coalesced)
	Eburnation: 1 (<1/3 of body)
C4 n/a	Lipping extent: n/a
	Degree of lipping: n/a
	Porosity: n/a
	Eburnation: n/a
C5 n/a	Lipping extent: n/a
	Degree of lipping: n/a
	Porosity: n/a
	Eburnation: n/a
(possible) C6	Lipping extent: 1/3-2/3
	Degree of lipping: 3
	Porosity: 2 (pinpointing and coalesced), 1/3-2/3 of body
	Eburnation: 1
(possible) C7	Lipping extent: 1/3-2/3
	Degree of lipping: 3
	Porosity: 2, 1/3-2/3 of body
	Eburnation: 2 (polish) 1/3-2/3 of body
Thoracic (T) 1	Lipping extent: 1/3-2/3
	Degree of lipping: 2-3
	Porosity: 3, inferior; 1, posterior
	Eburnation: 2
T2	Lipping extent: 1/3-2/3
	Degree of lipping: 3
	Porosity: n/a, highly fragmented

	Eburnation: 1
T3	Lipping extent: >2/3
	Degree of lipping: 2
	Porosity: 3
	Eburnation: 1/3-2/3
T4	Lipping extent: 1/3-2/3
	Degree of lipping: 2-3
	Porosity: 3, 1/3-2/3
	Eburnation: 1, <1/3
T5 (possible Schmorl's nodes)	Lipping extent: 1/3-2/3
	Degree of lipping: 3
	Porosity: too damaged
	Eburnation: 0
T6	Lipping extent: 1/3-2/3
	Degree of lipping: 3
	Porosity: 3, 1/3-2/3
	Eburnation: 1, <1/3 of body
T7	Lipping extent: <1/3
	Degree of lipping: 2
	Porosity: n/a
	Eburnation: 0
T8	Lipping extent: 1/3-2/3
	Degree of lipping: 3
	Porosity: 2, >2/3 of body
	Eburnation: 0
T9	Lipping extent: 1/3-2/3
	Degree of lipping: 2-3
	Porosity: 2, 1/3-2/3 of body
	Eburnation: 0
T10 (possible Schmorl's node, inferior side)	Lipping extent: >2/3
	Degree of lipping: 3
	Porosity: 3, >2/3 of body
	Eburnation: 1, <1/3 of body
T11	Lipping extent: 1/3-2/3
asymmetrical; larger on right side with possible	Degree of lipping: 2
	Porosity: 2, 1/3-2/3 of body
	Eburnation: 0-1
T12	Lipping extent: 1/3-2/3
	Degree of lipping: 2-3

	Porosity: 3, >2/3 of body
	Eburnation: 1, >1/3 of body
Lumbar (L) 1	Lipping extent: >1/3
	Degree of lipping: 1
	Porosity: 2, 1/3-2/3 of body
	Eburnation:0
L2	Lipping extent: <1/3
	Degree of lipping: 2
	Porosity: 2, <1-3 of body
	Eburnation: 1, <1/3 of body
L3 (left side especially robust)	Lipping extent: >2/3
	Degree of lipping: 3
	Porosity: 3, >2/3 of body
	Eburnation: 0
L4	Lipping extent: >2/3
(boney growth out of right side of body)	Degree of lipping: 3
	Porosity: 3, >2/3 of body
	Eburnation: 2, <1/3 of body
L5	Lipping extent: >2/3
	Degree of lipping: 2-3
	Porosity: 3, 1/3-2/3 of body
	Eburnation: 0

Metacarpals and Metatarsals Table 4	Measurements (in *mm*)
Right Metacarpal (MC) 1 (intact)	Mediolateral (ML) width of base: 3.94
	Anterio-Posterior (AP) width of base: 14.35
	ML width of head: 12.85
	AP width of head: 12.57
	ML maximum diameter of midshaft: 10.39
	AP maximum diameter of midshaft: 8.14
	Length: 40.71
Right MC 2 n/a	Mediolateral (ML) width of base: n/a
	Anterio-Posterior (AP) width of base: n/a
	ML width of head: n/a
	AP width of head: n/a
	ML maximum diameter of midshaft: n/a
	AP maximum diameter of midshaft: n/a
	Length: n/a
Right MC 3 (too fragmented to measure)	Mediolateral (ML) width of base: n/a
	Anterio-Posterior (AP) width of base: n/a
	ML width of head: n/a
	AP width of head: n/a
	ML maximum diameter of midshaft: n/a
	AP maximum diameter of midshaft: n/a
	Length: n/a
Right MC 4 (missing base)	Mediolateral (ML) width of base: n/a
	Anterio-Posterior (AP) width of base: n/a
	ML width of head: 10.0
	AP width of head: 11.28
	ML maximum diameter of midshaft: 5.95
	AP maximum diameter of midshaft: 7.2
	Length: 50.38mm
Right MC 5 (base missing)	Mediolateral (ML) width of base: n/a
	Anterio-Posterior (AP) width of base: n/a

	ML width of head: 11.13
	AP width of head: 11.1
	ML maximum diameter of midshaft: 6.85
	AP maximum diameter of midshaft: 6.19
	Length: 45.16
Left MC 1 n/a	Mediolateral (ML) width of base: n/a
	Anterio-Posterior (AP) width of base: n/a
	ML width of head: n/a
	AP width of head: n/a
	ML maximum diameter of midshaft: n/a
	AP maximum diameter of midshaft: n/a
	Length: n/a
Left MC 2 (damaged head and base)	Mediolateral (ML) width of base: n/a
	Anterio-Posterior (AP) width of base: 14.06
	ML width of head: n/a
	AP width of head: n/a
	ML maximum diameter of midshaft: 7.28
	AP maximum diameter of midshaft: 8.35
	Length: 54.04
Left MC 3 n/a	Mediolateral (ML) width of base: n/a
	Anterio-Posterior (AP) width of base: n/a
	ML width of head: n/a
	AP width of head: n/a
	ML maximum diameter of midshaft: n/a
	AP maximum diameter of midshaft: n/a
	Length: n/a
Left MC 4 n/a	Mediolateral (ML) width of base: n/a
	Anterio-Posterior (AP) width of base: n/a
	ML width of head: n/a
	AP width of head: n/a
	ML maximum diameter of midshaft: n/a

	AP maximum diameter of midshaft: n/a
	Length: n/a
Left MC 5 (intact)	Mediolateral (ML) width of base: 11.09
	Anterio-Posterior (AP) width of base: 9.78
	ML width of head: 10.45
	AP width of head: 11.25
	ML maximum diameter of midshaft: 8.58
	AP maximum diameter of midshaft: 6.10
	Length: 49.55
Unknown MC (base & head severely damaged)	Mediolateral (ML) width of base: n/a
	Anterio-Posterior (AP) width of base: n/a
	ML width of head: n/a
	AP width of head: n/a
	ML maximum diameter of midshaft: 8.38
	AP maximum diameter of midshaft: 7.95
	Length: 49.06
Metatarsal (MT) 2 (slight damage to head)	Mediolateral (ML) width of base: 14.19
	Anterio-Posterior (AP) width of base: 14.95
	ML width of head: 12.87
	AP width of head: 14.22
	ML maximum diameter of midshaft: 7.52
	AP maximum diameter of midshaft: 8.80
	Length: 61.56

Osteometrics of Long Bones Table 5	Measurements (in *mm*).
Right Humerus, fractured distal end	157mm
Left Humerus, missing proximal head, fractured distal end	239mm
Right Ulna, proximal head missing, partially fractured distal end.	224mm
Left Ulna, distal end missing.	220mm
Right Radius, proximal end missing	202mm
Left Radius, complete	197mm
Right Femur, fractured distal end	335mm
Left Femur, largely intact with slight distal end fracture	350mm
Right Tibia, fractured on both distal and proximal ends	270mm
Left Tibia, proximal head missing, distal end partially fractured	280mm
Right Fibula, slight damage to both distal and proximal ends	240mm
Left Fibula, partially fractured distal end	296mm

Stature, Sex, and Age

All stature, sex and age determinations taken from Taoüa's remains were conducted using the guidelines established in Buikstra and Ubelaker 1994, supplemented with Bass 2005 and White 2000; please refer to tables 4 and 5 for exact measurements of the non-vertebral elements of the post-crania. While the cranium had been previously sexed as female by the 2011 excavation crew, we wanted to confirm that determination for our own analysis. Generally, when analyzing post-crania osteologists prefer to use parts of the pelvic girdle to determine the sex of skeleton, as it provides several good indicators of sex (Bass 2005; Buikstra and Ubelaker 1994; Ubelaker 1989).

Taoüa's pelvic girdle, however, was in too poor of a condition for an accurate read, so instead we decided to sex her measuring the transverse and vertical diameter

measurements of the humeral head, as outlined in Bass 2005. We chose this method because we felt that the right humeral head was the most intact and thus accurate of all the places used to sex a skeleton using post-crania (Bass 2005; Buikstra and Ubelaker 1994). The transverse diameter was 39.02 mm and the vertical diameter was 42.8 mm; the vertical diameter range for a female is under 43 mm so Taoüa, while robust, fell within this range (Bass 2005: 152). The standard range for the transverse diameter of a female prehistoric California populations (comparable to other American indigenous peoples) is within 38.6 mm to 39.6 mm again within the range for a woman (Bass 2005:158).

Sex measurements of the cranium can be divided into metric (trait can be measured numerically) or non-metric (traits that cannot); for Taoüa, we were hesitant to use metric cranial traits as a sex indicator due to the earlier mentioned cranial modification, which warped the metric traits of the skull. However, Taoüa had a rounded mental eminence (chin), rather than squared, supraorbital ridges that were smooth and not very pronounced, small teeth and a small palate all indicate a sex determination of female (Bass 2005:81). In conjunction with a broad and narrow sacrum and a wide sciatic notch of the right pelvis, the conclusion is that this individual was undeniably female (Bass 2005: 209-215).

We also used the distal and proximal ends of the humerus to help with determining age; as both epiphyseals were fused, we judged her to be at least 24 years of age and in conjunction with complete adult dental eruption, she was more likely to be in

her thirties when she died (Bass 2005; Buikstra and Ubelaker 1994). Another indicator used in age estimation are the sternal ends of the ribs and with Taoüa we found porosity coupled with slight lipping indicating an age range of 28-35, based on Bass 2005 and White 2000. While much of the pelvis was destroyed, we were able to determine that the right pubic symphysis had extremely delineated edges and slight lipping further reinforced an age range of early-to-mid 30's (Bass 2005). Additionally, the extensive levels of remodeling and osteoarthritis throughout her skeleton we thought she may be in her late thirties, though this could easily have been confounded by an extremely physical and active lifestyle (Weiss 2009).

Stature can be determined by using any variety of long bones, but as the most intact bones in our case happened to be right MC1, left MC5, we decided that these particular bones would serve best as an indicator (Bass 2005; Buikstra and Ubelaker 1994). The formula for determining stature from hand bones, as outlined in Bass 2005, is the (length of the bone in mm)(slope of bone)+intercept+/-the Standard Error of the mean (SE) (Bass 2000: 187). The slope, SE and the intercept can all be found in Bass 2005: 189; for MC1, the formula is as follows: 40.71(1.659)+90.02+/-5.52, with a final range of 152.04-163.08cm in height. For MC5, the formula was 49.55(1.468)+88.52+/-5.47 which is a range of 155.47-165.67cm. This leaves Taoüa with a full range of 152.04 cm to 165.67cm in height, or approximately 5 to 5.5ft. When we calculate in the stature measurements from all available bones, including the bones with either the distal or proximal end (or both) damaged, we get a large range of 136.02-166.73cm, or 4.4 to 5.5 ft.

Chapter 5

Conclusions

In the process of researching the indigenous people of the Caribbean, I learned that there was much contention, murkiness, confusion and outright falsehoods over how the Caribbean became populated, not to mention who was living in the Caribbean, what they were like and how they fit into the human experience. The earliest aceramic cultures were largely nomadic, subsisting off of resources from island to island and utilizing relatively primitive lithic technologies. Eventually, the earlier Casimiroid and Ortoroid cultures were replaced by the ceramic-using Saladoid people, whose technology and culture altered over time as the Saladoid culture became more complex (Allaire 1997a; Haviser 1997; Hofman et al. 2001).

Around 500-600BCE, the Saladoid culture was replaced by the Ostionoid culture from mainland Kalina (modern Guianas), which in and of itself proceeded to undergo several changes depending upon the location. By the time Columbus reached the Caribbean, the Greater Antilles was occupied by the Arawak/Taino people, a relatively complex chiefdom society utilizing ceramic subseries technology similar to, but more complicated than the early Ostionoid ceramics (Allaire 1980; Rouse 1964). In the Windward islands of the Lesser Antilles, the Ostionoid culture evolved into the localized Troumassoid subseries, before the Ostionoid series was replaced entirely by the Sauzoid complex, around 1050CE (Allaire 1980; A. Bullen and R. Bullen 1975; Rouse 1964; Keegan 2000).

While Allaire (1980, 1997a, 1997b, 2008) argues that the Troumassoid culture disappeared around 800-900CE and the Lesser Antilles were abandoned until 1050CE, when the Sauzoid technology begins to appear. However, Allaire lacks substantial evidence to support this hypothesis and the majority of work done by others seems to contradict this idea entirely (A. Bullen and R. Bullen 1975; Keegan 2000; Wilson 1989). In the Leeward Islands, such as Nevis, there appears to be a continuation of the Ostionoid technology from its first introduction, with none of the alterations that are seen in the Greater Antilles or the Windward islands (Wilson 1989, 2006). This indicates a continual Island Carib occupation of Nevis and other Leeward Islands, up until at least 1050CE

According to ethnographic, historic, and archaeological evidence, it seems the Taino considered the inhabitants of the Lesser Antilles, who we know as the Island Caribs, enemies and violent aggressors (Allaire 1980, 1997a, 1997b, 2008; Davis and Goodwin 1990; Wilson 1989). While war was an important part of Carib life, insinuating its way into Carib spirituality, marital life, trade and political organization, the level of bloodthirstiness (i.e. cannibalism) stated by the Arawaks was greatly exaggerated (Allaire 1997b; Davis and Goodwin 1990). This issue was further compounded by the habit of the early European settlers to refer to any indigenous Caribbeans who resisted colonization as Carib, both for "political and clerical reasons" (Davis and Goodwin 1990: 38) while those who did not resist invasion were referred to as Arawak or Taino (Allaire 1980; Davis and Goodwin 1990).

From historical records, linguistic analysis and ethnographic documentation, it seems possible that Caribs did kidnap Arawak women and force them into marriage; the strongest evidence here is the linguistic analysis, summarized well in Davis and Goodwin 1990. However, Taoüa was almost definitely of Carib birth, as the fronto-occipital cranial modification was intentional and would have begun at birth, or very close to birth; this is further supported by the fact that the Caribs of the Lesser Antilles were known to push on the frontal and occipital regions of their children to create a fierce aspect(O'loughlin 2004; Petitjean-Roget 1961; Walker 1983; Weiss 2009; White 1996).

Thus, the type of modification seen with Taoüa indicates that she was born a Carib. Additional support for this hypothesis comes from the complete lack of any indicators of cultural replacement or significant change on Nevis after the Ostionoid ceramic series appears (Wilson 1989, 2006).

Taoüa displayed unique skeletal traits that indicate cultural practices ranging from the aforementioned cranial modification, to levels of OA indicating continual paddling and possibly baring heavy loads on her shoulders, and extreme levels of vertebral OA and what are likely Schmorl's nodes. These traits are supported by known Carib cultural practices, including intensive subsistence strategies, maritime trade and warfare, and reports of Caribs using shoulders to bare a heavy load (Keegan 2000; Glazier 1980; Petersen 1997; Petitjean-Roget 1961; Watters 1997). While vertebral OA is highly influenced by pathology and genetics, Schmorl's nodes seem to be entirely indicative of heavy activity such as constant digging or repetitive carrying of heavy burdens (Rogers

and Waldron 1995; Weiss 2009; Weiss and Jurmain 2007). Additional traits, such as carious lesions and extreme attrition, indicate that Taoüa likely subsisted off a combination of agricultural and maritime resources, though Bullen (1967) mentions that a common cultural practice among the Caribs was to suck on sugar canes, or use sugar in beverage-creation, both of which would have contributed to dental caries (Larsen 1981, 1980; Weiss 2009).

All of the skeletal traits strongly support that Taoüa was a right-handed female, around five feet in height and lived a very active life, ate a combination of foods that contained large amounts of grit, likely both from stone-grinding and or use of the teeth as tools, and foods that had high levels of carbohydrates or sugars. This connects back to my earlier research questions concerning this individual's gender, age, and stature, and can provide glimpses into prehistoric Caribbean life, using Taoüa as a lens for understanding. While Taoüa died young compared to our standards, she lived quite a long time for prehistoric individuals; the exact cause of her death is unknown; though due to the lack of any evidence of perimortem trauma, it is likely that she died as a result of pathology, possibly relating to periodontal diseases. Despite the periodontal disease, Taoüa displayed no signs of nutritional deprivation and very little instances of possible boney infections; coupled with a relatively long life, it can be concluded that Taoüa was a relatively healthy individual.

The relatively low levels of trauma and non-existent levels of malnutrition could indicate a higher socio-economic status but without a larger population with which to

provide a comparison, making such a determination is not possible (Walker 1983). Taoüa lived for over thirty years in the Caribbean and provides evidence to support and challenge hypothesis concerning the migratory aspects of the Caribbean. For instance, was the Lesser Antilles abandoned after 800CE, as Allaire (1980, 1997a, 1997b) suggests or was it continually occupied from the Saladoid era to Columbian contact (Davis and Goodwin 1990; Wilson 1989)?

The remains of Taoüa definitely support the latter hypothesis, as she was clearly of Carib origin and tested through multiple radio-carbon tests as from roughly 900-1050CE, placing her well after the time by which Allaire (1980, 1997a, 1997b) states the Lesser Antilles were abandoned.

It is my hope that through this thesis, I can help illuminate the life of a person who lived many hundreds of years ago. There was a continuation of habitation in America that goes unbroken for millennia, long before Christopher Columbus ever thought about sailing west. Judging by Taoüa, the Caribs of Nevis were low-level agriculturalists who still either needed or desired easy access to maritime resources for both dietary purposes and trading purposes; while Taoüa displays the *aterabae* meant to increase fierceness, we were unable to identify any indication of intra-personal aggression on her skeletal system. While a single individual is not truly enough to draw conclusions concerning Carib aggression, Taoüa may indicate lower levels of violence among women in the Leeward Islands; more research will be needed before such a statement can be supported.

The evidence and research gathered in the process of creating this thesis is meant to help archaeologists, historians, and the extant Carib population better understand the prehistoric Carib culture and the story of the prehistoric Caribbean as a whole. Additionally, this was a project done in large part due to the eagerness of the NHCS and the modern Nevisians overall to learn about the previous inhabitants of their island.

Future research into the Caribs of the Leeward Islands will be essential in determining the history of the Caribbean both before and after the arrival of Columbus. While there is currently a lack of existing biological research of the indigenous Caribbean, skeletal studies in the area may provide an avenue of future information. While the Caribbean, with its hot and damp climate, is not conducive to preserving biological material, the fact that White Bay alone has at least three other burials, all possibly from Taoüa's time, indicates that there is plenty of information to be gathered. Future studies will necessitate research into biological remains, as other pursuits of research have been largely exhausted. Later archaeological research will need to more completely examine the available skeletal information in order to draw a more complete picture of the indigenous peoples of the Caribbean.

References

Allaire, Louis.

2008 *The Cambridge Histories of the Native Peoples of the Americas*, Vol. 3: South America, Part II. Frank Salomon and Stuart B. Schwartz, eds. Cambridge University Press: Cambridge, United Kingdom.

1997a The Lesser Antilles Before Columbus. In *The Indigenous People of the Caribbean*. Samuel Wilson, ed. Pp. 20-29. University Press of Florida: Tallahassee, Florida.

1997b The Caribs of the Lesser Antilles. In *The Indigenous People of the Caribbean. Samuel Wilson*, ed. Pp. 179-185. University Press of Florida: Tallahassee, Florida.

1980 On the Historicity of Carib Migrations in the Lesser Antilles. *American Antiquity*45(2): 238-245.

Bartone, Robert with Aad H. Versteeg.

1995 The Structures of Tanki Flip, Aruba. International Association of Caribbean Archaeology. Basse Terre, Guadeloupe, July 24-28, 1995.

Bass, William

2005 *Human Osteology: a Laboratory and Field Manual*. 5th ed. Missouri Archaeological Press: Missouri, United States.

Bullen, Adelaide K.

1969 Case Study of An Amerindian Burial with Grave Goods from Grande Anse, St Lucia. International Association of Caribbean Archaeology. St. George's, Grenada, July 7-11, 1969.

Bullen, Adelaide K.

1967 Field Comments on the Skull Excavated in 1967 at Caliviny Island, Grenada, West Indies. International Association for Caribbean Archaeology

Bullen, Ripley P. and Adelaide K. Bullen.

1975 Cultural Areas and Climaxes in Antillean Prehistory. Gainesville, Florida.

Buikstra, Jane E. with Douglas H. Ubelaker.

1994 *Standards for Data Collection from Human Skeletal Remains*. Arkansas Archaeological Survey: Arkansas, United States.

Cooper, Vincent O.

1997 Language and Gender among the Kalinago of Fifteenth-century St. Croix. In *The Indigenous People of the Caribbean*. Samuel Wilson, ed. Pp. 186-196. University Press of Florida: Tallahassee, Florida.

Crespo-Torres, Edwin

2010 Ancient Bones Tell Stories: Osteobiography of Human Remains From Tibes. In *Tibes: People, Power, and Ritual at the Center of the Cosmos*. L. Antonio Curet and Lisa M. Stringer, eds. Pp. 191-208.

Davis, Dave with R. Christopher Goodwin

1990 Island Carib Origins: Evidence and Nonevidence. *American Antiquity* 55(1): 37-48.

Dukes, Joel A. and Elizabeth J. Reitz.

1993 Use of Vertebrate Resources at Trants, A Saladoid Site on Montserrat. International Association for Caribbean Archaeology. San Juan, Puerto Rico, July 25-31, 1993.

Duncan, William N and Charles Andrew Hofling.

2011 Why the Head? Cranial Modification as Protection and Ensoulment Among the Maya. *Ancient Mesoamerica* 22(1): Pp. 199-210.

Evans-Pritchard, E.E.

1976 [1937] *Witchcraft, Oracles, and Magic among the Azande*. New York: Oxford University Press.

Faccia, KJ and RC Williams

2008 Schmorl's Nodes: Clinical Significance and Implications for the Bioarchaeological Record. *International Journal of Osteoarchaeology*: 18: 28-44.

Feder, Kenneth

2007 *Linking to the Past: A Brief Introduction to Archaeology*. Oxford University Press: United States.

Ferguson, R. Brian.

1990 Blood of the Leviathan: Western Contact and Warfare in Amazonia. *American Ethnologist* 17(2): 237-257.

2000 The Causes and Origins of "Primitive Warfare" on Evolved Motivations for War. *The Anthropology Quarterly* 73.3(2000): 159-164.

Glazier, Stephen D.

1980 A Note on Shamanism in the Lesser Antilles. International Association for Caribbean Archaeology. St. Kitts.

Haviser, Jay B.

1997 Settlement Strategies in the Early Ceramic Age. In *The Indigenous People of the Caribbean*. Samuel Wilson, ed. Pp. 59-69. University Press of Florida: Tallahassee, Florida.

1985 Prehistoric Human Remains on Curacao. International Association for Caribbean Archaeology. San Juan, Puerto Rico, July-August 1985.

1983 An Inventory of Prehistoric Resources on St. Eustatius, Netherlands, Antilles. International Association for Caribbean Archaeology. Martinique, Caribbean, July 25-30, 1983.

Hofman, Corinne L, with Menno L.P. Hoogland and Andre Delpuech.

2001 Spatial Organization at a Troumassoid Settlement, the Case of Anse a La Gourde, Guadalupe. International Association for Caribbean Archaeology. Aruba, July 22-28, 2001.

Hofman, Corinne L. with Alistair J. Bright, Arie Boomert and Sebastian Knippenberg.

2007 Island Rhythms: The Web of Social Relationships and Interaction Networks in the Lesser Antilles. *Latin American Antiquity* 18(3): pp. 243-268.

Hurston, Zora Neale.

1966[1938] *Tell My Horse: Voodoo and Life in Haiti and Jamaica*. United States: HarperCollins Publishers.

Jurmain, Robert with Viviana Ines Bellifemine.

1997 Patterns of Cranial Trauma in a Prehistoric Population from Central California. *International Journal of Osteoarchaeology* 7: pp. 43-50.

Keegan, Walter

2000 West Indian Archaeology 3. Ceramic Age. *Journal of Archaeological Research*8(2): 135-167.

2009 Central Plaza Burials in Saladoid Puerto Rico: An Alternative Perspective. *Latin American Antiquity* 20(2): 375-385.

Kohn, Luci Ann P. with Steven R. Leigh and James M. Cheverud.

1995 Asymmetric Vault Modification in Hopi Crania. *American Journal of Physical Anthropology* 98: pp. 173-195.

Larsen, Clark Spencer.

1981 Skeletal and Dental Adaptations to the Shift from Agriculture on the Georgia Coast. *Current Anthropology* 22(4): pp. 422-423.

Lundberg, Emely R.

2003 Late Pre-Columbian Archaeological Classification and the Study of Taino Boundaries. International Association for Caribbean Archaeology. Santo Domingo, Dominican Republic, June 29-July 6, 2003.

Meniketti, Marco,

2004 The Historical Archaeological of Nevis, West Indies: Capitalism, Environment, and the Evolution of the Caribbean Colonial Landscape, 1625-1833. Ph.D. dissertation, Department of Anthropology, University of Michigan.

Morris, E., Leech, R., Crosby, A., Machling, T., and Williams, B.

2001 Nevis Heritage Project Interim Report 2000. The Nevis Heritage Project, with University of Southampton Press: Southampton, United Kingdom.

Myers, Robert A.

1984 Island Carib Cannibalism. *New West Indian Guide* 3(4): 147-184.

O'Loughlin, Valerie Dean.

2004 Effects of Different Kinds of Cranial Deformation on the Incidence of Wormian Bones. *American Journal of Physical Anthropology* 123: pp. 146-155.

Petitjean-Roget, Jacques.

1961 The Caribs, As Seen Through the Dictionary of the Reverend Father Breton. International Association for Caribbean Archaeology. Forte-de-France, Martinique, July 3-July 7, 1961.

Petersen, James B.

1997 Taino, Island Carib, and Prehistoric Amerindian Economies in the West Indies: Tropical Forest Adaptations to Island Environments. In *The Indigenous People of the Caribbean*. Samuel Wilson, ed. Pp. 118-130. Tallahassee, Florida: University Press of Florida.

Pretty, Graeme L and Angela Calder.

1998[1980] Mummification in Australia and Melanesia. In *Mummies, Disease & Ancient Cultures*, 2nd ed. Aidan Cockburn, Eve Cockburn & Theodore A. Reyman, eds. Pp. 289-307. Cambridge University Press: Cambridge, United Kingdom.

Rodriguez, Miguel.

1997 Religious Beliefs of the Saladoid People. In *The Indigenous People of the Caribbean*. Samuel Wilson, ed. Pp. 80-85. University Press of Florida: Tallahassee, Florida.

Ramos, Reniel Rodriguez, Elvis Babilonia, L. Antonio Curet and Jorge Ulloa.

2008 The Pre-Arawak Pottery Horizon in the Antilles: A New Approximation. *Society for American Archaeologists* 19(1): pp. 47-63.

Reed, Jessica with James B. Patterson.

1999 A Comparison of Huecan and Cedrosan Saladoid Ceramics at the Trants Site, Montserrat. International Association for Caribbean Archaeology. St. George, Grenada, July 11-July 17, 1999.

Righter, Elizabeth.

1997 The Ceramics, Art, and Material Culture of the Early Ceramic Period in the Caribbean Islands. In *The Indigenous People of the Caribbean*. Samuel Wilson, ed. Pp. 20-29. University Press of Florida: Tallahassee, Florida

Rojas-Sepulveda, Claudia, with Yann Ardagna and Oliver Dutour.

2008 Paleoepidemiology of Vertebral Degenerative Disease in a Pre-Columbian Muisca Series from Columbia. *American Journal of Physical Anthropology* 135: pp.416-430.

Rouse, Irving.

1964 Prehistory of the West Indies. *American Association for the Advancement of Science*144(3618): pp. 499-513.

1977 Patterns and Processes in West Indian Archaeology. *World Archaeology 9(1), Island Archaeology*: pp. 1-11.

Siegel, Peter E.

1997 Ideology and Culture Change in Prehistoric Puerto Rico: A View from the Community. *Journal of Field Archaeology* 23(3), pp. 313-333.

1991 Saladoid Survival Strategies: Evidence from Site Locations. International Association for Caribbean Archaeologists. Barbados, West Indies, July 22-28 1991.

Sutton, Mark Q, with Brooke S. Arkush.

2009 [1996] *Archaeological Laboratory Methods: An Introduction.* 5th ed. Kendall/Hunt Publishing Company: United States of America

Tacoma, J.

1985 Skeletal Remains from de Savaan Region, Curacao. International Association for Caribbean Archaeology. San Juan, Puerto Rico, July-August 1985.

Torres-Rouff, Christina.

2002 Cranial Vault Modification and Ethnicity in Middle Horizon San Pedro De Atacama, Chile. *Current Anthropology* 43(1): Pp. 163-171.

Ubelaker, Douglas H.

1989[1978] *Human Skeletal Remains: Excavation, Analysis, Interpretation*, 2nd ed. Taraxacum Publishers: Washington D.C., United States.

de Waal, Maaike S.

2003 Pre-Columbian Site Patterns in the Eastern Guadeloupe Area. An Archaeological Survey of La Désirade, Petit Terre, and Pointe Des Châteaux (1998-2000). International Association for Caribbean Archaeology. Santo Domingo, Dominican Republic, June 29-July 6, 2003.

Walker, Jeffery B.

1983 A Preliminary Report on the Lithic and Osteological Remains from the 1980, 1981, 1982 Field Seasons at Hacienda Grande (12 PSj7-5). International Association for Caribbean Archaeology. Martinique, Caribbean, July 25-30, 1983.

Watters, David R.

1997 Maritime Trade in the Prehistoric Eastern Caribbean. In *The Indigenous People of the Caribbean*. Samuel Wilson, ed. Pp. 88-99. University Press of Florida: Tallahassee, Florida.

Weiss, Elizabeth

2009 *Bioarchaeological Science: What We Have Learned from the Past*. Nova Science Publishers, Inc: New York, United States.

Weiss, Elizabeth and R. Jurmain.

2007 Osteoarthritis Revisited: A Contemporary Review of Aetiology. *International Journal of Osteoarchaeology* 17: pp. 437-450.

White, Christine D.

1996 Sutural Effects of Fronto-Occipital Cranial Modification. *American Journal of Physical Anthropology* 100(3): Pp. 397-410.

White, Tim D.

2000 [1991] *Human Osteology*. 2nd edition. Academic Press: United States of America.

Wilson, Samuel

1989 The Prehistoric Settlement Pattern of Nevis, West Indies. *Journal of Field Archaeology* 16(4): 427-450.

1997 *The Indigenous People of the Caribbean*. Samuel Wilson. University Press of Florida: Tallahassee, Florida.

2006 *The Prehistory of Nevis, a Small Island in the Lesser Antilles*. Yale University Publications in Anthropology: New Haven: Connecticut.

Appendix

A LETTER TO LIVING CARIBS

The following is a letter forwarded to the only know remaining extant populations of Caribs today, on the island of Dominique.

March, 2014.

To Whom it May Concern,

My name is Chris Keith and I am an archaeologist operating out of San Jose State University (SJSU), San Jose, California, United States of America. I have worked for a few years on archaeological sites on the island of Nevis, West Indies and, in 2011, I was part of a field crew that discovered human remains on the beach of White Bay, on the southeastern side of Nevis. Due to lack of excavation and conservation reasons, we decided that, at that time, it was best to only remove the cranium of this individual from the burial, since it was in danger of being damaged by surface elements. However, I returned to Nevis in 2012 to remove, with the permission of the Nevis Historical and Conservation Society (NHCS) the remaining post-cranial elements of this individual in order to prevent this individual from being lost to the ocean, as a result of erosion. We excavated the remaining skeletal elements and analyzed them at a lab provided by the Medical University of the Americas, on Nevis. The remains are currently being curated by the NHCS at the facilities located at the Alexander Hamilton Museum, in Charleston.

This discovery and information is pertinent to you because it was discovered through radio-carbon analysis and archaeological research that this person, judged to be a woman, was a prehistoric Carib, living sometime during the eleventh century CE. As direct descendents of the Carib nation, I felt it was my responsibility to inform you of the existence of these remains, and of the existence of other remains on White Bay, possibly also of Carib descent. The remains are currently in possession of the NHCS but Evelyn Henville, director of the NHCS, is very interested by the possibility of having a exhibit focusing on this individual, and on the Caribs of Nevis overall. I am sure she would

welcome any feedback or help from living Caribs, as your story is part of the overall story of the Caribs.

Additionally, these remains were used by myself to partially fulfill the requirements for a Master's degree in Arts from SJSU. The research gathered from remains, the excavation and the available literature of pre-Columbian peoples of the Caribbean were used to write a thesis as the culmination of the work completed. I freely offer this completed research, as well as the extensive amount of photos taken to document the process of excavation and analysis. For access to the photo album, please go to photobucket.com, username: whitebay2012 Password: Taoüa1. For a full downloadable version of the entire photo album or a copy of my thesis, please email me at ckakeith@hotmail.com, with the subject heading "White Bay research." I also welcome any questions or comments that may arise. Please feel free to contact me, and I hope that further cooperation between living Caribs, researchers and the NHCS will lead to future research into the burials remaining on White Bay.

Thank you,

Chris Keith

San Jose State University

Department of Anthropology

ckakeith@hotmail.com