Patterns of paleomobility in the ancient Antilles: an isotopic approach

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CHAPTER 5 MATERIALS, SITES AND SETTINGS

5.1 Introduction

In this chapter, I provide background contextual information on the sites included in this study. First, I present a short overview of the geographic setting of the Caribbean in general, including some notes on terminology. Then I present a concise description of each of the archaeological sites from which human skeletal materials were sampled including a brief introduction to their geographic, chronological, and cultural contexts with emphases on the burial populations. This chapter concludes with some remarks concerning the quantity and quality of relevant contextual information for the sites and sample populations included in this study.

5.2 Geographic Context of Study Area

The Caribbean region is comprised of a series of archipelagoes that lie in a sort of stepping stone fashion, south and southeast of Florida, east of Central America, and north of the northern coast of South America (Figure 1). The three main archipelagoes are: 1) the Bahamian archipelago; 2) the Greater Antilles; 3) the Lesser Antilles (Figure 2). The Bahamian archipelago (comprised of the separate island nations of The Bahamas, and Turks and Caicos) contains hundreds of small islands and cays, located off of the north coast of Hispaniola and to the south and east of Florida. The Greater Antilles consist of the larger islands of the western Caribbean basin these include the islands of Puerto Rico, Hispaniola, Cuba and Jamaica. The Lesser Antilles consist of a series of small islands, oriented roughly north-south and located between the Orinoco River delta of northeastern and the Anegada passage separating the Virgin Islands from Puerto Rico. The Lesser Antilles are also often further subdivided into the Leeward Islands in the northern end of

the island chain and the Windward Islands in the south. Trinidad, and to a lesser extent Tobago, which lies quite near the northern coast of South America, is geologically part of the mainland and is often considered as part of the cluster of continental islands which lie in a west-east row along the southern Caribbean Sea. The western end of this chain comprises the Leeward Antilles, a less formal grouping that includes such islands as Aruba, Curaçao, Bonaire, Isla Margarita, Las Aves, and Los Roques.

There are a number of different terms and names for the various islands and archipelagoes within the study area that are sometimes used interchangeably despite their distinct meanings and origins. For the sake of clarity and consistency, I will provide short summaries of the terminology used herein. First, the word 'Caribbean' is often used to refer to the large group of islands that separate the Caribbean Sea from the Gulf of Mexico and the Atlantic Ocean. In the strictest sense this usage does not include the islands of the Bahamian archipelago or Barbados, which are technically in the Atlantic Ocean, or the Leeward Antilles. The more inclusive term the 'West Indies', generally refers to all of the islands that lie within the Caribbean Sea including these islands and island groups. The word 'Antilles' in general is an intermediate term referring to all of the islands of the Caribbean with the exception of the Bahamian archipelago. To complicate matters further, there are numerous other islands and islets along the Central American coastline that lie within the Caribbean Sea and thus are also technically Caribbean islands.

In the present work, I will use the following terminology: 1) the 'Caribbean' or 'insular Caribbean' to refer to all of the islands of the West Indies (including the Bahamian archipelago); 2) the 'Antilles' to refer to the Greater and Lesser Antilles (including Barbados, Trinidad, and Tobago), and the Leeward Antilles; 3) the 'Antilles (*sensu stricto*)' to refer to only the Greater and Lesser Antilles (excluding Trinidad, Tobago, or the Leeward Antilles); and 4) the 'circum-Caribbean' or 'Caribbean region' to refer to the insular Caribbean plus all of the mainland coastal areas that abut the Caribbean Sea.

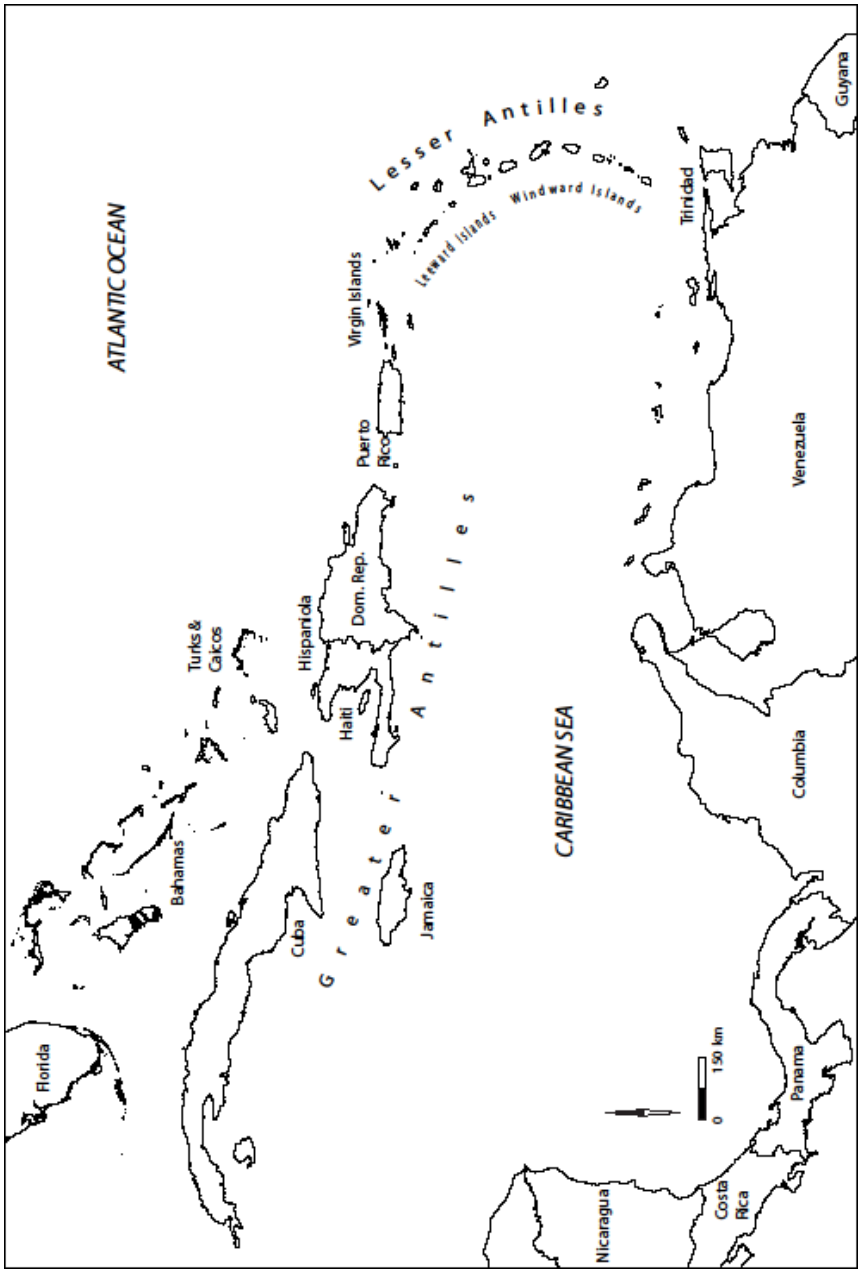


Figure 1 **Map of the Caribbean Region.**

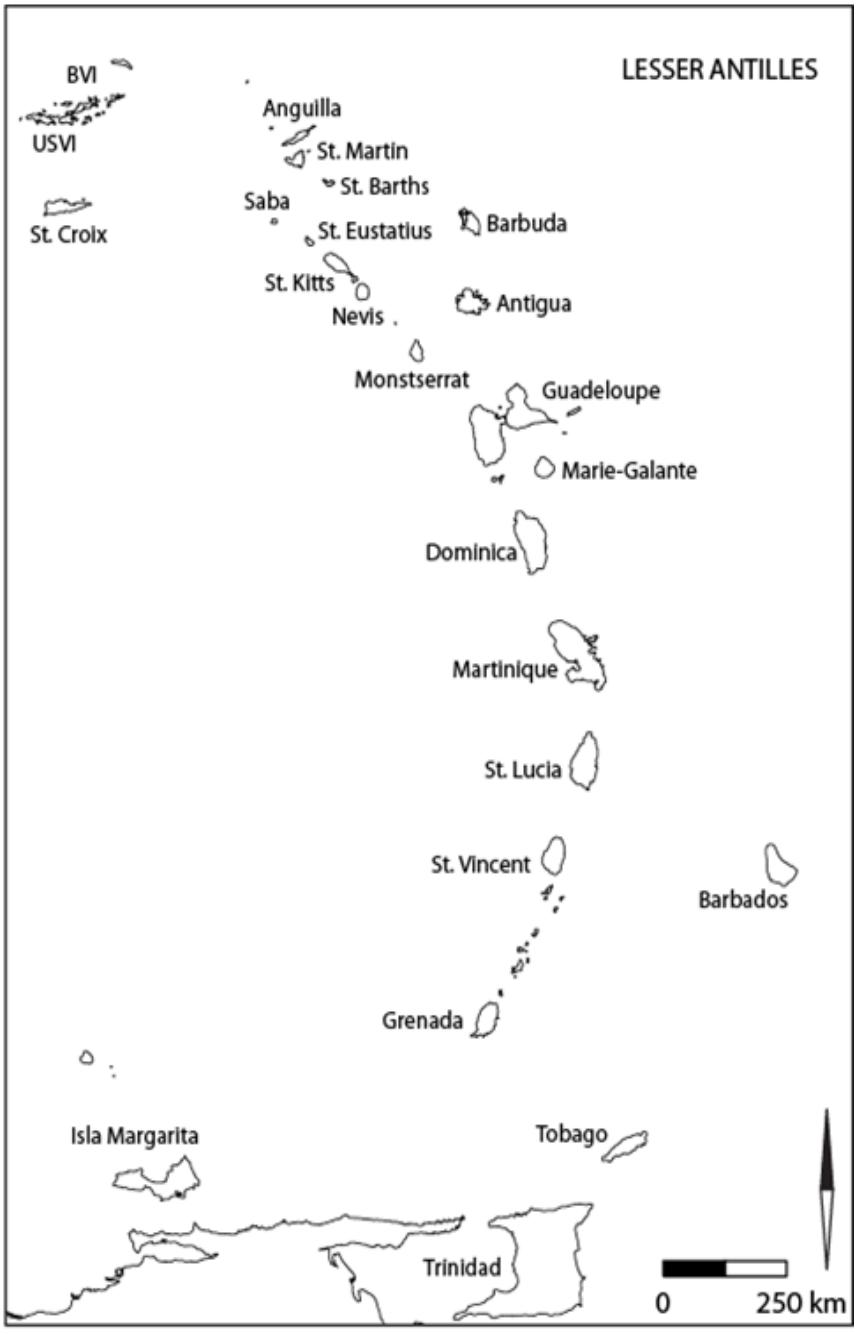
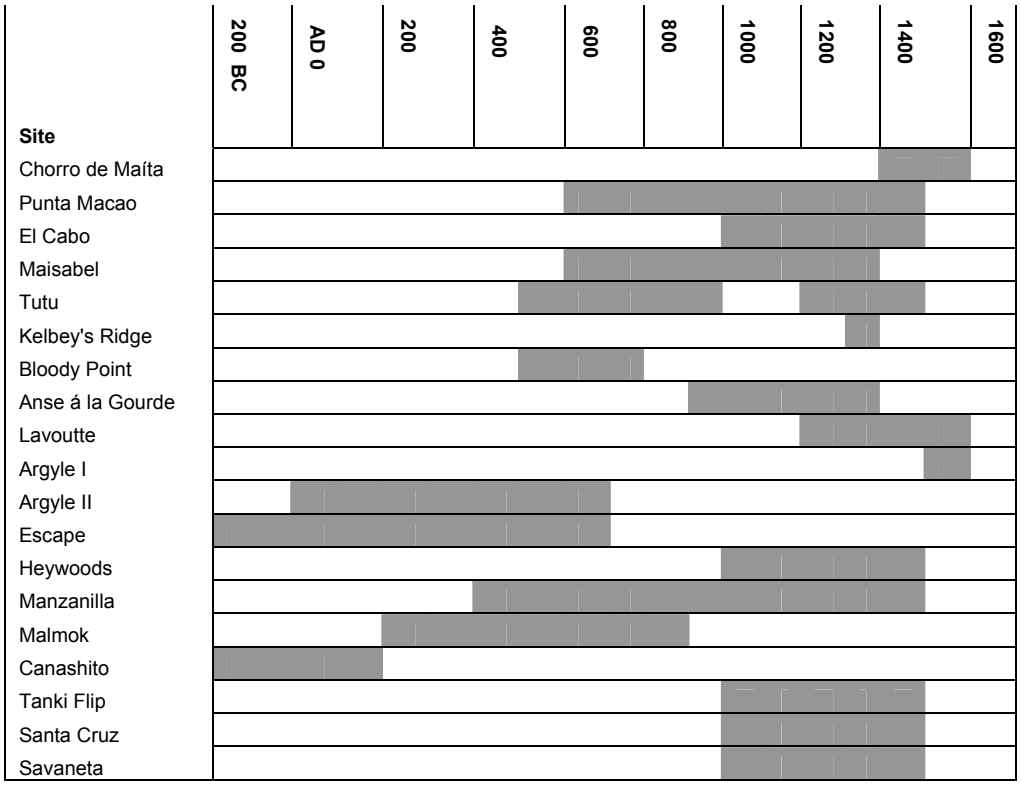


Figure 2 Map of the Lesser Antilles.

Table 1: Site chronologies showing approximate dating of skeletal assemblages



5.3 Site Settings and Skeletal Assemblages

In this section I provide descriptions of the site settings for each of the skeletal assemblages included in this research project: 1) El Chorro de Maíta, Cueva de los Muertos, and Potreno del Mango- Cuba; 2) Punta Macao, El Cabo, and Bartolo- Dominican Republic; 3) Maisabel- Puerto Rico; 4) Tutu- St. Thomas (U.S. Virgin Islands); 5) Kelbey's Ridge 2 and Spring Bay- Saba; 6) Bloody Point- St. Kitts; 7) Anse à la Gourde- Guadeloupe; 8) Lavoutte and Giraudy- St. Lucia; 9) Argyle I, Argyle II, Escape, and Buccament West- St. Vincent; 10) Heywoods- Barbados; 11) Manzanilla- Trinidad; and 12) Malmok, Canashito, Santa Cruz, Savaneta, and Tanki Flip- Aruba (Figure 3). These site descriptions focus primarily on the geographic location, history of

discovery and research, site type, dating of occupation, and any available information about the burial populations pertaining to mortuary practices, demography, and previous isotope analyses. The temporal contexts of the skeletal assemblages are highly variable and span the time period from approximately 200 B.C. to A.D. 1600 (Table 1). However, the majority of these skeletal populations are associated with the Late Ceramic Age with a large proportion dating to roughly A.D. 1000-1500.

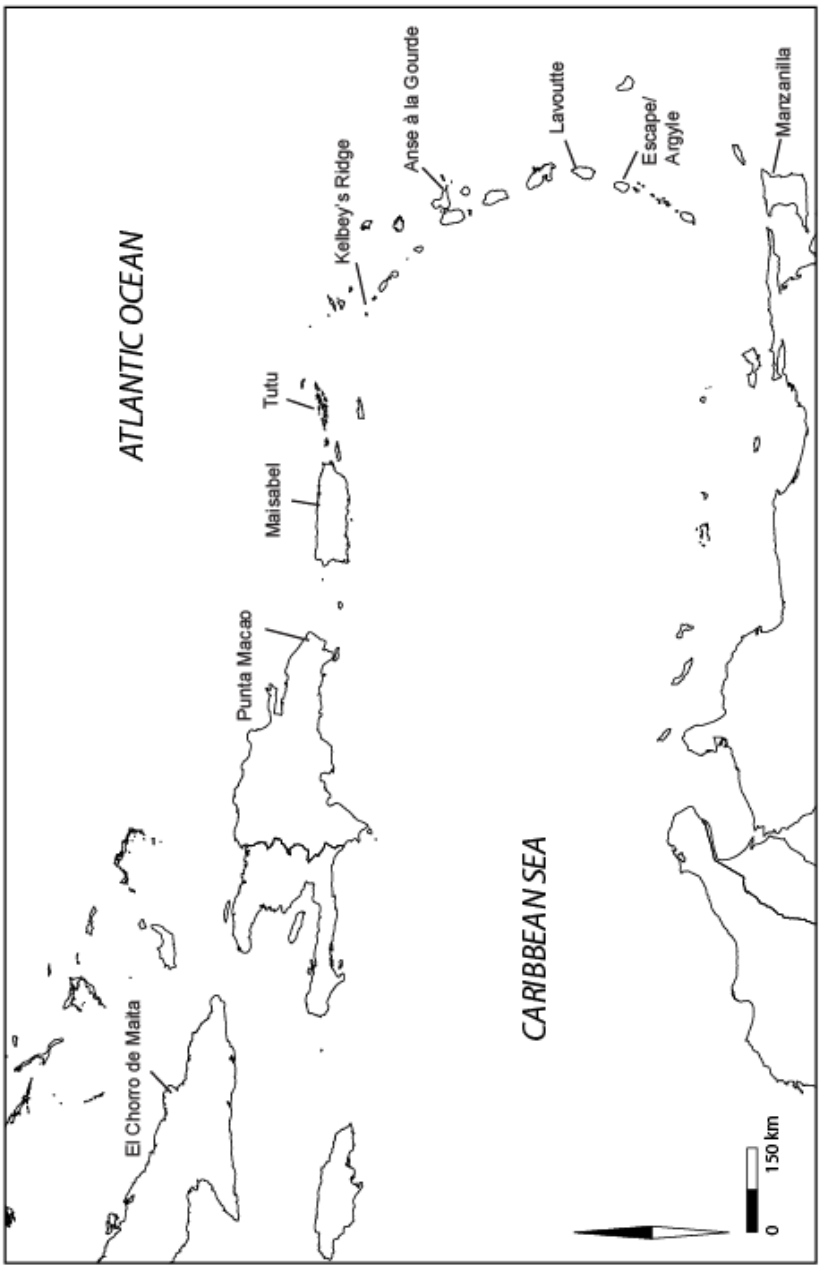


Figure 3 Map of the Caribbean indicating the location of the major sites included in this study.

5.3.1 El Chorro de Maíta- Cuba

The site of El Chorro de Maíta is located in northeastern Cuba in the province of Holguín. The site lies on the slope of a hill known as Cerro de Yaguajay, approximately four km from the coast. The site is composed of a large settlement characterized as a "*Fase agricultores*" (Guarch Delmonte 1990) or "*Etapa agoalfarere*" (Tabío 1984) cultural type. The site was first scientifically assessed by Irving Rouse in 1941, who reported on the nature of the site itself and the provenance of archaeological materials discovered there (Rouse 1942). Most of the ceramic assemblage is assigned to a local variant of the Meillacan Ostionoid subseries (Rouse 1992; Valcárcel Rojas 2002).

A large cemetery was excavated in the west central portion of the site in the 1980's by the Departamento Centro Oriental de Arqueología under the direction of José M. Guarch Delmonte (Guarch Delmonte 1996). Non-funerary spaces were also revealed by these excavations and these portions of the site have been interpreted as the remains of an indigenous village that surrounded the burial area (Guarch Delmonte 1996). In both the cemetery and surrounding areas, small quantities of European materials were discovered together with indigenous materials (Guarch Delmonte 1996). The European materials primarily consist of ceramics, metals, and the remains of domestic pigs (*Sus scrofa*) and point to continued use of the site and cemetery into the early colonial period (the 16th and early 17th centuries). Subsequent excavations have also been carried out by Roberto Valcárcel Rojas in collaboration with researchers from the University of Alabama (Persons et al. 2007; Valcárcel Rojas and Rodríguez Arce 2005; Valcárcel Rojas et al. 2010) and have recovered additional indigenous and European materials from the site including more European ceramics dating to the early colonial period.

The remains of at least 108 individuals were reported by the original excavator (Guarch Delmonte 1996). The initial osteological analysis of the site's skeletal assemblage was carried out in the 1980's by Manuel Rivero de la Calle and colleagues (1990). This initial analysis focused primarily on the physical characteristics of the human remains in addition to the associated grave materials. Physical anthropological analysis revealed the widespread occurrence of frontal-occipital cranial modification with

all of the adult skeletons, except for burial no.36, no.22, and no.45. Interpretations of ancestry based on cranial morphology and stature were also posited. The burial population was reported to be of native (Amerindian) ancestry with a few notable exceptions. For example, burial no.36 appears to be a modern intrusive burial. Additionally, burial no.22 is represented by a cranium, associated with a small quantity of post-cranial fragmentary bone, and the facial and craniometric traits of this individual were interpreted as being European (Rivero de la Calle et al. 1990:85).

A more recent osteological analysis was carried out by Dr. Darlene Weston in 2010 in the context of the NWO-VICI project (Valcárcel Rojas et al. 2011; Weston 2010b). Utilizing updated standards and procedures for the reporting of skeletal remains, this study was more broadly focused and has revealed new information on this burial population especially with regard to its composition, ancestry, cranial and dental modification practices. This study (Weston 2010b) identified the presence of at least 133 individuals and significant alterations were also made to the age and sex distributions reported by the original investigators.

Estimations of ancestry were made possible by the use of craniometrics for three individuals: nos. 22, 45 and 81. Comparisons of standard cranial measurements were made between (Howell's) reference populations and these individuals using FORDISC 3.0. The cranium of no.45 scored most similar to an African male, the cranium of no.22 scored most similar to a White male, and the cranium of no.81 scored equally similar to an African female and a Hispanic female, a pattern that would be consistent with an individual of mixed ancestry (Valcárcel Rojas et al. 2011). It should be noted that these results reflect the diverse ancestries of the people of Cuba in the colonial period (Valcárcel Rojas et al. 2011).

An analysis of the practice of intentional cranial modification at El Chorro de Maíta was executed by Anne Van Duijvenbode (Valcárcel Rojas et al. 2011; van Duijvenbode 2010). This study used a sample of the entire burial assemblage, consisting of 54 individuals: 42 adults, five adolescents and seven juveniles. Intentional cranial modification is present in approximately 80% of the sample, with the vast majority of the modified group possessing the same head shape; fronto-occipital parallel modification (Valcárcel Rojas et al. 2011). The overall pattern at El Chorro de Maíta is that a large

percentage of the population possesses modified crania and amongst them there is little variation in the type of modification employed. Individual no.72B is the only exception to the homogeneity of shapes within the sample. This female has fronto-occipital modification of the vertical subtype. This individual was also unique in terms of her funerary treatment, having been buried in an unusual position (facing down with a large stone on top of the legs). The different shape of the skull and its uniqueness compared to other pre-Columbian skeletal assemblages in the Caribbean are consistent with a foreign origin (Valcárcel Rojas et al. 2011).

In addition to the dissimilar type of intentional cranial modification, this individual also presents a clear case of intentional dental modification, which was identified during a dental anthropological study of the human remains from this cemetery, conducted by Hayley L. Mickleburgh (Valcárcel Rojas et al. 2011). A clearly distinct form of intentional dental modification was recorded for individual no.72B (the only one observed for this assemblage). This modification was performed only on the upper incisors and canines, and no other teeth were affected. A small number of cases of intentional dental modification have been reported in the Caribbean region, but in all cases these have been identified as individuals of African origin. The form of dental modification amongst these isolated African cases is clearly different from that of individual no.72B. Both the resulting form and the techniques employed in the modification of no.72B are more consistent with patterns reported for prehistoric Mesoamerican populations. In fact, this type is most similar to types which are found in Post-classic contexts from Guatemala, Honduras, and particularly Belize. No other individuals with this type of intentional dental modification have been reported to date for the prehistoric Antilles. The presence of this unique (for the Antilles) type of dental modification, in combination with both the distinct cranial modification and mortuary treatment of no.72, lends further support to the notion that this person is an immigrant, probably of Mesoamerican origin (Valcárcel Rojas et al. 2011).

Radiocarbon dates obtained directly from human bone material have been reported for several burials and more dates are currently pending. Several of the currently available radiocarbon dates span the period immediately before and after initial contact (i.e., ~AD 1500) and thus it is not possible at this time to clearly distinguish between pre-

and post-contact burials based on these data alone (Valcárcel Rojas et al. 2011). A large number of burials contained small metal tubes that recent metallurgical analysis have identified as brass aglets (Cooper et al. 2008; Martinón-Torres et al. 2007; Martinón-Torres et al. 2012; Valcárcel Rojas et al. 2010). Brass is a metal first brought to the Americas by Europeans and thus all burials containing brass clearly date to the post-contact period. Based on the presence of various materials and objects of European origin (e.g., brass artifacts, pig remains) and the presence of 'Christian-type' burial practices (extended position with arms crossed), Valcárcel Rojas (2012) has identified at least 32 individuals that date to the post-contact period. Although the remainder of the burials has yet to be more securely dated, he has proposed that the entire burial population might date to the post-contact or colonial period (Valcárcel Rojas 2012).

Three additional human dental samples were obtained from two sites in the vicinity of El Chorro de Maíta. The first, Cueva de los Muertos, is a cave site located in the limestone hills less than two kilometers from El Chorro. Numerous human skeletal remains have been uncovered from the cave over the years. Relatively little contextual data from this site is available but it thought to have possibly represented a burial place for residents of settlements from the surrounding area (Valcárcel Rojas 2012). The second, Potreno del Mango, is a small site located to the southeast of El Chorro de Maíta near the eastern tip of Cuba. Teeth from these two sites were collected and analyzed in an attempt to determine the spatial extent of the local Sr isotope range at El Chorro de Maíta.

5.3.2 Punta Macao and El Cabo- Dominican Republic

Punta Macao is a settlement and burial site located in the province of La Altagracía, on the eastern coast of the Dominican Republic. The site is multi-component but seems to predominantly date to the Late Ceramic Age with radiocarbon dates indicating a main period of occupation and use around A.D. 640 to 1300. The presence of the site was originally reported as early as the 16th century (Las Casas 1992) and it has been explored by a large number of Caribbean archaeologists and researchers over the last century including De Booy, Rainey, Veloz Maggiolo and Ortega, and more recently by a team

from El Museo del Hombre Dominicano. The largest excavation of the site to date was carried out by Marcio Veloz Maggiolo and Elpidio Ortega (1972), who characterize the site as a large farming village of great proportions, which in its later levels corresponds to the Taíno period in the Greater Antilles. The cemetery itself was not thoroughly investigated until 2004, when it was excavated by a team from the Museo del Hombre Dominicano prior to the construction of a golf course. Besides the burials themselves, the site has also yielded a broad array of ceramic vessels and ceremonial objects (Ortega et al. 2003; Távarez María and Luna Calderón 2007; Távarez María 2008; Veloz Maggiolo and Ortega 1972). The ceramic assemblage is dominated by the Boca Chica style, with lesser quantities of Ostiones ware and another termed the 'Macao' style, which is believed to be transitional between Boca Chica and Ostiones (Veloz Maggiolo and Ortega 1972).

In total, fifteen burial pits were excavated from the southern portion of the site and a physical anthropological analysis of the Punta Macao skeletal assemblage has been recently conducted (Távarez María and Luna Calderón 2007; Távarez María 2008) [see also (Ulloa Hung 2008)]. This study focused on recording skeletal indicators of age and sex, cranial modification, stature, foodways, and pathologies. Twenty six individuals were identified in total, including eight juveniles and eighteen adults, of which eleven are males; six are females, and one of indeterminate sex (Távarez María and Luna Calderón 2007). Most interments are primary burials although some are composite burials containing the remains of adults with the partial or complete remains of one or more juveniles. In addition to a Chicoid ceramic vessel covering the cranium of burial no.2, grave goods were found in association with nine burials and primarily consist of fragmented ceramics, and unworked shell, bone, and lithic remains. The burial positioning was variable, but supine was the most common position and all individuals had flexed lower limbs. Burial orientation was also highly variable. Of the individuals possessing modified crania, tabular oblique was the prevalent form. Available radiocarbon dates obtained from three individuals, along with associated ceramic materials indicate that the burial assemblage primarily dates to the Late Ceramic Age.

El Cabo is also a Late Ceramic Age settlement site located on the far eastern coast of the Dominican Republic. This site was known to the archaeological community

since at least the 1970's (Ortega 1978) and was subjected to small-scale investigations in subsequent years. Recently, large-scale excavations of the site were carried out by a team of archaeologists from Leiden University, under the direction of Menno Hoogland and Corinne Hofman, in collaboration with the Museo del Hombre Dominicano (Hofman et al. 2006b; Hofman et al. 2008b; Samson 2010, 2011). Analyses of the material remains revealed the presence of both Chicoid and Ostionoid ceramics and indicate that this multi-component site was likely inhabited for several centuries from roughly the 7th to early 16th centuries A.D., although the houses date to between the 9th and 16th centuries (Hofman et al. 2006b; Hofman et al. 2007b; Hofman et al. 2008b; Samson 2010, 2011; St. Jean 2008). Excavations of the site revealed a very large number of postholes cut into the underlying bedrock; the analyses of these have revealed that many of these are the remains of house structures that underwent multiple cycles of renewal and reconstruction throughout the occupation of the site (Samson 2010).

During excavations of the domestic areas, four primary burials were encountered and excavated. One of the burials is of an infant (or neonate) interred within a post-hole. The other three burials are adults with one possibly associated with house structure #6, while the other two were located in midden deposits. Adult burials are primary interments in small oval pits in flexed position (Hoogland and Hofman, pers. comm. 2011). Grave goods include a pink *Chama sarda* bead and a boat-form vessel may also be associated with one of the burials. The skeletal material has not been subjected to intensive osteological analysis or radiocarbon dating, although based on associated materials the burials seem to date to the Late Ceramic Age. Given the scale of the excavations and the size and intensity of occupation at the site, one might expect to find more than a few burials. The small size of burial population may reflect the possibility that the deceased were mostly buried outside of the settlement itself, for example in a nearby cemetery or perhaps more likely within the multitude of cave systems found in the karstic region of the country (de Booy 1915).

Bartolo is a small site located within a few kilometres of El Cabo in the eastern Dominican Republic that was documented during a visit by Hoogland and Hofman in 2007 and in two recent surveys in the region (Johnson 2009; Olsen Bogaert 2004). The site has not been systematically excavated but surface remains include

fragmented Chicoid ceramics and human skeletal materials (Johnson 2009). A single human tooth collected from the surface was sampled for this study for comparison with the El Cabo and Punta Macao collections.

5.3.3 Maisabel- Puerto Rico

Maisabel is a multi-component settlement site located near the center of the northern coast of Puerto Rico. Early investigations of the site were conducted by the Instituto Cultura Puertorriqueña under the supervision of Ovidio Dávila Dávila and uncovered the remains of several midden deposits and a large Saladoid component. Large scale excavations of the site were also conducted by the Centro de Estudios Avanzados de Puerto Rico y el Caribe and the Centro de Investigaciones Indigenas de Puerto Rico under the direction of Peter Roe and continued by Peter Siegel in collaboration with the latter. These excavations revealed the presence of both Saladoid and Ostionoid components at the site and indicated a continuous occupation over a millennium throughout much of the Early and Late Ceramic Ages (Siegel 1989b; Siegel and Roe 1991; Siegel 1992, 1996, 1999, 2010).

Excavations yielded 34 burials in total, of which two are secondary interments and the rest are primary. Twenty four burials were located in the central area of the site, interpreted as the central plaza of an indigenous village (Siegel 1992). Ten additional burials were also discovered in a macro-block near posthole features, possibly associated with an Ostionoid house structure (Siegel 1992). Radiocarbon dating of the burials in the central plaza indicates that it was in use throughout the entire occupation of the site from roughly A.D. 200-1100, and based on uncalibrated radiocarbon dates from the skeletal material Siegel (1992) recognizes two main groups within this population. The majority of the burials are associated with an earlier Saladoid period occupation and a smaller number to a later Ostionoid period occupation. Additionally, most of the burials in the central plaza cemetery seem to be associated with the earlier Saladoid period, while most of the burials found outside of the cemetery seem to be associated with the Ostionoid. Siegel has interpreted the presence of the cemetery within the central plaza area as an

indication of its central role as a sacred locus (or *axis mundi*) of social and ritual activities (Siegel 1989b, 1992, 1996, 1999). The shift over time (from the Early to Late Ceramic Age) in the location of burials from the central plaza to more domestic spaces at this site and other Ceramic Age sites have been noted by many other observers (Curet and Oliver 1998; Hofman and Hoogland 2004; Keegan 2009; Righter 2002; Siegel 1999) and have contributed to ongoing discussion concerning temporal variation in mortuary practices and to broader debates concerning socio-cultural change in the region (Curet and Oliver 1998; Keegan 2009; Siegel 2010).

An osteological analysis of the burial assemblage was originally carried out by Budinoff (1991) in which she reported not only sex and age estimations but also demographic inferences derived from these patterns, in addition to stature estimations and detailed descriptions of certain pathologies and their implications for general health conditions amongst the population. More recently, the burial assemblage was re-analyzed in the context of the VICI-project with similar goals, utilizing slightly different methods and procedures for estimations of age and sex and the diagnosis of pathological conditions by a Darlene Weston and a research team from Leiden University (Weston and Schats 2010). This more recent analysis indicates the presence of 35 individuals, of which 27 are adults and eight are juveniles. Of the adults, there are 16 males, eight females, and three of indeterminate sex. Clearly, there is a sex bias in this population with more than twice as many males as females.

Stable isotope analyses of human bone materials from Maisabel have been carried out by Anne Stokes (1998, 2005). Based on the results of carbon and nitrogen isotope analysis of bone collagen and carbon isotope analysis of bone apatite, she was able to reconstruct certain aspects of diet at his site. The stable isotope results from Maisabel indicate: 1) the consumption of both terrestrial and marine resources but that the latter was the larger source of dietary protein; and 2) that although C_3 plants were the primary source of dietary energy C_4 plants were also an important component of the diet. Stokes (2005:199) also notes that "the Maisabel individuals had very diverse diets, which are not reflected in mean values. Individual choice or potentially some other factor such as hierarchy or age was responsible for the observed diversity".

5.3.4 Tutu- St. Thomas, U.S. Virgin Islands

Tutu is a large, multi-component habitation site located in an inland valley of eastern St. Thomas, U.S.V.I. about two km from the east coast (Righter 2001). The site was excavated by a large team of investigators prior to development of the land for use as a shopping centre in the 1990's (Righter 2002). These excavations revealed the presence of a large village with a central plaza area surrounded by domestic structures and refuse middens. There were apparently two main distinct occupations at Tutu; one dating to the Early (Cedrosan Saladoid) and the other to the Late (Chican Ostionoid) Ceramic Age (Righter 2002). Ninety two radiocarbon dates in total have been obtained from the Tutu archaeological village site and these indicate that it was settled as early as the first century A.D. and ultimately abandoned by circa A.D. 1500. There is little evidence for occupation between A.D. 950 and A.D. 1150 (Righter 2001, 2002) suggesting that the site may have been abandoned and resettled multiple times.

Over 40 burials dating to both time periods were discovered and have been subjected to intensive and extensive archaeological analyses, including osteological, trace elements, and stable isotope analyses amongst others (Farnum and Sandford 2002; Larsen et al. 2002; Norr 2002; Sandford et al. 2002). Based on associated ceramic materials and 27 radiocarbon dates obtained directly from human bone material, nine of the skeletons are associated with a late extension of the Saladoid period, dating to roughly A.D. 450-960, while the remainder are associated with a later Ostionoid occupation, dating to around A.D. 1170-1535 (Sandford et al. 2002). Village structure and burial customs are characterized by both continuity and change (Righter 2001). The early occupation consists of a roughly horse-shoe shaped ring of dispersed structures, located on a flat knoll with a central open space. The late occupation was generally more circular and that the location of the central plaza may have shifted over time as the village structure shifted to the north and northeast (Righter 2001, 2002).

In terms of mortuary practices at Tutu, evident changes between the earlier and later phases are attributed to changes in the social, political, economic, and ideological realms (Curet and Oliver 1998; Hofman et al. 2001b; Siegel 2004). All early period

burials (dated to between A.D. 450 and 640) were accompanied by partial or complete pottery vessels, two of which were foetal remains interred within complete ceramic bowls (Righter 2001, 2002). In contrast, to the early period burial assemblage, only two late period burials (dated to between A.D. 1200 and 1500) are interred with ceramic vessels and these are both of infants (Sandford et al. 2002). Another important temporal distinction is that only one of the 24 late period skeletons was buried in the central burial precinct, while the other 23 were buried in apparent family groups, clustered in exterior areas of domestic structures, and sometimes aligned with exterior house posts (Righter 2002). The shifting patterns of mortuary practices and their association to changes in socio-political and economic patterns are very similar to those found at the site of Maisabel, Puerto Rico (Siegel 1992, 1996, 1999, 2010).

Paleobotanical analyses has revealed that although the inhabitants relied on a mixed diet of plants and terrestrial and marine animals throughout the site's occupation, there were some clear differences in resource exploitation between the earlier and later inhabitants (Pearsall 2002; Piperno 2002). Trace element concentration analysis was performed on human femoral bone samples and soil samples from the Tutu site (Farnum and Sandford 2002). Using multiple techniques, these researchers found no widespread or substantial contamination of the elements Strontium (Sr) or Barium (Ba). These results provide greater degrees of confidence in the interpretation of the isotopic analyses of these remains and indicate that the elemental concentration data may be useful contributors to dietary reconstructions at this site. Human remains from the later Ostionoid component possessed higher Sr to Ba bone concentrations than the remains from the earlier Saladoid component (Farnum and Sandford 2002). This pattern is consistent with a shift towards less reliance on terrestrial food resources in later periods, although this shift still falls within the mixed marine and terrestrial consumption range Price (Burton and Price 1999, 2000). No further correlations were discovered between bone elemental concentrations and biological sex or age at death (Farnum and Sandford 2002).

Analyses of carbon (C) isotopes from bone collagen and apatite carbonate and nitrogen (N) isotopes from bone collagen were also conducted on a subset of the Tutu skeletal assemblage (Norr 2002). These results are in accordance with other lines of

evidence indicating a broad-based subsistence strategy and mixed reliance on marine and terrestrial resources. The overall general dietary pattern is homogenous throughout the sample population indicating shared dietary practices between males and females, adults and children (Norr 2002). In contrast to the trace element study, the isotopic results revealed no major shift in diet between the earlier and later periods (Norr 2002). Comparisons with published dietary isotope results from other contemporaneous sites in the Caribbean show that the ancient inhabitants of Tutu generally consumed less terrestrial resources than most Greater Antillean populations but less reef, and more pelagic, marine resources than most Lesser Antillean populations (Norr 2002; Stokes 1998).

Physical anthropological and dental analyses of the Tutu skeletal materials revealed several interesting patterns of health and disease (Larsen et al. 2002; Mickleburgh 2006; Sandford et al. 2002). Generally poor oral health and relatively high frequencies of carious lesions were reported for this population, the latter probably attributable to the consumption of starch-rich foods, such as manioc (Larsen et al. 2002; Mickleburgh 2006). A slight decrease in caries rates from the early to later period may be associated with the proposed greater reliance on marine resources in the later period, as previously discussed(Larsen et al. 2002; Mickleburgh 2006). Osteological analysis of the skeletal remains also revealed widespread lesions consistent with those produced by treponemal disease. The conditions of most lesions were suggestive of a chronic condition but the late occupation skeletons appear to be more frequently and severely afflicted (Sandford et al. 2002). In fact, the rate of incidence and prevalence of skeletal indicators of treponematosis are both high relative to those reported for other similar Caribbean skeletal assemblages (Schats 2010).

In total, the Tutu skeletal sample is comprised of 20 subadults and 22 adults, with adults defined as those individuals with an estimated age at death of 16 years or older (Sandford et al. 2002). Of the adults, six are males and fourteen are females, while biological sex could not be determined for the other two adult individuals. Based on the previously discussed AMS dates, adult skeletons from the early period consist of one male, seven females, and one of indeterminate sex. The dating of these early period burials overlaps substantially with the proposed time period of the Cedrosan Saladoid. A

Saladoid designation for this burial assemblage is also confirmed by the presence of Saladoid pottery in most of the graves. The fact that many of the AMS dates post-date the traditionally conceived ending of the Saladoid chronology (Rouse 1992) probably indicates that the Saladoid period lasted much longer than previously recognized, a notion that has gained traction in recent years (Pestle 2010; Rodríguez Ramos 2007; Rodríguez Ramos et al. 2010). Dated adult skeletons from the late period include five males and seven females (Sandford et al. 2002). All of the dates from the late period skeletons fall within the Chican Ostionoid time period.

5.3.5 Kelbey's Ridge 2 and Spring Bay 1c- Saba

Kelbey's Ridge 2 is a Late Ceramic Age site located near the northeast coast of Saba and was excavated by a team from Leiden University in the 1980's under the direction of Menno Hoogland and Corinne Hofman (Hofman and Hoogland 1991; Hoogland and Hofman 1993; Hoogland 1999). The main occupation of the site is dated to the Late Ceramic Age (A.D. 1250-1350), as evidenced by the presence of Chican Ostionoid ceramics. Excavations revealed the presence of at least five house structures, in addition to multiple hearths and burials. The house structures are approximately round in shape with maximum diameters of between five and eight meters. The terrain slope and differential posthole depths suggest that the structures may have been built on elevated platforms. Several of the structures seem to have been rebuilt on roughly the same spot over a relatively brief period of occupation and two of these contain evidence for subsequent use as cooking structures (Hofman and Hoogland 1991, 2011; Hoogland and Hofman 1993; Hoogland 1996; Hoogland and Hofman 1999).

Multiple lines of evidence point to the existence of nonlocal, foreign, or exotic influences at this site. The decorated portion of the ceramic assemblage is represented by the Boca Chica style that is typical of late prehistoric groups from Hispaniola and Puerto Rico. A snuff-inhaler made of manatee bone and carved into the shape of a fish was found in association with one of the burials. This item of ritual paraphernalia is also more typical of the material culture of Taíno groups of this period. Additionally, a jadeite axe

and two *zemis* made of coral have also been discovered at Kelbey's Ridge. The presence of nonlocal, possibly Taíno-affiliated, artifacts and materials at this site have been explained as the expansion of Taíno societies toward the Lesser Antilles driven by a combination of socio-politico-ideological and economic incentives (Hofman and Hoogland 2011; Hoogland and Hofman 1993; Hoogland and Hofman 1999). These various lines of evidence have led the excavators of the site to propose several hypotheses concerning the origins of this population and the nature of the relationships between groups occupying Saba, the northern Lesser Antilles, and the eastern Greater Antilles (Hofman and Hoogland 2011; Hoogland and Hofman 1999). Firstly, a group (or groups) fleeing from socio-political instability in the Greater Antilles may have settled in the northern Lesser Antilles at this time. This expansion could have included the migration of small groups of Taíno colonists or settlers, resulting in the eventual inclusion of parts of the northern Lesser Antilles into a Taíno interaction sphere. This hypothesis finds support from Curet's (Curet 1992:289) proposal that the migration of Chicoid groups to the Lesser Antilles and elsewhere might be associated with decreases in population observed for the Chican Ostionoid period of Puerto Rico. Secondly, the incorporation of the smaller islands of the northern Lesser Antilles (like Saba) into a larger social-political-ideological system may have been the result of a desire to establish a supportive outpost, base, or gateway community in order to control one of the major routes of exchange between the Greater Antilles and the Lesser Antilles and mainland South America (Hofman and Hoogland 2011; Hoogland and Hofman 1999).

The Kelbey's Ridge skeletal assemblage was recently subjected to a thorough osteological analysis using standard procedures. All references to age, sex, pathology, and health conditions described herein are derived from the skeletal report of this analysis (Weston 2010a). The overall patterns of this small population are characterized by an over-representation of juveniles. Pathological evidence points to strenuous lifestyles and very poor dental health for most of the adults (Weston 2010a). The burial assemblage is composed of seven burials comprising eleven individuals, of which eight are juveniles and three are adults. The adult and juvenile burials are characterized by the interment of the deceased in a flexed, nearly seated position within confined burial pits. Interestingly, Kelbey's Ridge has provided the only case of cremation reported to date for the Lesser

Antilles. Two of the seven burials are composite burials containing the remains of both an adult and a juvenile. All seven burials are located in the habitation area, within or around the house structures (Hoogland 1999). Grave goods are rare and in addition to the inhaler mentioned above, consist of hollow bird bones (that may have served as the inhalation tubes), and stone and coral artefacts.

Spring Bay (1c) is a small component of a Ceramic Age habitation site, located near the Kelbey's Ridge site along the northeast coast of Saba (Hofman and Hoogland 1992; Hofman et al. 1987). The site is comprised of a large midden area, primarily containing food refuse, and the site appears to have been possibly occupied and abandoned multiple times since its initial settlement in the Early Ceramic Age. Excavations revealed a single burial of a child in a flexed position in one of the late components of the midden. Chican Ostionoid type pottery was found associated with the burial and radiocarbon dating of the skeletal remains indicates a similarly late date (~A.D. 1450) and that the individual was contemporaneous with the Kelbey's Ridge 2 population (Hofman and Hoogland 1992; Hofman et al. 1987).

As part of her dissertation research, Anne Stokes (1998) carried out stable isotope analyses on the human skeletal materials from these two sites on Saba. This study included carbon isotope analyses of both bone collagen and apatite as well as nitrogen isotope analysis of bone collagen. Based on these results, Stokes (1998:203) concluded that "the protein portion of the diet was derived from a mixture of terrestrial and marine animals" and that "most carbohydrate in the diet was based on C_3 plants".

5.3.6 Bloody Point- St. Kitts

Bloody Point is a Ceramic Age settlement located on the western (leeward) coast of the island of St. Kitts. The site was excavated by an international team supervised by Starr Farr in the 1990's which revealed the presence of both Early and Late Ceramic Age assemblages (Farr 1996). The site's primary phase of occupation is roughly contemporaneous to the well-known site of Golden Rock on the neighbouring island of St. Eustatius (Versteeg and Schinkel 1992). Several burials were excavated from the site

and these displayed a variety of burial treatments including flexed and extended burials, and single and multiple burials (Farr 1996). A small number of radiocarbon dates obtained from human bone indicate that at least some of the burials date to the later occupation of the site (Farr 1996). Dental samples from four adult individuals were sampled for Sr isotope analysis.

5.3.7 Anse à la Gourde- Guadeloupe

The multi-component settlement site of Anse à la Gourde, Guadeloupe is located in the eastern part of the island of Grande-Terre on the Pointe de Chateaux peninsula. The peninsula was densely occupied with larger settlements, hamlets and special workshop areas from Saladoid to post-Saladoid times, suggesting a multi-village organization was at place in the area for several centuries (de Waal 2006; Hofman et al. 2001a; Hoogland et al. 2010). The site itself was excavated by a team of researchers from Leiden University and the Archaeological Service of the Direction Régionale des Affaires Culturelles of Guadeloupe (DRAC) in the 1990's under the direction of Corinne Hofman, Menno Hoogland and André Delpuech (Delpuech et al. 2001; Hofman et al. 1999; Hofman et al. 2001a; Hoogland et al. 2001; Hoogland et al. 2010).

An initial Early Ceramic Age occupation (dated to A.D. 500-700) is attested to by the presence of Cedrosan Saladoid ceramic deposits. The earlier component is located closer to the sea and this area was apparently more affected by regional climatic changes, sea level rise, and related reconfigurations of the coastline and reefs in front of the settlement possibly resulting in temporary abandonment of the site (Beets et al. 2006) The settlement was fully reoccupied around A.D. 900 and remained so until roughly A.D. 1400. The Late Ceramic Age occupation partly overlays the previous Saladoid settlement, however, great parts of the latter were lost due to the retreat of the coastline (Beets et al. 2006). During this period, at least three clear occupation phases are discernible in the archaeological record (i.e., A.D. 900-1100, A.D. 1100-1250, and A.D. 1250-1400). The ceramic assemblages of these occupation phases are evidenced by the presence of Mamoran/ Troumassan Troumassoid to early and late Suazan Troumassoid materials. The

ceramic assemblages overall display a high diversity of influences and also include Cayo and Morne Cybèle stylistic traits (Delpuech et al. 2001; Hofman et al. 1999; Hofman et al. 2001a; Hoogland et al. 2001; Hoogland et al. 2010).

At least 24 different structures, comprising houses and associated domestic structures, and more than 80 burials, relate to three phases of the Troumassoid occupation (Hoogland et al. 2001; Hoogland et al. 2010). The considerable palimpsest of features points to the reconstruction of houses and the burying of community members on the same spot for centuries (Bright 2003; Delpuech et al. 2001; Hofman et al. 2001b; Hoogland et al. 2001; Morsink 2006). These structures are located next to a vacant space, which probably functioned as a plaza for the community and are enclosed by midden deposits in a doughnut shape. The subsistence remains recovered from the midden areas evidence the heavy reliance on fish and shellfish complemented in minor instances with land crab and terrestrial (Grouard 2001). Exploitation was focused in the vicinity of the settlement and predominantly oriented towards the lagoon, its coral reef and the estuary zone. The numerous grinding stones and ceramic griddles point to the processing and consumption of root crops; like manioc, sweet potato, yams, and zamia.

Local clay sources on the Pointe des Chateaux evidently were exploited for the manufacture of the pottery and numerous local sources were also exploited for the manufacture of lithic and shell implements (Knippenberg 2006; Lammers-Keijsers 2007). The presence of many nonlocal artefacts points to the integration of this community in a broader network of exchange tying together local, micro-regional, and macro-regional interaction spheres. For example, flint from Long Island, Antigua and greenstone and calci-rudite from St. Martin (Knippenberg 2006) indicate the incorporation of the local community in a social network that existed since the Archaic Age and was maintained throughout the Late Ceramic Age (Hofman et al. 2007a; Hofman et al. 2010; Hofman et al. 2011; Hofman and Hoogland 2011). Evidence of long distance exchange is represented by possible fragments of jadeite celts, that may have come from the Greater Antilles (Cuba or Dominican Republic) or even possibly from as far as Guatemala (García-Casco et al. 2009; Harlow et al. 2006; Schertl et al. 2012). Furthermore, there are a few examples of decorated bone fragments from exotic species such as armadillo and opossum (Grouard 2001). These are all quite uncommon in sites in the Lesser Antilles

and were likely introduced directly from the South American mainland (Giovas et al. 2011; Newsom and Wing 2004).

The burials at Anse à la Gourde occur in clusters of three to ten burials and are closely associated with house structures (Hofman et al. 2001b; Hoogland et al. 2001). The burials seem to be exclusively associated with the Troumassoid occupation of the site (~A.D. 1000-1350). Burial pits are often located in close proximity to post-holes cut into the bedrock and some burials were found within post-holes themselves, indicating likely associations with specific structures or 'houses' (Bright 2003; Delpuech et al. 2001; Hofman et al. 2001b; Hoogland et al. 2001; Morsink 2006). A wide variety of mortuary practices have been identified at this site including both primary and secondary burials, and single and composite burials (Hoogland et al. 2001; Hoogland et al. 2010). Detailed analysis of taphonomic processes, anatomical positioning, and burial contexts indicate that many of the interred may have been wrapped (possibly in a hammock) prior to interment and in some cases there is also evidence for desiccation of the corpse and for post-burial manipulation of the corpse in an open grave (Hoogland et al. 2001; Hoogland et al. 2010).

A minimum of 99 individuals have been reported from approximately 86 burial features, meaning that many of the graves contain the remains of more than one individual (Weston 2011a). The skeletal assemblage consists of 18 subadults and 89 adults of whom 31 are males, 40 are females, and 18 are of indeterminate sex (Weston 2011a). The burial population is composed primarily of adult individuals with relatively few juveniles. The general underrepresentation of children within the burial population may indicate that they possessed a different social status in life and death and that their bodies received distinct mortuary treatment than adults, possibly being disposed of elsewhere outside the village (Hoogland et al. 2010). Pathological lesions consistent with treponemal disease were observed amongst this population (Schats 2010). Dental anthropological analyses of the dentitions from this population revealed both dietary patterns and the use of teeth as tools (Mickleburgh 2006). Stable isotope analysis of human skeletal material from Anse à la Gourde found indications of a mixed diet of terrestrial and marine protein food resources (de Vos 2010; Stokes 1998) and little

indication of intra-societal differences in dietary practices relative to age or sex (de Vos 2010; Laffoon and de Vos 2011).

5.3.8 Lavoutte and Giraudy- St. Lucia

The Late Ceramic Age site of (Anse) Lavoutte is located in Cas-en-Bas along the eastern coast of northern St. Lucia. The midden area of this site was subjected to extensive excavations by Ripley and Adelaide Bullen in cooperation with Eric Milton Branford of the St. Lucia Archaeological and Historical Society in the 1960's (Bullen and Bullen 1970). Based on the ceramic materials, the Bullens (1970) concluded that the site's occupation dated to the Suazey period, spanning from about A.D. 800 to 1500. Portions of a large, distinct, ceramic figurine of a seated female figure, known as the 'Lady of Lavoutte', was discovered by local workers and ultimately brought to the attention of Ripley Bullen. Another portion of this artifact was uncovered by subsequent excavations in addition to a number of other unique, highly decorated figurines and a *guaíza*-like artifact. The discovery of these objects, in addition to materials believed to be of Greater Antillean origins, and the size and location of the site led the Bullens to propose that the settlement represented a Carib ceremonial center (Bullen and Bullen 1970). This assertion was later explored by Louis Allaire (Allaire 1999) who determined that much of the supposedly exotic material was probably locally-made but that the presence of such ceremonial paraphernalia and Taíno-derived iconography in the Lesser Antilles may indicate attempts by local leaders to acquire and project power and influence [see also (Allaire 1990)].

A smaller-scale excavation was carried out in the 1980's by a team of archaeologists from the University of Vienna under the supervision of Herwig Friesinger (Fabrizii-Reuer and Reuer 2005). This work expanded on investigations of the refuse deposits and also uncovered three human burials. In 2009 and 2010, a large-scale rescue excavation of the site was carried out by Leiden University under the direction of Corinne Hofman and Menno Hoogland in collaboration with the St. Lucia Archaeological and Historical Society and the Museum of Natural History, Gainesville (Hofman and

Branford 2011; Hofman et al. 2012). This most recent fieldwork focused on the portions of the site which were most vulnerable to impending damage from human and natural processes. In the course of this work, more than forty burials were discovered and systematically excavated within a relatively small portion of the site.

The spatial relationship and proximity of the burial features to the post-holes of structures suggest that the burials were likely placed within the settlement in or near house structures. Although primary interment is the most common burial form, wide variation exists for many aspects of the overall burial treatment. For example, several composite burials are comprised of a complete set of remains of one individual interred with the partial remains of other individuals (disembodied crania in at least two cases). Burial pits were generally small and oval or round in shape, with the majority of individuals facing to the east. Radiocarbon dates are available for twelve of the individuals from this skeletal population and appear to cluster into three distinct periods [A.D. 1150-1300, A.D. 1300-1400, and A.D. 1400-1600] (Hofman et al. 2012).

The majority of the radiocarbon dates obtained thus far from human bone materials fall roughly between A.D. 1200 and 1500. This evidence is in accord both with the Bullens' (1970) original proposition that the main occupation of the site dates to the Late Ceramic Age, and the preponderance of Suazoid materials within the ceramic assemblage. Osteological analyses of the human remains were conducted by Darlene Weston and included estimations of sex, age, and pathological conditions. Analysis of patterns of cranial modification, and analysis of patterns of dental wear also carried out by Anne van Duijvenbode and Hayley Mickleburgh, respectively. A skeletal report of this burial assemblage has been generated from this study and forms the basis for the data presented herein (Weston 2011b). In total, the skeletal assemblage consists of 53 individuals, of which five are juveniles and 48 are adults. Of the adults, there is an equal distribution of 14 males and 14 females, while the sex could not be determined for another 20 individuals based on the generally poor condition of the much of the skeletal remains. The age distribution shows an under-representation of juveniles, a pattern similar to that found at the site of Anse à la Gourde, Guadeloupe and may be partially attributed to differential mortuary treatment based on age at death (Hofman et al. 2001a; Hoogland et al. 2010).

Lastly, Giraudy is a Ceramic Age site located in southeastern St. Lucia near the coast. The site was initially excavated by Ripley and Adelaide Bullen in collaboration with Eric Branford and uncovered numerous ceramic fragments in addition to various artifacts of shell, bone, and stone (Bullen et al. 1973). These early excavations also revealed the two major occupations at the site based on the presence of a 'modified' or Late Saladoid and a Suazan Troumassoid component. Further excavation of the site was conducted in 2004 by a team of researchers from Leiden University and the Florida Museum of Natural History, under the direction of Corinne Hofman and Menno Hoogland, and William Keegan, respectively (Hofman et al. 2004). Their excavations yielded additional material remains including a large number of pottery fragments and food refuse, in addition to a shell axe, spindle whorls, and human remains including a single human tooth that was sampled for this present study.

5.3.9 Escape, Argyle I, Argyle II, and Buccament West- St. Vincent

The adjacent sites of Argyle I, Argyle II, and Escape are located on the southeastern (windward) coast of the island of St. Vincent. Although known to the archaeological community for several years, large-scale excavations of these sites were only carried out in recent years as part of mitigation efforts corresponding to the construction of an international airport.

The Argyle (I) site was excavated by Leiden University under the direction of Corinne Hofman, Menno Hoogland and Arie Boomert, with participation of Alistair Bright, Angus Mol and Hayley Mickleburgh in 2009 and 2010. The site dates to the late prehistoric and early colonial period, and has been interpreted as an Island Carib village (Hoogland et al. 2011a; Hoogland et al. 2011b). Identified site structures consist of several small round house structures and a larger oval structure thought to have been a 'men's house' (Hoogland et al. 2011a). European materials, including glass seed beads dating to the 16th and 17th centuries, were also recovered from the site as well as Cayo pottery, confirming the association with this ceramic style with the Island Carib occupation of the Lesser Antilles (Allaire 1994; Boomert 1986, 2011; Hoogland et al.

2011a). In addition to numerous post-holes and other features, two excavated burial pits contained extremely weathered and fragmented human remains, mostly comprised of dental elements.

The Argyle (II) site is a large multi-component site located to the southwest of the Argyle I site on the southeast coast of St. Vincent. Ongoing excavations at the site have been conducted by Kathy Martin and Royden Lampkin of the St. Vincent and the Grenadines National Trust since 2010 and have been continued by the SVG Public Archaeology program since 2011 under the direction of Margarita Guzman and Jode Mackay. The large amount of cultural remains and identified features at this site indicate that it may have been a large Amerindian settlement, with an occupation spanning from the Early Ceramic (Saladoid) to Late Ceramic (Suazoid) Ages (de Guzman and Mackay 2011). Excavations in 2010, also uncovered several burials in flexed position, some containing items of personal adornment such as stone beads. In 2011, an additional 21 burials were identified of which 11 were fully excavated. Mortuary practices at the site were highly diverse as indicated by the presence of primary and secondary burials, and both flexed and extended burials. Grave goods, such as lithic materials (flakes and debitage), stone beads and pendants, and ceramic remains including a complete Saladoid vessel were fairly common (de Guzman and Mackay 2011).

Escape is a large, multi-component site located north of the Argyle sites along the riverbank and was mitigated by Iosif Moravetz of Bison Historical Services and Richard Callaghan of the University of Calgary in 2009 and 2010. The site occupation spans both the Early and Late Ceramic Age as attested to by the presence of 'modified' or late Saladoid and Suazoid ceramics (Moravetz and Callaghan 2011). However, the main occupation of the site dates to the Saladoid period, based on ceramic chronology and initial radiocarbon assays of associated materials. Excavations revealed a large number of post-holes, and several structures of varying shapes and sizes have been identified (Moravetz and Callaghan 2011). In addition to the post-hole features, at least 36 burials have been excavated to date from the central portion of the site near some of the identified structures. A wide range of mortuary treatment was also identified, including flexed, semi-flexed, and extended positioning of the body. Most of the burials are primary although a small number of secondary deposits were also documented. Additionally, the

burials were relatively rich in grave goods, with a fairly large number of burials containing at least one artifact and several graves containing multiple burial inclusions. Grave goods consist of beads and pendants made from shell and stone (the latter representing a wide variety of raw materials including some that appear to be manufactured from nonlocal semi-precious stones); axes and flakes; and ceramic materials including a whole Saladoid vessel. Although none of the skeletal material has yet to be radiocarbon dated, the burials are assumed to have been deposited during the Saladoid occupation of the site based on the associated cultural remains and grave goods (Moravetz and Callaghan 2011).

The site of Buccament West is located in Buccament Bay on the southwestern coast of St. Vincent. Earlier excavations of the site and surrounding area have been conducted by the Bullens and more recently a single burial was excavated by Royden Lampkin and Kathy Martin of the St. Vincent National Trust. The burial consists of the skeletal remains of one human individual in addition to faunal bone material (possibly from a dog) placed in a large ceramic vessel (Kathy Martin, pers. comm. 2011). The chronological and cultural context of the burial is unknown at this time.

Unfortunately, systematic osteological analyses of the skeletal assemblages from these sites have yet to be carried out. Hopefully this much needed research will be conducted in the near future. In the meantime, relatively little contextual data are available for these skeletal materials other than the temporal, spatial, and cultural contexts of the site itself.

5.3.10 Heywoods- Barbados

The site of Heywoods is situated on the northwest coast of Barbados, near Speighstown, along the modern shoreline and near a former mangrove marsh (Drewett 1995; Hinds et al. 1999). The site had been known to the public through the writings of several historians and small-scale testing of the site carried out by Peter Drewett in the 1980's and early 1990's (Drewett 1991, 1995). Salvage operations of the site were carried out in the mid-1990's as the construction of a new marina at the site yielded large quantities materials.

Rescue excavations were supervised by Maureen Bennell with the assistance of Ronald Hinds; while May Hill Harris has collaborated on various aspects of the project, especially the ceramic analysis.

These excavations revealed the presence of a large multi-component habitation site, spanning from the pre-ceramic to late ceramic periods. The main Ceramic Age occupation seems to date from the late Saladoid to early Troumassoid periods (Harris 2003). Interesting finds at this site include large quantities of faunal and ceramic remains, including several wells comprised of stacked bottomless pots that probably served as water collection and storage features; high densities of features; and even preserved wooden posts and carved wooden ceremonial artifacts (Hinds et al. 1999). During the 1994 field season, at least six separate burials were excavated, one of which included lithic materials and a highly decorated bottomless vessel. In addition to these finds, several burials were also identified both in association with house structures dating to the Saladoid period and in the later Suazoid component of the site. Burials were mostly flexed and grave goods were uncommon, with one individual grave containing two stone beads (Drewett and Bates 2000). To date, an extensive skeletal report has yet to be published on the burial assemblage from Heywoods and the cultural-chronological context of the individual burials remains unclear.

5.3.11 Manzanilla- Trinidad

The site of Manzanilla is located on the central eastern coast of Trinidad near Cocos Bay and adjacent to the northern end of Nariva Swamp. Recent archaeological research at the site was initiated by a small survey and test excavations carried out by Leiden University in 1997 (Boomert et al. 1997). Preliminary results indicated that the site was a suitable setting for future investigations of Amerindian settlement practices (Nieweg and Dorst 2001). Large-scale, horizontal excavations were first carried out in 2001 and were later extended in 2003, 2004, 2006 and 2007 (Dorst et al. 2003; Dorst et al. 2004; Dorst and Altena 2005; Dorst 2006, 2008). These excavations were directed by Marc Dorst working in collaboration with, and the support of, both the Department of History of the

University of the West Indies and the National Archaeological Committee of Trinidad and Tobago.

Archaeological features and materials at the site seem to date to two distinct periods of habitation: 1) an earlier, Saladoid component of the Late Palo Seco period (AD 350-650) and; 2) a later, Araquinoid period component (AD 650-1400) (Dorst 2007, 2008; Jansen and Dorst 2007). The Saladoid deposits mainly consist of the lower portions of a large midden area. At least nine burials have been discovered which are believed to be associated with a late Palo Seco period occupation of the site (Altena 2007). The Araquinoid deposits are represented by middens, two house structures, and at least twenty burials (Altena 2007). Limited radiocarbon dating has been performed to date but available results from analyses conducted by the University of Groningen and Trent University of Calgary confirm that at least some of the structures and associated burials date to the later Araquinoid periods, circa A.D. 1010 to 1410 (Dorst 2006, 2008).

To date, at least 43 burials have been identified and 21 have been fully excavated and documented (Dorst 2008). Many of these are double, multiple, or composite burials and thus the minimum number of individuals represented far exceed this number. Enormous variability in mortuary treatment is evidenced by variation in burial type (primary, secondary, composite); burial position (flexed, semi-flexed, and extended); and burial orientation (no dominant direction of orientation) (Altena 2007; Baetsen 2003; Jansen and Dorst 2007). Very few burials have associated grave goods, although the limited grave goods discovered to date are rather distinct in several ways. These grave goods include a small number of shell beads, probably representing items of personal adornment. One burial contains the remains of a juvenile interred in the posthole of a residential structure with a shell pendant carved in shape of a jaguar's canine tooth; and a translucent, notched, quartz pebble (Altena 2007). Burials were also found within the central posts of the same structure. A large stone axe and a greenstone frog pendant were both found in close proximity to two burials (Dorst et al. 2004; Dorst 2006, 2008).

The excavators have noted two important general patterns related to the differential funerary treatments of the Saladoid Late Palo Seco and Araquinoid complexes. The earlier Saladoid burials appear to be clearly clustered in association with a midden, this cluster may represent a communal burial area (Altena 2007; Jansen and

Dorst 2007). The older burials are all in an extended supine position (with two exceptions), lack grave goods, and lack evidence for post-inhumation manipulation of the corpse (Altena 2007; Jansen and Dorst 2007). By contrast the burials assigned to the later Araquinoid complex are associated with two structures and are believed to be buried in clusters within or around multi-family houses (Altena 2007; Jansen and Dorst 2007). The later period burials display a greater degree of variability in mortuary treatment, most notably with widespread evidence for post-inhumation manipulation of the corpse. Evidence for leaving the corpse for extended periods of time within open grave pits and the movement or removal of skeletal elements, especially of long bones and crania, is explained as reflecting elements of death rituals (Altena 2007) and is very similar to patterns of funerary behaviour in other contemporaneous Amerindian burial contexts (Boomert 2000; Hofman and Hoogland 2009; Hoogland 1999; Hoogland 1997; Hoogland et al. 2001; Kraan 1998; Sandford et al. 2002; Sannen 2006).

5.3.12 Malmok, Canashito, Santa Cruz, Savaneta, and Tanki Flip- Aruba

Malmok is a preceramic (Archaic) burial site located on the northwestern coast of Aruba. Excavations of the site were primarily conducted by a team of researchers under the direction of Aad Versteeg (Versteeg 1991b, 1993). A large, roughly oval-shaped shell midden was identified and partially excavated, in addition to numerous burials. Radiocarbon dating of shells from the midden and burial area indicate that the two areas are roughly contemporaneous and date to approximately the first several centuries A.D. Extensive horizontal excavations of the site did not yield any features or other evidence of permanent structures (Versteeg 1991b, 1993). Earlier excavations at the site uncovered a number of burials and forty more burials were excavated from the burial area adjacent to the salina (Tacoma 1991; Versteeg 1991b, 1993). Osteological analysis of the skeletal remains was conducted by Jouke Tacoma (Tacoma 1991; Versteeg 1991b, 1993). Burials occurred in clusters of roughly three to seven individuals with males often placed in the center of the clusters. This spatial patterning has led the investigators to suggest that these clusters may represent household groups and that the central male burials may represent

headmen (Versteeg 1991b, 1993). Burial treatment was somewhat variable, although most interments were primary, flexed, and oriented east-west. A large number of burials were covered with large limestone blocks or turtle carapaces and a red dye was observed on the cranium of several individuals (Versteeg 1991b, 1993).

Canashito is a preceramic (Archaic) rock-shelter (or *abri*) located on the slope of Ceru Canashitu in central Aruba. Recovered remains at the site are primarily food refuse with a preponderance of shell material, in addition to several burials. A single radiocarbon date from one of the skeletons yielded an uncalibrated date of 2210 ±95 BP (Tacoma 1991). This early date and the lack of ceramic materials at the site indicate that it is probably associated exclusively with an Archaic Age occupation (Gould 1971). Five human burials were excavated by Ringma in 1950, and similar to the Malmok burial assemblage, these burials are arranged in a cluster around a central male adult burial (Tacoma 1991; Versteeg 1999). Other similarities to Malmok include the presence of a large limestone rock in one burial and the tightly flexed positioning of most of the skeletons. Osteological analysis conducted by Tacoma also indicate general morphological similarities between the Malmok and Canashito skeletal assemblages, including dolichocranic (long) and acrocranic (high) cranial shapes, possibly indicating similar ancestries for these populations (Tacoma 1991).

Santa Cruz is a large ceramic period (Dabajuroid) settlement site located in central Aruba. Excavations of the site were conducted by Leiden University and the Archaeological Museum Aruba in 1991 and 1992 under the supervision of Aad Versteeg (Versteeg 1999). Available radiocarbon dates indicate that the main occupation of the site occurred around A.D. 950-1250, although the site may have been inhabited until the contact period (early 16th century). Excavations uncovered as many as 31 burial features in nine distinct clusters, including many composite burials containing multiple individuals. Positioning and orientation of the burials were highly variable and grave goods were relatively common including several items of personal adornment (Versteeg 1999). Osteological analysis of the human remains recovered at the site was conducted by Jouke Tacoma (Tacoma 1991).

Savaneta is a large Ceramic Age (Dabajuroid) settlement site on the southwestern coast of Aruba. The main occupation of the site dates to roughly A.D. 950-1250, making

the occupation contemporaneous with the Santa Cruz and Tanki Flip habitation sites, and it may have similarly remained inhabited until the contact period. Excavation of the site was conducted by Boerstra in the 1970's and revealed the presence of human burials (Versteeg et al. 1997; Versteeg 2001). Unfortunately, the original field notes have been lost and thus very little contextual information concerning the site as a whole or of the human skeletal materials is available.

Tanki Flip is a large ceramic period (Dabajuroid) habitation site located in northwestern Aruba, several kilometres inland. Early excavations at the site were conducted under the supervision of Boerstra in 1977. This excavation yielded a large number of human skeletal remains (Versteeg and Rostain 1997; Versteeg, et al. 1997). The site was later excavated by a team from Leiden University and the Archaeological Museum of Aruba in 1994 and 1995, under the supervision of Aad Versteeg (Versteeg et al. 1997). Based on the spatial patterning of recorded postholes, multiple house structures were documented at this site. The primary occupation of the site dates to roughly A.D. 950-1250, and thus it is contemporaneous with the Savaneta and Santa Cruz sites, and it may have also remained in use up to the period of contact (Versteeg and Rostain 1997; Versteeg 1999). Seven composite burials were excavated and the remains of at least 15 individuals were identified. Four of the burials are associated with one of the house structures. Several of the graves are urn burials containing human skeletal remains placed inside of an inverted ceramic burial vessel. One of these burials contained the remains of at least seven individuals placed in an urn covered by an inverted ceramic bowl (Versteeg and Rostain 1997; Versteeg 1999).

5.4 Summary

In summary, the animals and plants sampled for Sr isotope composition as part of the biosphere mapping component of this research project were collected from over 30 different islands throughout the Caribbean region. Most of the faunal remains derive from archaeological sites systematically excavated by various research teams working in the region over the last few decades. These archaeological faunal remains are supplemented

by modern animal samples (primarily land snails) and modern plants (primarily grasses) systematically collected by the author and members of the Leiden Caribbean Research Group over the last few years. The sampling locations were strategically chosen to represent the widest possible range of geographic and geologic settings for each island included in the present study.

The human skeletal remains sampled for multiple isotope analysis as part of the human provenance component of this research project derive from a large number of sites located on twelve different islands in the Caribbean region. Most of the burial assemblages were strategically selected based on the size of the skeletal population, the amount of available contextual information, and to represent a wide range of spatial and temporal contexts. A limited number of smaller skeletal populations and isolated burials were also opportunistically sampled to provide baseline data for comparative analysis of Sr isotope variation in the region. Most of the of the skeletal populations included in this study derive from systematic archaeological excavations carried out by the Leiden Caribbean Research Group and other large-scale archaeological research projects conducted over the last few decades.

Site selection is biased based on the aforementioned criteria of large sample size and availability of relevant contextual information. Nonetheless the quantity and quality of available contextual data was highly variable between sites. For example, most of the larger skeletal populations derive from sites that have been extensively and intensively studied from multi-disciplinary research designs focused on the analysis of a broad array of materials and lines of evidence. Most of the larger skeletal populations have also been recently subjected to osteological analysis (or reanalysis) using updated and standardized procedures for the scoring and recording of skeletal traits for estimations of sex and age. Additionally, stable isotope analyses and paleodietary reconstructions have also been conducted for some of these skeletal assemblages. In contrast, for some of the sample populations, not only has no osteological analysis been carried out to date but in several cases little or no contextual information has been published and some site reports are not available thereby limiting the interpretations of the results and data presented herein. Nonetheless, I have included the analyses of these smaller and less well-studied

collections for comparative purposes and in the hope that relevant information will become available in the future.