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Reading the dental record : a dental anthropological approach to foodways, health and disease, and crafting in the pre-Columbian Caribbean

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CHAPTER 1 INTRODUCTION

Before the historian can judge wisely the political skills of human groups or the strength of their economies or the meaning of their literatures, he must first know how successful their member human beings were at staying alive and reproducing themselves (Crosby 2003:XXV–XXVI).

1.1 BACKGROUND

This study was designed to investigate human foodways, health and disease, and certain (gender-related) craft activities in the pre-Columbian Caribbean archipelago, through integrated analyses of patterns of dental wear and pathology in a large



Figure .1 Map of the Caribbean showing the sites incorporated in this study (Pepijn van der Linden and Hayley L. Mickleburgh). (1) Wemyss Bight cave, Eleuthera Island, Bahamas (2) Clarence Town caves, Long Island, Bahamas (3) Gordon Hill caves, Crooked Island, Bahamas (4) Chorro de Maíta, Cuba (5) Manigat cave, Île de la Tortue, Haiti (6) Daile 1, Haiti (7) La Caleta, Dominican Republic (8) Juan Dolio, Dominican Republic (9) Higüey, Dominican Republic (10) Punta Macao, Dominican Republic (11) El Cabo, Dominican Republic (12) Coto, Puerto Rico (13) Maisabel, Puerto Rico (14) Santa Elena, Puerto Rico (15) María de la Cruz cave, Puerto Rico (16) Hacienda Grande, Puerto Rico (17) Monserrate, Puerto Rico (18) La Mina, Vieques, Puerto Rico (19) Esperanza, Vieques, Puerto Rico (20) Punta Candelero, Puerto Rico (21) Santa Isabel, Puerto Rico (22) Collores, Puerto Rico (23) Cañas, Puerto Rico (24) Yauco 1, Puerto Rico (25) Tutu, St. Thomas, USVI (26) *Unknown site*, St. Croix (27) Kelbey's Ridge 2, Saba (28) Spring Bay 1c, Saba (29) *Unknown site*, St. Kitts (30) Mamora Bay, Antigua (31) Indian Creek, Antigua (32) Anse à la Gourde, Guadeloupe (33) Lavoutte, St. Lucia (34) Point de Caille, St. Lucia (35) Heywoods, Barbados (36) Buccament West, St. Vincent (37) Argyle, St. Vincent (38) Escape, St. Vincent (39) Argyle 2, St. Vincent (40) Savanne Suazey, Grenada (41) Simon Beach, Grenada (42) Manzanilla, Trinidad (43) Saladero, Venezuela (44) Tocorón, Venezuela (45) Canashito, Aruba (46) Malmok, Aruba (47) Tanki Flip, Aruba (48) Savaneta, Aruba (49) Santa Cruz, Aruba.

number of skeletal remains from the region. A total of 458 human dentitions from 49 sites from throughout the Caribbean region were analyzed (Figure 1.1).

The study of past peoples' foodways – food consumption and its social and cultural context – can be considered one of the main lines of investigation in archaeological research both in the past and at present. More than just being the adoption of a certain diet and a means for fulfilling the daily required calorie intake, foodways encompass and influence all aspects of society and lifestyle: economic systems (how society uses and distributes its resources), division of labour (according to age and/or gender), social and political organization (access to resources and distribution of wealth and power), and ritual and ceremonial activities. Studying how past communities organized division of labour, cooperation between individuals, available technology, and access to resources, is elemental to understanding their social and cultural identity. Differences or similarities in foodways in different communities within an interaction sphere can, for instance, be an important basis for interaction and exchange between these communities. Such interaction, although possibly driven by the desire for goods and materials that cannot be produced within the own community, extends far beyond the mere exchange of objects. Strong social and cultural bonds are formed between interacting communities (Hofman et al. 2007; Hofman and Hoogland 2011). Furthermore, food procurement, production, consumption and disposal of remains are key aspects in the communication of social and cultural identity, both in intra- and intercommunity interactions. The acts of food production and consumption themselves are highly structured and follow very specific rules in all societies (Appadurai 1981; Curet and Pestle 2010; Douglas 1975, 1984; Farb and Armelagos 1980; Van der Veen 2003).

The bulk of our knowledge of foodways in pre-Columbian societies in the Caribbean is based on analyses of faunal and botanical remains, food production tools such as ceramic cooking pots and (stone and coral) grinding implements, local environment and climate, and ethnohistoric accounts. In recent years, stable isotope and trace element analyses focussing on palaeodiet in the region have greatly enhanced our understanding of foodways prior to European involvement in food production after A.D. 1492 (De Vos 2010; Farnum and Sandford 2002; Van Klinken 1991; Norr 2002; Pestle 2010a, 2010b; Pestle et al. 2008; Stokes 1995, 1998, 2005). Of course, all of these methods for studying foodways have their advantages and limitations which depend heavily on the methodology used and the scale of analysis. The analysis of diet based on faunal remains, for example, is naturally biased toward over-representation of the non-vegetable, protein rich component of the diet. Ethnohistoric accounts, while requiring caution in their interpretation due to the Eurocentric perspective of the authors, may provide more significant insights into the social and cultural context of diet and subsistence practices as opposed to specific information on the composition of the diet. Carbon and nitrogen isotope analysis, on the other hand, is an excellent tool for investigating the composition of the diet with regards to the amount of marine and terrestrial foods and the propor-

tion of C3 and C4 plants consumed, while they are less suited to investigating the specific types of plants and animals which constitute the different components of the diet. One of the great advantages of stable isotope analyses in the reconstruction of palaeodiet is the fact that it uses individual human skeletons in an approach that is both geared toward understanding dietary practices at the micro-scale, i.e., individual persons, groups and communities, and divulging dietary practices at larger regional and temporal scales (provided enough skeletal remains are available of course). In this study, I use dental wear and dental pathology in individual humans to understand foodways at inter- and intrasite levels.

Health and disease are reflected in the human dentition in the form of dental pathology and developmental defects, which for a great part are closely associated with diet and the intake of nutrients. Particularly dental pathology such as caries, abscesses, and alveolar bone resorption are associated with the composition of the diet and preparation techniques of the foods. The dentition may reflect the general physiological condition of an individual at a certain stage in their life, for example in dental defects such as linear enamel hypoplasia, however these conditions are often heavily influenced by the adequacy of the diet (in providing the necessary nutrients), and by metabolic disorders which reduce an individual's ability to absorb and process nutrients. Interpreting health and disease from the dentition is therefore complex, and requires great attention for the role of the diet in the development of pathology and defects.

Craft activities in the pre-Columbian Caribbean have mostly been investigated by consulting the ethnohistoric sources and assigning certain categories of archaeologically recovered material culture to the realm of sociopolitical influence and the development of power relations accordingly. This study approaches the topic of craft activities from a very different angle, i.e., by defining individuals as crafts(wo)men based on dental characteristics, while the associated material culture is absent.

1.2 READING THE DENTAL RECORD: INTRODUCTION TO THE RESEARCH

This research uses methods which are derived from dental anthropology, a field of research which is relatively new to the Caribbean, to shed new light on past foodways, health and disease, and craft activities in the pre-Columbian Caribbean region. The foremost premise of this research is the assumption that biometrical data, embedded in their cultural and social context, increase our current knowledge of foodways, health, and general lifestyle.

1.2.1 Foodways

Dental anthropology is the branch of physical anthropology and osteology that concerns itself with the biology and behaviour of hominins as reflected in their teeth. Palaeodiet reconstruction in dental anthropology generally involves analysis of patterns of dental wear and pathology in sizable skeletal assemblages. Detailed

analyses of dental macro- and microwear patterns have shown that it is possible to distinguish the type of abrasive agents which cause certain patterns of wear. These abrasive agents can either be foods or other materials which are introduced into the oral cavity. Likewise, dental pathology has been shown to be indicative of diet – especially the proportion of carbohydrates in the diet, as high prevalence of dental caries (the most ubiquitous human dental disease) is often related to high carbohydrate intake. In this study statistical analyses of data on human dental wear and pathology from a range of archaeological sites throughout the Caribbean are embedded within a multi-disciplinary approach, which combines (osteo)archaeological, environmental, and ethnohistorical evidence, as well as information from clinical dentistry as the backdrop from which to interpret the dental anthropological data. In other words, the dental anthropological evidence for foodways, health and disease, and crafting is placed alongside what is currently known from palaeofaunal and palaeobotanical analyses, tool assemblages associated with food production, palaeoenvironment and palaeoclimate studies, ethnohistoric and ethnographic accounts, and clinical dental research. A major caveat in the potential for dietary reconstruction based on dental wear and pathology, however, is the fact while the pathology load (i.e., the amount and severity of pathological conditions related to the composition of the diet) is a good indicator of the proportion of protein versus carbohydrate intake, based on dental anthropological data alone the fauna and flora which were consumed cannot be reliably distinguished. In the Caribbean, as briefly mentioned above, and discussed in more detail in Chapter 3, we have a pretty good idea of the types of terrestrial and marine animals that were available, throughout the different phases of occupation of the region, and at intra-regional and site levels. With regards to the vegetal component of the diet, however, we are faced with issues of preservation in a (sub)tropical environment, although much palaeoethnobotanical research in the past few years has made considerable headway in resolving this (Berman and Pearsall 2000, 2008; Newsom and Pearsall 2003; Newsom and Wing 2004; Pagán Jiménez 2007, 2009, 2011; Pagán Jiménez et al. 2005; Pagán Jiménez and Rodríguez Ramos 2007; Pearsall 2002). In an attempt to get to grips with plant food consumption at a similar scale of analysis as the dental anthropological data used in this study (i.e., based on analyses of individual humans), I set up a parallel investigation in collaboration with Dr. Jaime Pagán-Jiménez, in which dental calculus from individuals from most of the sites I include in this study research were studied for micro botanical inclusions (in this case starch grains and phytoliths). In this way, it is possible to identify at least some of the plants which comprised the vegetal component of the diet, or in other words the carbohydrate intake (Mickleburgh and Pagán Jiménez 2012).

The results of these investigations are used to come to new insights into foodways in the region. As will be explained in more detail below, this kind of incorporation of dental anthropological research into archaeology and some of its closely related disciplines is highly advantageous to all research and researchers concerned. In addition to the research objectives outlined below, I aim to demonstrate here not

only that dental anthropology is valuable to archaeologists, but also that dental anthropological research must rely upon various other fields of research in order to make itself valuable to researchers outside the confines of its own field.

1.2.2 Health and disease

[T]here is, in fact, no means of knowing the state of health during life of the individuals who come to comprise an assemblage of skeletons, especially because what determines their actual state of health depends not only upon the diseases that affected their internal organs, but their mental state, their diet and many other environmental and social factors, about which there is little to be known from the state of their bones (Waldron 2009:10).

The study of human health from the dentition, while an important part of dental anthropological research, essentially falls within the domains of palaeodemography, palaeopathology and palaeoepidemiology. For all of these research disciplines, dental health is an extremely important factor for the reconstruction of past population trends (Cohen and Crane-Kramer 2007; Steckel and Rose 2002; Waldron 2009). The issue of past oral and general health is complex however, not only for the large number of inherent assumptions that are necessarily made in order to study this subject using human skeletal (dental) remains, but also for the fact that what is actually studied is past oral and general disease, not health, as Tony Waldron elegantly remarks in the quote above. Nevertheless, dental disease has been shown to be indicative of levels of ancient health, particularly when pertaining to large groups of individuals over long periods of time. As explained above, dental palaeopathology has proved itself particularly effective in distinguishing changes in foodways and (resulting) nutritional stress. In this sense, the complete dental pathology load (Listi 2007; Lukacs 1989) for both individuals and groups is used in this study to elucidate dietary practices, but also general health trends in space and time. Other forms of (developmental) stress may also be observed in the dentition, reflecting physiological and nutritional stress during different life phases. Here, information from the dentition will be complemented by palaeopathological information from the rest of the skeleton, where available. Once again, ethnohistoric sources are consulted, as some describe diseases and conditions of physical stress in the indigenous population of the Caribbean at the time of first contact with Europeans (Crespo Torres 2005b, 2008; Schats 2010, 2011). Of course, the necessary caution in interpretation of these documents again applies to this case.

1.2.3 Craft activities and production

One of the most distinctive characteristics of fifteenth-century Taino society (at least to the modern observer) is a vibrant sense of artistic creativity and exuberant innovation in material expression. Taino artisans produced a wide variety of craft items,

including elaborate decorated ceramics, cotton and cotton products, ground and polished stone beads and ornaments, carved shell and bone ornaments, tools of stone, shell and bone, carved wooden objects, tobacco, various foodstuffs, and exotic birds and feathers [...] [W]omen spun and wove cotton into clothing and hammocks, made baskets and mats, and carved some ceremonial wooden items, and pottery production is assumed by most contemporary authors to have been done by women [...] [M]en carried out the fabrication of heavier wood items, such as canoes and buildings, and produced stone tools and objects (Deagan 2004:601).

The above quote, although referring to the Late Ceramic Age and Early Contact period Taíno societies of the Greater Antilles, could equally be taken as a description of pre-Columbian Caribbean societies in general (including those of the Archaic Age), because for all periods of Caribbean history archaeologists have found – and continue to find – elaborate and decorative items which must have required considerable skill and knowledge to produce. However, the study of craft production, aside from the technological aspects involved (e.g., stone chipping and grinding techniques), or the choices of raw materials (i.e., local versus exotic), or the role of craft objects in the social and ritual realm (e.g., exchange and gift-giving), has received relatively little attention in Caribbean archaeology so far. Specifically, the individuals who became craft producers, embodying the technological, and no doubt supernatural or spiritual skills required for this role, and the manner in which their knowledge and experience was passed on, has received little attention. The two main sources of information we have on craft activities for the pre-Columbian Caribbean at this point in time are artefacts recovered from archaeological excavations (usually the end product of such activities), and of course ethnohistoric accounts of craft activities during the (Early) Contact period, which are often used as an example of such activities during pre-Columbian times. Of course, these methods for studying craft activities are affected by similar advantages and limitations as those mentioned for the study of foodways. As ever, the archaeological record is biased toward preservation of durable materials, such as pottery and stone, while perishable materials are only rarely preserved. This automatically complicates the study of craft activities, as a very important category of such activities involves perishable materials, for instance the fibrous plant materials used in basketry or organic pigments used in paints. Equally, the ethnohistoric accounts of such activities have their limitations. As mentioned above, we must be very careful in using and interpreting these accounts due to the underlying motives of the authors. Furthermore, the use of such documents may result in the tendency to gloss over the undoubtedly great social and cultural variation that was present in the region at the time of European arrival. This arrival also very rapidly had its effects on the daily lives of local populations, influencing social roles and (gender-based) labour division, and by extension changing local craft activities (Deagan 1988, 1996, 2004).

While the complexities of using certain material culture remains and ethnohis-

torical data in studying craft activities are not resolved through the study of the human dentition (or the entire skeleton for that matter), dental anthropological information can certainly contribute to our understanding of craft production on an individual level. In this study I use patterns of dental wear related to the use of the teeth as tools to infer craft producing individuals. This is based on the fact that in order to create such patterns of wear, a person must have engaged in a certain activity using the teeth for an extended period of time on a regular basis. This in itself of course gives little indication of the type of material being worked, or the degree of skill involved, however, the precise pattern of wear can sometimes reveal the type of action and material(s) involved. In collaboration with Saskia Kars of the VU University Amsterdam, Scanning Electron Microscopy (SEM) was used to analyse a small number of cases of teeth-as-tools wear, in order to get to grips with the type of materials being processed by the teeth, and the precise action (i.e., direction of movement, degree of force) involved.

1.3 RESEARCH QUESTIONS

As introduced above, the emphasis in this study lies on investigating foodways, health and disease, and craft activities in the pre-Columbian Caribbean archipelago, using evidence in the form of dental wear and pathology in human dentitions. These themes will be dealt with using a multi-disciplinary approach, which involves the integrated use of archaeological site context data, ethnohistoric and ethnographic sources, clinical dentistry, and of course statistical analyses of patterns of dental wear and pathology from a range of sites throughout the region. The aims of this study can be translated into the following research questions:

How does evidence from human dentitions contribute to knowledge of the life-ways and cultural practices of the pre-Columbian Amerindians of the Caribbean archipelago?

- a. What do dental wear and pathology reveal about foodways in the region? Can patterns be discerned over time and/or space? If so, how do these relate to socio-cultural, sociopolitical, and environmental developments in the region over time?
- b. What does dental pathology reveal about oral and general health and disease patterns in the region over time, and how does this compare to other lines of evidence on past health in the region?
- c. What indications are there for the use of the teeth as tools, and can these be linked to particular craft activities? Are there indications for age and/or gender-related divisions in these practices? Can 'non-alimentary activities' be elucidated using ethnographic and ethnohistoric information?

1.4 KEY ISSUES

Dental anthropological research, like many approaches in osteoarchaeology, is characterized by an interesting dichotomy between the unit of analysis (an individual person) and the type of questions the data are often used to answer (pertaining to larger groups, communities, and entire populations, often over extended periods of time). This is especially the case in dietary studies based on traces of (macro)wear and pathology in the human dentition; diet reconstruction cannot be done at the level of the individual, as a single dentition does not reveal the type of patterns and processes that allow a reconstruction of food consumption patterns. As such, the underlying assumption of this approach is that by studying large groups of individuals with some form of shared lifestyle (co-habitation, contemporaneity, social and cultural similarity, etc.), we are able to infer what life would have been like for an individual within the group. Dental anthropological studies of diet and subsistence practices are adept at distinguishing clearly different dietary practices between large samples. Subtle differences are harder to interpret, as this type of research relies on significant differences as indicated by statistical analyses. Likewise, the reconstruction of foodways based on dental wear and pathology relies heavily on the resolution of the chronological data related to the sample set. A good handle on the temporality within the dataset allows for the study of processes, trends, and developments. In this, the reconstruction of foodways in dental anthropology shows at once its greatest strength and its greatest weakness: in comparing subsets of data (e.g., the early and late phases of occupation in a particular region), this type of research may reveal incredibly detailed information on changes or continuity in diet and subsistence over time. When faced with a single, short occupation phase, however, the presence of a particular pattern of wear or pathology is often harder to interpret. For example, the type of dental wear and the pathology load may reveal a picture of a group of humans who were clearly focussed on a high carbohydrate intake. Naturally, this is hugely valuable information to an archaeologist, however, when the comparison of two phases of occupation at the site reveal subtle differences in wear and pathology between the two phases, e.g., indicating a gradual shift from predominantly marine foods to increased carbohydrate consumption, it may be possible to elucidate the relation between subsistence practices and social and economic processes at the site. This crude example merely serves to demonstrate that one of the greatest advantages of dental anthropological research in understanding past social and cultural behaviour lies in its ability to reveal processes and developments through comparisons. The above forms one of the key issues in the present study; in applying dental anthropological data to the reconstruction of foodways in the pre-Columbian Caribbean (or any other region for that matter), fundamental choices are made in the manner in which the data are structured, and subsets of data are compared to each other. In this study, I use spatial and temporal variation in the skeletal assemblages included as the basis for comparisons, which therefore reflect differences, processes and developments over extended periods of time and across large spaces. While this

approach is in part dictated by the nature of dental anthropological methods, it is also devised to simultaneously reflect potential changes or continuity in subsistence practices during grand sociocultural, sociopolitical, and environmental changes recognized over time in Caribbean archaeology, and potential differences between communities who occupied a broad interaction sphere, the circum-Caribbean, in which there is a considerable degree of environmental, biological, social, and cultural diversity (Hofman et al. 2010). Fundamental in this approach is an awareness of the variability in resolution of contextual data for the sites included here (see section 5.4). By this I mean mainly the differences in the amount of information on dating. Some assemblages have been extensively radiocarbon dated, while others are dated to broad time frames based on ceramic typologies, which are currently under close scrutiny (e.g., Rodríguez Ramos et al. 2010).

1.5 OUTLINE OF THE FOLLOWING CHAPTERS

In Chapter 2 the history and development of the field of dental anthropology is discussed, and the different types of dental wear and pathology and their relation to three main themes of investigation of this study – foodways, health and disease, and craft activities – are described and explained based on results from extensive previous research in dental anthropology. Chapter 3 introduces the geographical, geological and climatic setting of the Caribbean region, and outlines the general development of social, cultural, and biological characteristics of pre-Columbian Caribbean peoples. The relation between previous studies of foodways and social organization in the pre-Columbian Caribbean, is discussed, as this research has profoundly influenced current understandings of past foodways in the region. Finally, this chapter also reviews current knowledge of pre-Columbian Caribbean foods and diet, health and disease, and craft activities.

In Chapter 4 the multi-disciplinary approach of the research is explained. The combined use of dental anthropology, archaeology, osteology, ethnography, and ethnohistory is argued to significantly increase the value and validity of the contributions of this work to our knowledge of foodways, health and disease, and craft activities in the pre-Columbian Caribbean. Furthermore, in this chapter the various methods employed during this study to document and analyse the results are discussed, described, and the statistical tests used are explained. Chapter 5 deals with the spatial and temporal distribution of the sites, and discusses what is known from previous research of each individual site and its burial population. Contextual information on the sites is broadly placed within the regional cultural framework discussed in Chapter 3. Chapter 6 presents the results of the analyses of dental wear and pathology, and is broadly organized into data pertaining to dental wear, dental pathology, and dental defects. Within these main categories, each individual subject is discussed at sample, site, and intra-site levels. In Chapter 7, the results presented in Chapter 6 are discussed within the context of dental anthropological studies worldwide, the individual site contexts, and the broad cultural context of the pre-Colum-

bian Caribbean region. The chapter is organized along the three major themes of investigation of this study: foodways, health and disease, and craft activities. Other themes that are dealt with in this chapter are crafting, LSAMAT, and dental evidence for individual life histories and juvenile foodways. Intra-site chronological differences and the broad scale chronological differences over time throughout the region are discussed. Finally, in Chapter 8 the conclusions of this study are outlined following the research questions explained above, and future directions of research are discussed.