PUERTO RICAN PRECOLONIAL HISTORY ETCHED IN STONE

By

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To Mael, for her love, support, and all the etceteras; to Darío, for all the joy that he has brought to us; to Camila, for all the joy that she will bring to us

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During the course of this work, I have been fortunate to count with the support and encouragement of a vast number of friends, colleagues, and family. Although the ideas presented here will likely succumb to the impetus of fresher and brighter minds in the future, the friendships established during the course of this work will hopefully withstand the test of time.

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This dissertation has a Chanlattean undertone (or overtone). It is my belief that Luis Chanlatte, together with his long-time colleague and friend Yvonne Narganes, has produced some of the most significant ideas in Antillean archaeology, several of which are further explored in this study. His contentions about the importance of Pre-Arawak peoples in the development of the late precolonial landscape of Puerto Rico, the discovery of the LH

manifestation and his consideration of it as representing a distinct ancestral tradition, and his overall emphasis in not taking things for granted were clear sources of inspiration in the ideas that are hereby presented. Chanlatte's research should serve as an example of verticality and persistence for the new generation of scholars working in the islands and elsewhere and his contributions to the archaeology of the Antilles have to be acknowledged. Hopefully, this dissertation provides a platform for giving his contributions their deserved stage in Antillean archaeology.

Another major influence on my lithified scope has been my good friend and mentor Jeff Walker. Jeff's contribution to the study of lithics in the Antilles deserves to be underlined, particularly when considering his influence on the new generation of Caribbean lithomaniacs. His unwavering support in the form of the friendship and the knowledge that he has shared with me through many years will be eternally appreciated. To him, my utmost respect.

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provided me with the collection from Cueva la Tembladera, for which I'm greatly thankful. The radiocarbon database developed for this work was a result of the efforts of a wide group of archaeologists, many of which provided me with unpublished results of their work. I particularly want to thank those that personally sent me their dates including Jaime Vélez, Juan González, Juan Rivera Fontán, Chris Goodwin, Sue Sanders, Daniel Koski-Karell, Tim Sara, Miguel Rodríguez Lopez, Luis Chanlatte, Yvonne Narganes, Carlos Pérez, Peter Siegel, Marisol Meléndez, Hernán Ortiz, L. Antonio Curet, Edgar Maiz, and Marlene Ramos.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Abstract of Dissertation Presented to the Graduate School
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The precolonial history of Puerto Rico and of the rest of the Antilles has long been constructed on the basis of the pottery-based chrono-cultural framework devised by the late Irving Rouse. In my study, which is framed from a materialist-based historical perspective, I put the major assumptions embedded in Rouse's model to the test using as primary lines of evidence the analysis of the technological styles reflected in the production of more than 8500 stone artifacts as well as an inventory of 560 radiocarbon dates from Puerto Rico. Using these lines of evidence, I propose an alternative perspective about the precolonial history of Puerto Rico since its initial discovery by our earliest ancestors to the time of the arrival of Europeans. The recently generated data from Puerto Rico indicate that the origins of agriculture, pottery production, and the initial transformations of the botanical and zoological landscape of the island were registered by the Pre-Arawak peoples. The analysis of the lithic materials from La Hueca-Sorcé and Punta Candelero also allowed me to delve into the "La Hueca Problem" and to argue that the La Hueca and the Cedrosan Saladoid cultural manifestations represent two distinct ancestral traditions whose major influences can be traced back to the Isthmo-Colombian area and somewhere in northern South America respectively. I then argue that the late cultural arena of the island was configured as a landscape of plurality rather than homogeneity, which resulted from the myriad

of interactions and negotiations that took place between the peoples that inhabited Puerto Rico through time. Such plural scenario not only emerged from the inter-societal engagements that were taking place within Puerto Rico but also from the macro-regional relationships that were being registered with peoples that inhabited surrounding continental regions, most notably with those of the Isthmo-Colombian area. I conclude by proposing a reticulate model for Antillean archaeology in opposition to the phylogenetic framework that is still dominant in the area and the consideration of the Greater Caribbean as a geohistorical area of study.

CHAPTER 1
INTRODUCTION

The traditional narrative of Puerto Rican history is typically represented as a four-layer cake. Each of these layers is constituted not only by the different ethnicities that contributed to our current Puerto Rican condition, but also embodies the distinct historical events that provide the backbone of the shared culture-historical imagery of our '500 years of history.' This cake is stratigraphically arranged with the indigenous people at the bottom, overlaid by the Spanish and then the African traditions, finally being frosted by the influence from the United States after their military invasion of our island in 1898. There is one major contribution from each of these layers: our noble character from the indigenous past; our mother culture from the Spanish past; our spicy flavor from the African past; and, our ($$) capital from U.S.A.

In the construction of the "official" history of Puerto Rico (Figure 1-1) more than half a century ago, the lowermost of these layers was (and still is) represented exclusively by the Taíno, the name given to the first indigenous societies to suffer the effects of the European invasion of this part of the world. This emphasis in the Taíno has resulted in an image of a pre-Columbian past that proceeds along a horizontal temporal vector, excluding from it those groups that inhabited the island prior to the Spanish incursion because they were not immortalized in written (i.e., historical) documents. As a result, our past has been collapsed into the aforementioned '500 years of history,' prior to which there was only *pre*history. This emphasis on documentary evidence in the construction of our historical narrative has thus resulted in a disjunction with an ancient past that goes back for more than 6000 years on the basis of the still pervasive "tyranny of the historical record" (Champion 1990) against archaeological data, which is usually considered to not be reliable enough to build history. In the limited number of instances in which a more careful attention is placed in the indigenous heritage of our historical lifeline the

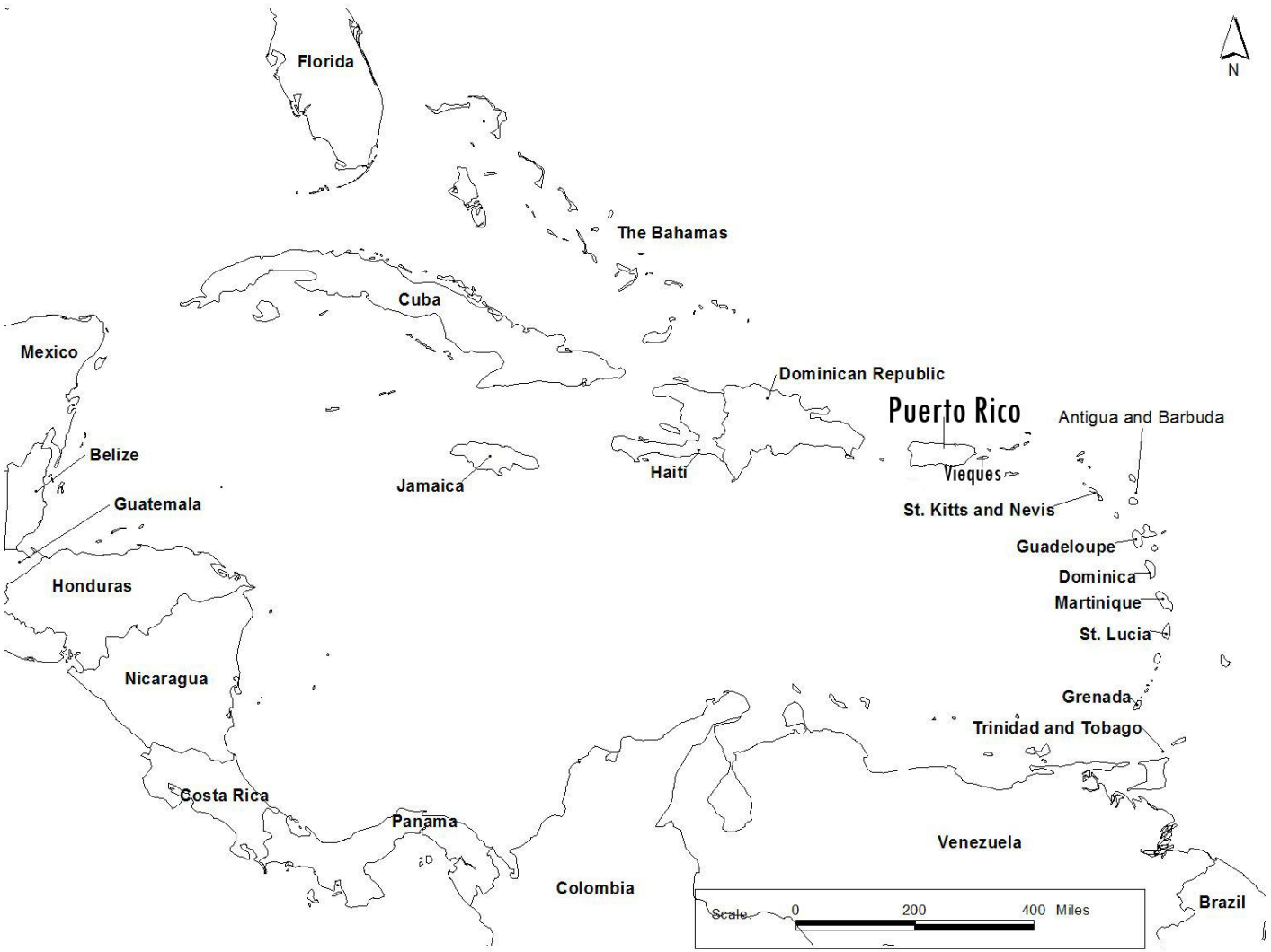

Figure 1-1. Location of Puerto Rico within the Caribbean.

focus is on the development of the peoples that migrated to the Antilles around 500 B.C. They are known archaeologically as the Cedrosan Saladoid and parochially known as the Igneri, and are thought to be the "ancestors of the Taino" (Rouse 1992:37).

Puerto Rico was inhabited for millennia prior to the arrival of Cedrosan peoples. These so-called "Archaic" peoples are usually characterized as primitive societies that lacked agriculture, ceramics, or any other complex technology. Thus, it is commonly considered that they were an easy target for the Cedrosan "colonists" (Siegel 2005:vi) from South America, who quickly exterminated, acculturated, or displaced them upon their arrival. Their quick disappearance has led to the generalized idea that these "Archaic" peoples "contributed little to the subsequent peoples and cultures of the Greater Antilles" (Rouse and Alegría 1990:80). As a result, these "Archaic" peoples have been divorced from the construction of the first stratum of Puerto Rican history. This discourse of the unidirectional power relationships that resulted in the colonization of the "Archaic" by the Cedrosan Saladoid does not differ much in its structure to that of the Europeans over the "Taíno" in the sixteenth century, and that of the North Americans over the Spanish at the end of the nineteenth century; all of those events reproduce the tropes of internal subservience and external supremacy that have served to naturalize a condition of coloniality as part of our identity (Sued Badillo 1992; Pagán Jiménez and Rodríguez Ramos 2008). As a result, the history of Puerto Rico has been envisioned as a sequence of colonizations since our early past, and we have had no option but to remain as the last colony in the world since then.

The main archaeological model used to construct such an image of our pre-Columbian history, and that of the rest of the insular Caribbean, was devised by Irving Rouse more than half a century ago (Rouse 1939, 1952). Although Rouse recently passed away, he is still a dominant figure in the Antillean archaeological landscape and his framework continues to be the

foundation upon which most archaeological work is done in the islands. In the latest version of Rouse's (1992) model, he makes several key assumptions:

1. The so-called Archaic peoples that arrived to Puerto Rico around 1000 B.C. were hunting-gathering societies.

2. Due to their foraging nature, those "Archaic" societies were an easy target (i.e., "sitting ducks;" Rouse 1992:70) for the Cedrosan "colonizers" of Puerto Rico and the Lesser Antilles, who acculturated or displaced them west upon their arrival to the island.

3. These Cedrosan Saladoid peoples migrated from the Orinoco Basin via the Lesser Antilles into Puerto Rico and eventually into the eastern portion of the Dominican Republic, and introduced pottery, agriculture, and settled lifeways to the Antilles.

4. Within the northern Antilles, the divergent evolution of the Cedrosans gave rise to the Huecan Saladoid subseries documented in Puerto Rico.

5. Around A.D. 250 the Cedrosan Saladoid peoples got rid, acculturated or pushed the Huecans to the east, after which they developed phylogenetically in a monocultural landscape into the Taíno.

6. The inhabitants of Puerto Rico and the rest of the insular Caribbean did not sustain significant contacts with peoples from surrounding continental regions with the exception of those from northeastern South America, the supposed homeland of our indigenous ancestors.

Rouse used two main lines of evidence in order to construct this framework. The first is based on the modal analysis of pottery. He contended that the "continuum of modes" observed in pottery from the Cedrosan Saladoid to the Taíno, archaeologically known as Chican Ostionoid, indicates a "genetic" (Rouse 1960a:313) relationship between them. The second major line of evidence was the use of 13 radiocarbon dates recovered from the island, which served as the chronological foundation for the cultural sequence that he had previously proposed on the basis of his ceramic analyses. This ceramocentrist perspective embedded in Rousean time-space systematics has, perhaps inadvertently, resulted in the imposition of a condition of liminality on other types of materials, in a similar fashion as that imposed on the "Archaic" peoples (who supposedly did not produce ceramics) in the construction of our historical lifeline.

This use of ceramics as the primary unit for tracing the origins and developments of the indigenous peoples of Puerto Rico, as well as in the Antilles in general, has resulted in a lack of systematic studies of other elements that might reveal alternative perspectives about our precolonial culture-historical sequence. This approach also ignores the possible interactions sustained within the island and with other regions besides northeastern South America during pre-Columbian times.

Material classes other than ceramics such as stone artifacts have taken the back seat particularly in Ceramic Age studies due to the fact that these are regarded as non-diagnostic for the elucidation of culture-historical processes (Siegel 1992:111). The lack of emphasis on lithic studies is especially intriguing in issues such as the nature of the contact situation between the "Archaic" peoples and later immigrants, especially when one takes into consideration that their interactions (i.e., the supposed demise, acculturation, or displacement of "Archaic" populations), have been traditionally addressed by the ubiquity of pottery rather than on methodically studied lithic sets, which was the primary type of material culture that was employed by the two.

Problem Statement

The main purpose of this work is to put to the test each of the major assumptions made in Rouse's model of our ancient past. Although in this task several lines of data are employed, this is done primarily through the use of two types of evidence heretofore not considered in detail in Antillean culture-historical studies. First, the analysis of the technological styles (*sensu* Lemonnier 1992, 1998) observed in the operational sequences involved in the production of lithic artifacts in the island through time; and, second, the evaluation of an inventory of more than 500 radiocarbon dates recovered from Puerto Rico after Rouse's initial construction of his framework. Through the detailed study of the particular raw materials used for lithic tool production through time in Puerto Rico and the analysis of the technological templates observed

in the manufacture of more than 8000 stone artifacts from several sites from the island, I will provide a revamped perspective regarding the ways in which the precolonial peoples of Puerto Rico interacted and negotiated their identities and how these engagements articulated the cultural landscape of the island through time.

A guiding premise in this study is the conservative nature of lithic traditions whose production protocols seem to be more stable than those observed in the manufacture of other items of material culture such as ceramics, as has been repeatedly argued for the West Indies (Bartone and Crock 1993; Crock and Bartone 1998; Rodríguez Ramos 2005a, 2006; Walker 1980; 1997) and for other contexts as well (e.g., Parry and Kelly 1987; Ranere 1975). The continuous enactment of traditions of stoneworking has been observed even in contact situations as drastic as those between the indigenous societies of the Americas and the European colonists (Silliman 2001; see chapters in Cobb 2003). Therefore, a working hypothesis of this study is that if the pottery based sequence proposed by Rouse is correct then this will be readily reflected by the continuity of the technological traditions enacted in lithic production between the different cultural manifestations defined for the island through time. This continuity should be more clearly reflected by a temporal and spatial continuum in the operational sequences involved in the production of lithic materials within styles, the most finite category in Rouse's (1992) model, and also from one style to the next as cultural divergence within the island proceeded according to this framework.

In addition to the study of the technological traditions observed in lithic production through time, the analysis of the radiocarbon database provides a basis for evaluating other assumptions made in Rouse's scheme such as the timing of the discovery of the island and the introduction of agriculture and pottery production, the duration of the interactions between the

Pre-Arawak[1] peoples and the later newcomers, as well as the temporal succession of the pottery styles that is considered to be indicative of their phylogenetic divergence. This analysis is also used for revising the chronological spread of the different ceramic styles defined for the island. The inter-assemblage variability observed in the lithic production practices together with their patterns of reproduction and change through time derived from the analysis of the radiocarbon dates provide the basis for revisiting not only the chrono-cultural sequence of the island, but also the currently held perspectives about the lifeways and dynamics of interaction of our indigenous ancestors within Puerto Rico and with surrounding regions since their arrival.

This work uses as additional lithic-derived data other recently generated sources of information that allow me to determine with a high degree of resolution the types of interactions that were sustained and their geographic extent. In order to establish the source of some of the materials recovered from different contexts in Puerto Rico, three main lines of evidence are

[1] It should be noted that in the present work I make use of most of the names for the pottery styles established in Rouse's framework strictly for referential purposes. I use those names because I consider that this is the most useful descriptive category defined in Rouse's scheme and thus far constitutes the archaeological *lingua franca* of the Antilles. However, I want to clarify that I am not assuming by their use the phylogenetic relationships or the temporality for such styles established in Rouse's framework since these do not seem to agree with the recently generated evidence from the island, as will be clearly evident throughout this work. In the case of the cultural manifestation that Chanlatte and Narganes (1980) called "*Huecoide*" (or Agro I) and Rouse (1992) termed "Huecan Saladoid," I will refer to it as "LH" in order to avoid the preconceived notions embedded in either of those two terms. With regards to the use of the concept "Cedrosan Saladoid," it will be employed to designate those contexts where white on red pottery has been found in Puerto Rico and the Lesser Antilles. Its use does not imply that these manifestations are homogeneous across the islands or that they are derived from a single migration that came to Puerto Rico via the Lesser Antilles from northeastern South America because, as will be indicated below, the available evidence seems to indicate otherwise.

I will also use the term "Pre-Arawak" to make reference to the peoples that inhabited Puerto Rico since before the incoming of the producers of the LH and Hacienda Grande manifestations to the island. This in no way pretends to homogenize the cultural landscape of Puerto Rico before the arrival of the later immigrants because at this point we do not have a clear idea about the variability that existed in the island during those times and afterwards. This term is rather used to avoid the structural and cultural features that the term "Archaic" has traditionally imposed on our understanding of the first peoples to occupy the island, although I recognize the problems inherent in the use of a concept that is based on linguistic designations that are themselves a matter of contention. Hopefully, in the near future we can come up with a better term that addresses the horizontal and vertical variability that existed in the island and the rest of the Antilles during those times.

considered. The first consists of the petrographic analysis of several celts that I selected from four sites on the island. This study was conducted by George Harlow (Department of Earth and Planetary Sciences, American Museum of Natural History) through the use of x-ray diffraction. The evidence generated in this study, supplemented with my inspection of collections housed in different museums of Costa Rica, is particularly informative for evaluating Rouse's single-migration hypothesis and his assumption of the lack of significant contacts of the inhabitants of the island with those of other surrounding continental regions besides northeastern South America. The second consists of the trace element study conducted by Sebastiaan Knippenberg (1995, 1999a, 1999b, 1999c, 2006) through the analysis of thin sections and application of Inductively Coupled Atomic Emission Spectroscopy on flakes, celts, and *cemíes* recovered from Puerto Rico and the Lesser Antilles. The results of Knippenberg's study provide information regarding the Antillean sources of some of the raw materials that were imported to Puerto Rico for lithic production, and thus to evaluate the nature and geographic extent of the inter-societal engagements recorded through time within the insular Caribbean. The third line of evidence comes from a lithic sourcing study that we conducted in different parts of Puerto Rico, which allowed us to locate some the main sources of economically important rocks employed in the production of stone implements in the island (Rodríguez Ramos et al. 2007; Walker et al. 2001).

In addition to these sourcing studies, I will make use of the important evidence recovered from the starch grain analyses conducted by Jaime Pagán Jiménez (2003, 2005, 2006a, 2006b; Pagán Jiménez et al. 2005; Pagán Jiménez and Oliver 2007; Pagán Jiménez and Rodríguez Ramos 2007) on stone tools unearthed from a substantial number of the sites included in this study. Pagán Jiménez's studies have provided the first direct evidence in the island of the processing of imported cultigens as well as endemic plants, thus eliciting culinary practices and

phytocultural interactions that were previously unknown in Antillean archaeology. This evidence is supplemented with the experimental work that I conducted on edge-ground cobbles, which is one of the most ubiquitous and long-lived artifact types in the precolonial history of the island (Rodríguez Ramos 2005b). Both of these lines of evidence will be used to address issues such as: the origins of agriculture in Puerto Rico; the possible areas of provenience of the botanical and culinary repertoires recorded in the island; and, the implications that the presence of such vegetative complexes have on our current notions about the lifeways and dynamics of interactions of its cultivators as well as of their anthropogenic alterations of the landscape of the island through time.

Although it may seem like a straw-man approach to be evaluating a model that was conceived more than half a century ago, I consider this task to be of utmost importance because this framework is still being reproduced in the major works recently published about the archaeology of Puerto Rico and the Antilles almost exactly as Rouse originally proposed it. As indicated by Petersen et al. (2004:21):

> The archaeological taxonomy and classification system used by most Caribbeanists to define and characterize archaeological temporal periods and cultures was developed through the central role and contributions of Irving Rouse. Rouse alone and Rouse with various students and other important collaborators such as José Cruxent, among others, has set the agenda and framed much of the discussion of regional research over the past 60 years. Any discussion of the Late Ceramic Age owes much to his research and publications.

Interestingly, aside from the early efforts of scholars such as Chanlatte and Narganes (1980, 1990) and Veloz Maggiolo (1980, 1984, 2001), among others, there have been few, if any, clear attempts to critically evaluate the main assumptions embedded in Rouse's chrono-cultural model with the use of the data that has been recently generated in Puerto Rico and the rest of the Antilles. As a result "the central nature of Rouse's contributions has been borne out time and time again" (Petersen et al. 2004:21) and thus "Rouse's work still provides the culture

historical framework within which new explanatory models are being developed" (Roosevelt and Siegel 2007:236). The fact that Puerto Rico served as the central location where Rouse's cultural chronology of the insular Caribbean was erected makes evident that this revision of the archaeology of the island is long overdue as it might have implications for that of the rest of the Greater and Lesser Antilles as well.

Particularly for me, as someone who assumes this to be part of my historical heritage, providing an accurate perspective of our ancient past is a critical endeavor when considering that such past was omitted in my education and continues to be mostly absent in the historical perspective that is still being reproduced and transmitted to the people of the island (e.g., Reyna Pérez [El Nuevo Día, 30 January 2007]). Furthermore, as will be noted in this work, the ancient past of Puerto Rico is full of evidence for historical intersections with the peoples from surrounding Antillean and extra-Antillean areas, particularly with what Hoopes and Fonseca (2003) called the Isthmo-Colombian area (which includes the modern territories of Colombia, Panama, and Costa Rica), whose precolonial histories were glued with ours through millennia by the Caribbeanscape. Thus, this dissertation also aims to serve as an initial step to overturn the "politics of segregation" (Rodríguez Ramos and Curet 2006:2; see also Sued Badillo 1992) embedded in the culture-area studies that have segmented our shared precolonial histories, which as an end result have led to the marginalization of the Antilles from historical processes that cross-cut such geo-cultural constructs.

Study Overview

The theoretical orientation taken in this work is discussed in Chapter 2. I start by providing an overview of the culture-historical approach advocated in Rouse's framework. I then outline the perspective followed in this work, which deviates markedly from the traditional culture-history particularly because of its dissociation from the essentialist and normative

metaphysic within which previous culture-historical studies were framed in the Antilles and elsewhere. This perspective emphasizes the non-linearity of historical trajectories and how such trajectories are actively shaped through socio-cultural processes operating at distinct, although mutually influential, scales.

This perspective also provides an active role to objects in identity building and social negotiation, in contrast to previous culture-historical approaches that envisioned artifacts as passive reflections of the norms of their producers. This approach also emphasizes the technological protocols involved in production of material culture, which reflect not only the enactment of traditions but also the tacit negotiations established with the raw materials used for its production as well as the social relations that promote its manufacture, circulation, and consumption. In Chapter 3, I provide an explanation of the technological approach hereby implemented for the study of the operational sequences followed in lithic manufacture and the methods involved in its implementation. This Chapter also describes the creation of the inventory of radiocarbon dates that serve as the chronological foundation of this study. Then, the sites from which the materials were obtained are described in order to contextualize the data produced in this work.

Chapters 4 through 6 are aimed at evaluating the different assumptions embedded in Rouse's model. This discussion is segmented, rather than by pottery changes as done in Rouse's model, by what I consider to be the major developments in the precolonial history of Puerto Rico and its relation to that of surrounding areas. Chapter 4 delves into the processes related to the first long-distance maritime dispersals registered since the initial peopling of the Americas, which are the ones that took place across the Caribbean Sea that resulted in the discovery of Puerto Rico. This chapter pays particular attention to the premises involved in Rouse's

characterization of our earliest ancestors as being hunting-gatherers, which constitutes the basis of the antecedent conditions assumed in his model for the articulation of the later mono-cultural landscape of the island. In this regard, Chapter 4 deals with important events in the history of Puerto Rico such as the timing of the arrival of these groups and their initial alterations to the landscape of the island, as well as to the origins of agriculture and pottery production. This Chapter closes by dealing with the implications that the recently generated data from Puerto Rico have for issues occurring at a much larger scale, particularly the maritime dispersal of early botanical complexes in the Neotropics.

Chapter 5 evaluates Rouse's premise that there was a single migration of pottery-making agriculturalists to the Antilles. Particularly, I will provide a lithic perspective to what Oliver (1999) termed the "La Hueca Problem." This issue has been one of the most hotly debated problems in Antillean archaeology in the past decades. It centers on whether a cultural manifestation found in Puerto Rico by Chanlatte and Narganes (1980) that they termed the *Huecoide* represents an independent migration to Puerto Rico as they suggest, or simply an intra-Antillean cultural divergence of the Cedrosan Saladoid as proposed by Rouse, who named it the Huecan Saladoid. With the use of the analysis conducted on the lithic collections recovered from the two major sites where this cultural manifestation has been found, La Hueca-Sorcé and Punta Candelero, I put those perspectives to the test. Although Chapter 5 focuses primarily on data from Puerto Rico, it also incorporates evidence from the rest of the Antilles and surrounding continents, as it is evident that this issue will not be solved until the scope of possible interactions of the producers of the LH and Hacienda Grande complexes of Puerto Rico is opened to other Circum-Caribbean regions, particularly the Isthmo-Colombian area. As will be shown in the last part of this Chapter, the movement of these peoples to Puerto Rico and other

islands and their interaction dynamics once they arrived were related to much wider processes which united people from Guatemala to Colombia, and possibly other regions as well.

According to Rouse, the next major cultural event in the archaeology of Puerto Rico and the rest of the Greater Antilles was constituted by the rise of the Ostionoid series at around A.D. 600. However, in this work I consider that it was at least a century before that that some of the major changes in the societies that inhabited Puerto Rico began to be observed. This period, which is the focus of Chapter 6, comprises a time when communities that were previously highly integrated begin to fission and, in conjunction, new types of interactions begin to be registered or intensified and new identities begin to be forged within the island. In dealing with this period, I emphasize the changes in the patterns of raw material selection and distribution, the shifts that are observed in the protocols involved in their transformation into tools, and how these reflect different patterns of interaction within the island and with surrounding regions. As will be shown at the end of this chapter, the changes observed in Puerto Rico during this period have much to do with those noted in the rest of the Antilles as well as with those documented in the Isthmo-Colombian area.

Chapter 7 concludes this dissertation by providing an explanation of the implications of the data hereby presented at the scales of Puerto Rico, the Antilles, and the Greater Caribbean. For the case of Puerto Rico, the evidence compiled in this work is used to provide a new chrono-cultural sequence for the island. For the Antilles, I propose a reticulate model in opposition to the phylogenetic framework that is still dominant in Antillean archaeology. For the Greater Caribbean, I briefly explore the implications that the evidence recovered from Puerto Rico and the rest of the Antilles has for other surrounding continental areas and propose the consideration of the Greater Caribbean as a geohistorical area of study. I conclude the dissertation with some

final thoughts regarding the impact of the evidence presented in this work in our imagery of the precolonial history of Puerto Rico.

CHAPTER 2
THEORETICAL ORIENTATION

This study is clearly framed from a materialist-based historical perspective. Although this may seem a retrodiction to the middle part of the last century, the importance of materiality (e.g., Brumfiel 2003; Holtorf 2002) and of a historical approach to archaeology (e.g., Cobb 2000; Pauketat 2001) and anthropology in general (e.g., Jones 1997; Roseburry 1989) has been reemerging with a new energy in the past decades. This perspective, however, is markedly different from the brand of culture-history that has been dominant in Antillean archaeology, which is based on a normative metaphysic. In this chapter, I will start by describing the framework that has dominated culture-historical studies in the insular Caribbean for more than half a century, as proposed by Rouse (1992). I then provide a discussion about this revamped brand of culture-history, which emphasizes: the importance of social negotiations for the articulation of traditions; the active role of material culture in social relations; the significance of inter-societal interactions for the configuration of cultural and social landscapes; and, the multiple mutually constituting scales in which such interactions and social negotiations take place.

Rousean Culture-Historical Systematics: An Overview

Irving Rouse has been widely recognized as one of the leading figures in the development of culture-historical archaeology in the United States (e.g., Lyman and O'Brien 2004; Willey and Sabloff 1978). In developing his spatio-temporal framework for the island, his initial source of inspiration came from his studies conducted as part of the *Scientific Survey of Porto Rico and the Virgin Islands* (Rouse 1952). Although Rouse's (1940:49) first impression of Antillean ceramics was that "It now seems more likely that pottery-making in the West Indies had a multiple origin, from both North and South America, rather than a single origin from the latter continent," a

decade later in his extensive publication of the results of his work on Puerto Rico he presented a markedly different perspective (Rouse 1952). Based on his analyses, Rouse concluded that there was a continuum of ceramic modes between the different pottery styles of the islands, which he interpreted as reflecting only one migration of pottery makers to the Antilles. Rouse traced the origins of this population movement to the mouth of the Orinoco, whence these people supposedly spread northward through the Lesser Antilles into Puerto Rico and eventually into the rest of the Greater Antilles. Since its original construction, Rouse's model has become the most widely used chrono-cultural framework in Caribbean archaeology.

The hierarchical chronological scheme devised by Rouse has gone through a considerable number of changes through the years. However, its initial culture-historical sequence has remained unaltered since the 1950s, as the modifications brought to it have been more in the character of fragmenting than in revising it. This model is primarily based on the normative notion that the "patterning observed in the archaeological record is a result of the shared ideas and values of a group of people" (Binford 1977:30). These cultural norms are reflected in the material culture produced by those groups (lithics in the Lithic and Archaic Ages and ceramics in the Ceramic Age) and can be traced by plotting the attributes (modes and dimensions) of the artifacts in the different islands. This model also assumes that the variability in material culture in different areas is a result of divergent evolution and cultural branching.

Rouse's initial work was aimed at tracing, not explaining, migratory processes and the geographic and temporal distributions of the different peoples and cultures in the Caribbean. Rouse (1990:59; Figure 2-1) summarized his method and its intentions in the following fashion:

> I form styles or complexes of pottery and other artifacts, each of which is indicative of a single people and culture, and plot their distribution on chronological charts in order to determine their units in time as well as in space. Then I group the styles into series and, following the lead of the late Gary Vescelius, have begun to divide the latter into subseries.

I plot the series and subseries on my charts in an effort to distinguish the successive waves of peoples that have engulfed the Antilles during the Lithic, Archaic and Ceramic Ages.

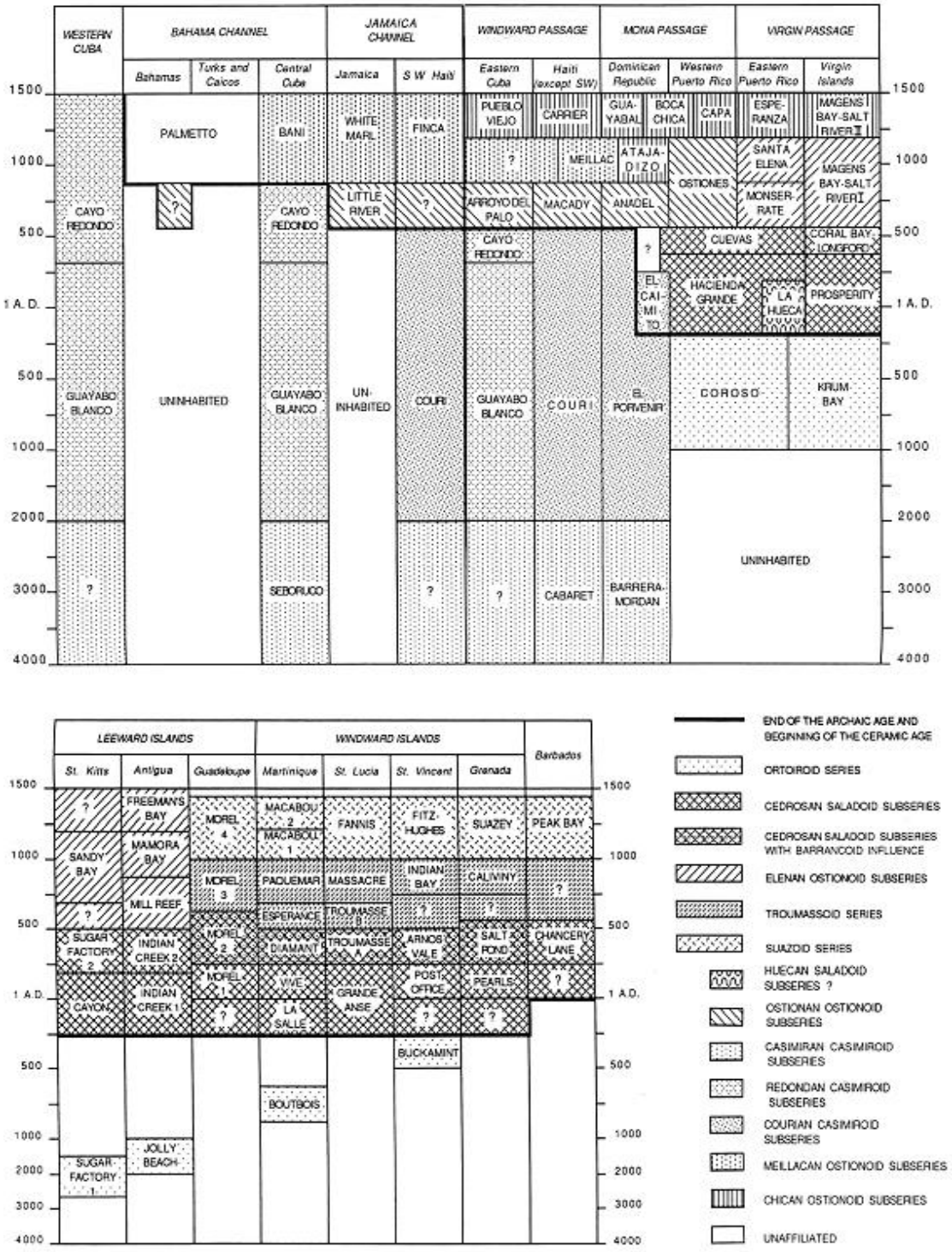

Figure 2-1. Rouse's chrono-cultural framework for the Antilles. (After Figures 14 and 15 in Rouse 1992:52-53).

Rouse's framework imported Willey and Phillips' (1958) Four Age system as its most inclusive category. This system is comprised by the Lithic, Archaic, Ceramic, and Historic Ages in the Caribbean. For the pre-Ceramic Ages, Rouse (1992) affixes the sole production of flaked stone tools to delimit the boundaries of the Lithic Age, while the introduction of the manufacture and use of pecked and ground materials and the production of shell artifacts are the defining criteria of the Archaic Age. The Lithic, Archaic, and Ceramic Ages are then subdivided into series (Ortoiroid, Saladoid, and Ostionoid for Puerto Rico), a concept that not only presupposes parallel lines of development but also a singular point of emergence. An "oid" is added as a suffix to the name of the melting pot area or site to denote a series. For instance, the term Saladoid defines the series developed in the Saladero site of the middle Orinoco River Valley region of Venezuela. Series are further divided into subseries, which are "an intermediate hierarchical level between the local peoples and cultures and the series to which they belong." (Curet 1992:43). These subseries, which use the "an" suffix, are fragmented into styles which represent the local lines of development and diversification of peoples and cultures as seen in the modal distributions of the different ceramic and stone tool inventories of Ceramic and Archaic groups respectively. Styles are labeled using the name of the site in which they were first discovered. For Rouse (1990:59) styles or complexes are equivalent to "cultures."

The time spans of these styles are then grouped in general periods (I, II, III and IV) based on those trends evidenced in ceramic and lithic repertoires and their distribution. The temporality of these periods was built on the basis of the then available sample of radiocarbon dates from the different islands of the Antilles. As explained by Rouse (1992:106):

> Periods Ia and Ib are pre-ceramic. Period IIa is the time when painted pottery was dominant; and Period IIb, the time when it was going out of fashion. Period IIIa is that of the newly found plain pottery. The later modeled-incised ware began during Period IIIb and reached its climax in Period IVa. Period IVb is historic.

One of the most understated but chief assumptions embedded in Rouse's model is his merging of culture and society into a single domain, considering that these changed concomitantly along a unilinear temporal vector. Rouse (1992:33) indicated that: "A parallel social development from bands in the Lithic and Archaic ages through villages in the Ceramic age to chiefdoms in the Formative age is also inferred from the remains."

In his later works, Rouse (1989) also incorporated into his model inter-cultural contact zones, which he labeled frontiers. For instance, Rouse argued that the Late Archaic/Cedrosan Saladoid frontier was established in eastern Hispaniola around A.D. 250 (Frontier 3 in Rouse's framework). However, the Cedrosans eventually "succeeded in *colonizing* the eastern tip of Hispaniola" (Rouse 1992:92; emphasis mine) and, after they developed around A.D. 600 into the Ostionoid series in Puerto Rico and the eastern portion of the Dominican Republic, they continued their expansion to the west by displacing the Archaic peoples to the most recondite areas of Haiti and western Cuba (Rouse 1992:96). Soon after, this Ostionoid expansion reached Jamaica (around A.D. 650), the Bahamas, and Cuba (around A.D. 800).

In what I consider to be one of Rouse's (1951, 1992) most important contributions, he acknowledged the fact that islands are not secluded contexts where cultures evolve without external influence from other islands. Rather, he understood that the cultures found in areas of two islands that face each other may have had more relations than those located at opposing ends of one island (Watters and Rouse 1989). Rouse argues that this is due to the seaward orientation of movement of these peoples. Within this scope, he defined several geo-cultural spaces that evidence these processes of interaction, which he called passage areas. Rouse considered that these developed at the onset of the Ostionoid series. For Puerto Rico he defined the Vieques passage area, which includes the eastern part of Puerto Rico, Vieques, Culebra, and the US

Virgin Islands, while the other extreme of the island is associated to the Mona passage area, which includes western Puerto Rico, Mona Island, and the eastern portion of the Dominican Republic.

Although Rouse acknowledged interactions between neighboring islands, he argued that the Antillean chain was an area whose "cultures" developed within the islands with little or no interactions with surrounding continental regions except for northeastern South America which for him formed a single cultural unit with the insular Caribbean. Although earlier frameworks had considered the Antilles to be a distinct culture area (Holmes 1914; Wissler 1916), Rouse (1960b:6; 1962:36) defined the Caribbean Area as being comprised of "the region lying east of Mesoamerica and the Intermediate area, north of Amazonia, and southeast of the United States, that is, to central and northeastern Venezuela, the adjacent part of British Guiana, and the West Indies." Rouse's definition of the "Caribbean" as a culture area has been the one most widely accepted in Antillean archaeology (e.g., Allaire 1999:674; Boomert 2000:3) and elsewhere (e.g., Willey 1971). This geocultural construct has been highly influential in Antillean archaeology because it not only served to underline the Orinocan origin of Antillean populations but also to alienate the islands from other surrounding continental regions (e.g., Rouse 1953). As a result, it has led to interpretations such as that the subsistence practices of the people that moved into the Antilles represented a "transference to insular settings of a tropical forest economy from South America" (Petersen 1997:124), while their ideological system was supposedly derived from the "modern and ancient lowland South American mythic symbolism" (Roe 1995:157; see also Alegría 1978; Boomert 1987, 2000; Siegel 1992).

The application of Rouse's model to the archaeological record of Puerto Rico (Figure 2-2) is particularly important because it was here where he articulated his original sequence, which

was then projected onto the Greater and Lesser Antilles. According to Rouse's (1992) latest scheme, the succession of cultural complexes of Puerto Rico starts around 1000 B.C. when the first wave of migrants, grouped within the Coroso culture of the Corosan Ortoiroid subseries of the Archaic Age, reached the island. Around 400 B.C., Cedrosan Saladoid peoples arrived in Puerto Rico from the Lesser Antilles and quickly eliminated, acculturated, or displaced west its previous Archaic inhabitants. As previously noted, these peoples, whose earliest style of pottery was named Hacienda Grande, were presumably the ones that introduced ceramics and agriculture to Puerto Rico and the rest of the Antilles.

Table 2-1. Rousean chrono-cultural sequence for Puerto Rico.*

<table>
<tr><th rowspan="2">Date</th><th rowspan="2">Period</th><th rowspan="2">Series</th><th colspan="2" rowspan="2">Subseries</th><th colspan="2">Complex/Style</th></tr>
<tr><th>West</th><th>East</th></tr>
<tr><td>A.D. 1200-
A.D.1500</td><td>IVa</td><td rowspan="3">Ostionoid</td><td colspan="2">Chican</td><td>Boca
Chica/Capá</td><td>Esperanza</td></tr>
<tr><td>A.D. 900-
A.D.1200</td><td>IIIb</td><td>Ostionan
WEST</td><td>Elenan
EAST</td><td>Late
(Modified)</td><td>Santa Elena</td></tr>
<tr><td>A.D. 600-
A.D. 900</td><td>IIIa</td><td colspan="2"></td><td>Early
(Pure)</td><td>Monserrate</td></tr>
<tr><td>A.D. 400-
A.D.600</td><td>IIb</td><td rowspan="3">Saladoid</td><td colspan="2" rowspan="3">Cedrosan</td><td colspan="2">Cuevas</td></tr>
<tr><td>400 B.C.-
A.D. 200</td><td rowspan="2">IIa</td><td rowspan="2">Hacienda
Grande</td><td rowspan="2">Hacienda
Grande/
La Hueca
(LH)</td></tr>
<tr><td>400 B.C. –
A.D.400</td></tr>
<tr><td>1000 B.C.-
400 B.C.</td><td>I</td><td>Ortoiroid</td><td colspan="2">Corosan</td><td colspan="2">Coroso</td></tr>
</table>

*Source: Rouse (1992:52).

The finding of a cultural manifestation in eastern Puerto Rico and Vieques named the *Huecoide* by Chanlatte and Narganes (1980), led Rouse to postulate the presence of a Huecan Saladoid subseries. The Huecans were also supposedly eliminated or driven east by the Hacienda Grande people, who continued to operate in ethnic isolation during its latest phase, developing the Cuevas style of pottery around A.D. 400. This style lasted between A.D. 400 and 600 until the development of what Rouse termed the Ostionoid series, reflected by the diversification of

the Cuevas in the eastern portion of the island into the Monserrate style of the Elenan Ostionoid subseries and in the west into the Pure Ostiones style of the Ostionan Ostionoid subseries. Around A.D. 900, the Monserrate changed into the Santa Elena style and around that same date, the Pure Ostiones transformed into the Modified Ostiones. By A.D. 1200 both the Elenan and the Ostionan Ostionoid subseries developed into the Chican Ostionoid subseries, which has been associated with the rise of the Taíno culture on the island. The development of this subseries is reflected by the change of the Santa Elena style into the Esperanza style in Eastern Puerto Rico and of the Modified Ostiones into the Capá style in the west.

As will be demonstrated in this work, neither the phylogenetic relationships outlined in this model nor the temporality involved in its assumed cultural and social changes are supported with the recently generated data from Puerto Rico and elsewhere in the Antilles, which indicate a much more complex precolonial landscape than previously assumed. In the following section, I will outline the theoretical approach that guides this work to make sense out of such socio-cultural complexity and to develop a perspective that better accounts for the evidence of our pre-Columbian culture-history.

Culture-History: Toward an Updated Approach

From Shared Norms to Contested Actions

In this dissertation, one of the main concerns will be to move away from the normative perspective about "cultures" that is ingrained in traditional culture-historical studies, such as that advocated by Rouse. For Rouse (1992) "cultures" were envisioned as bounded entities composed of the sum of the shared package of cultural traits. These traits were culturally transmitted in the form of ideal norms or mental templates, which governed the behaviors involved in the production of material culture. These shared norms, reflected in the reproduction of particular artifact attributes (i.e., modes), are thus the ones that are traced in order to determine

the spatio-temporal distribution of particular "cultures." These "cultures" are very conservative, changing very slowly in response to processes such as diffusion or, in more drastic cases, migrations. It is of these spatially and temporally circumscribed "cultures" that the squares that diagram the culture-historical sequence of the islands are composed.

However, in the present work cultures are considered to be constituted of the cumulative outcome of the contested actions of individuals and social factions (Marquardt 1992; Pauketat 2003). So, instead of being unified entities that lump whole populations into internally undifferentiated categories, these are envisioned as mosaics of practices that express themselves materially through the constant act of social performance. These are dynamic, constantly being influenced and influencing ecological, politic-economic, and ideological processes, and thus are always in the state of becoming or emerging (Cobb 2000; Wolf 1984). In this sense, people do not simply operate robotically reproducing or aiming to adjust to the norms imposed by their cultures and societies, but are rather actively engaged in defining, at least partially, the conditions of their existence within their particular contexts of social interaction. This does not mean that social actors and collectivities are not constrained by a specific set of social, cultural, and natural parameters but rather that these parameters are actively created and transformed through the negotiation of the cultural rules that promote their reproduction in the social arena of daily practices (Pauketat 2001).

One of the most ingrained assumptions in Rousean culture-history is its focus on elaborated artifacts for the definition of "cultures," which in most cases were probably related to the elite and/or to their use in special activities. This usually results in the marginalization from the definition of "cultures" the products of the every-day and of the common people (Cobb 2000; Kepecs 1997). In Rouse's model, this is particularly evident when focusing on decorated

pottery, which is a type of artifact that, in addition of providing a gender-biased perspective, results in the creation of "cultures" on the basis of material elements that usually constitute less than 10 percent of the ceramic assemblages recovered from most sites in the Antilles (Keegan 2004:39, citing Petersen and Watters 1995). This focus on the elaborated things and practices obviously recreates the discourses on the definition of "culture" that have formed part of the creation of institutionalized narratives of identity in nations, which are particularly problematic when applied to precolonial entities whose identities might have been built using markedly different parameters, as is observed in non-Western cultures today (Jones 1997). Furthermore, this perspective makes invisible the construction of "cultures" through the contributions of particular sets of social actors, particularly the ordinary people (Kepecs 1997). In opposition to this, the present work will provide particular (albeit by no means exclusive) attention to heretofore unconsidered elements of material culture that are as important in cultural formation as decorated pottery, particularly the dynamics involved in the production of utilitarian lithic materials associated to daily practices of both men and women.

Another major deviation in this work from the Rousean perspective is related to his assumption that norms are homogeneously reflected in time and space within a "culture," as reflected in the squares that form the basis of his diagrams (Rouse 1986:7). Furthermore, Rouse's model assumed that the people that shared a pottery-defined "culture" for some reason went through similar historical trajectories and that because of that, cultural changes occurred at the same time within an island and across the Antilles. However, it is considered here that identities are fluid, contested, and contingent on history and context (Gosden 2005) and that cultural plurality is the rule rather than the exception at any point in time (Lightfoot et al. 1998; Wilson 1999). As will be shown during the course of this work, this is the case of Puerto Rico

where there is a significant social and cultural horizontal variability observed through time, and where different historical trajectories were taken even by people who produced the same pottery styles. Unfortunately, thus far, such cultural, social, and historical pluralities have been eclipsed by lumping the remains of our ancestors into essentialist cultural categories such as those depicted in Rouse's culture-historical framework.

From Passive Things to Active Objects

If there is one thing that this dissertation shares with Rouse's approach it is a focus on materiality as the main source of information for envisioning precolonial historical processes. However, the approach to materiality advocated here is quite different from Rouse's. As previously noted, in a traditional Rousean perspective artifacts are indexes of culture that reflect the shared norms of their producers. These norms are represented in the modes imprinted in the finished artifacts. Therefore, the modes (in the case of pottery) and/or the finished artifacts (in the rest of material culture) are considered to be passive reflectors of the cultural templates that govern the objectification of ideas into the material domain.

However, the approach advocated here envisions artifacts as material representations of negotiated actions "which are continually created but also continually act back on their creators, users and perceivers to maintain or to disrupt culturally defined boundaries within and between social groups" (Watson 1995:688; see also Dobres and Robb 2005:161). Therefore, these are not only passive reflections of cultural norms or social behaviors but are also actively engaged in shaping ethnic and/or social identities (e.g., Gosden 2005) while, in other cases, they are used as emblems of resistance (e.g., Johnson 1999; Silliman 2004) or to legitimate the asymmetry of power relations (e.g., Helms 1987). This does not mean to imply that "traditions of doing" do not exist, but that these are the outcome of negotiations and that their reproduction does not

constitute an *ad hoc* process but a choice that is exercised within the structural confines of culture, society, and the environment (Dobres 2000; Pauketat 2001).

It is particularly on these choices that the approach advocated here underlines (Lemonier 1992). Instead of focusing on the types of end products as *fossil directeurs* as in traditional culture-historical approaches, the present study will consider what Appadurai (1986) labeled the "cultural biographies" the material undergoes in its transformation from the natural to the social and cultural domains. This perspective considers that there is a web of material, social, and symbolic significations and social relations embedded in the different choices taken to produce, circulate, and consume an artifact that reflect much more than the utilitarian nature of their intended function (Edmonds 1995; see also Mauss 1990). For instance, as will be shown in this work during some periods the color of the raw material used in the production of a celt played as significant a role in its selection as the mechanical properties of the raw material employed in its manufacture. In other cases, the format of extraction of a flake from a core also served to reify identities in addition to have served to produce objective pieces to be employed in particular tasks. Therefore, artifacts are not only indicative of cultural affiliation as assumed in traditional culture-history but are also actively engaged in the dynamics that form the basis of social action (Gosden and Marshall 1999).

These "things" not only include artifacts but also entail the landscapes of action (Johnson 1999). The history of the environment in which those societies sustained themselves is of marked importance as, rather than being merely a constraint over the operation of these societies as has been commonly assumed in the biogeographic perspectives applied in the Caribbean (e.g., Davis 1988; Goodwin 1979), it was a humanized object (Pfefferberger 1988) manipulated by them for their own advantage. This does not preclude the fact that environments do in fact place a key set

of constraints over people, but an emphasis is also put in trying to address the choices that people made to circumvent such constraints. As will be shown in this work, the landscape of some areas of Puerto Rico was transformed into an artifact since the discovery of the island and such built environments were reproduced and constituted a marked foundation for claiming the ancestry of place in late precolonial societies.

When viewed diachronically, these objects and the practices that led to their production embody narratives of cultural and social performances whose cumulative outcome constitutes the thread of history (Brumfiel 1992). The analysis of these things and their role on the societies that produced and reproduced them cannot be envisioned in isolation. In the next section, I stress the importance of understanding the dynamics of interaction in which these artifacts were involved, not only within particular communities, but also with those that inhabit the island and surrounding regions.

From "Cultures" in Isolation to People in Interaction

In contrast to Rouse's approach, which considered cultures as bounded entities, this dissertation will underline the "rough edges" (Duany 2005) of culture and how interactions at different levels helped to shape the pre-Columbian cultural landscapes of the island through time. It is assumed here that no culture is an island but rather that these are actually the product of interaction, both internal and external. It further is considered here that "cultures" do not interact as assumed by Rouse, but that people do. This does not mean that these interactions are not culturally mediated, but that there are not preordained parameters of interacting based simply on the fact that the people produced the same pottery style. Therefore, the ways that individuals or social factions interact is highly variable within cultures and even within communities. In fact, it is in the negotiations of ways of enacting and interacting that cultures are built, reproduced, and redefined, which results in the aforementioned diverse historical trajectories.

In contrast to previous approaches to socio-cultural engagements in the Antilles, the present work will be framed within what Shortman and Urban (1998) termed the "interaction paradigm," which provides a more historically situated perspective to the ways in which distinct communities and peoples interact at different levels and scales and on the effects that these engagements have on socio-cultural change in each of them. In this framework, it is considered that interactions between societies are the rule rather than the exception, and these have a vital place in their reproduction, evolution, and/or collapse. Although it stresses the importance of endogenous processes, it also assumes that it is impossible to understand a society without considering the ways in which its relationships with other groups are framed and provides careful attention to the effects that the external inputs resulting from such socio-cultural entanglements have on the different peoples under interaction.

Materiality leads to ways in which to explore these interactions. The material correlates for such engagements are derived from evidence such as the sourcing of the extraneous materials found at archaeological sites, their stylistic affiliations, and the specific archaeological contexts in which these were recovered, among other elements. However, in contrast to previous approaches to cross-cultural interaction (e.g., Rogers 1990), it is considered that the amount of materials at a site is not necessarily indicative of the magnitude and the directionality of the interactions that were sustained by its inhabitants because, in many cases, perishable products and information were the two main elements that were being transacted, thus indicating that the evidence will most commonly present an understated perspective of the intensity of such social engagements (e.g., Helms 1987; Lathrap 1973; Mauss 1990). Furthermore, as noted by Lightfoot (1995:200), we cannot use a single index (e.g., material ratios and frequencies) to determine the character, magnitude, or the directionality of interactions, but rather we need to

consider a variety of indicators in order to gain a better perspective of such contact situations. For instance, importance needs to be placed on processes of innovation, the scales of mutual transformations, the integration of extraneous symbols and ideologies in cultural traditions, and how such processes are expressed in material culture and in the articulation of landscapes. It is also stressed that the products that were being circulated might have acquired different meanings in the particular locations in which these were moved, and thus that particular attention needs to be paid to their association to other items that formed part of their contexts of production, distribution, and consumption (Gosden and Marshall 1999).

In Rouse's model, the lowest scale in which interactions takes place is at the level of cultures and the outcome of these interactions is usually portrayed as being directed by the social stage of development of the parts involved. For instance, this is the case in his approach to the interactions between the "foraging" Archaic people and the Cedrosan "villagers." Although Rouse acknowledges that some elements of Archaic peoples were incorporated into the ceramic-producing horticulturalists, particularly noted in ceramic decorations in the Dominican Republic and Haiti derived from Archaic stonework, this is remitted simply to a process of "trait borrowing," although eventually the former was eventually acculturated into (or "colonized" by) the Cedrosan society or pushed away from their homelands.

These unidirectional types of relationships between people of different "levels" of social development is assumed when the term "colonization" is used to describe such types of inter-societal interactions. Rouse (1992:176) defined colonization as the "replacement of the people in one part of a local area by a foreign people - a cultural process." However, ethnographic (e.g., Headland and Reid 1989; Smith 1998) and archaeological (e.g., Wadley 1996; Zvelebil 2006) evidence has suggested that there are many ways in which people of diverse social practices

interact and that the level of social complexity (if such a thing exists) does not dictate the outcome of their interactions. The entanglement in Rouse's model of culture and society and the temporalization and characterization of peoples' lifeways and interaction dynamics based on their supposed stage of development are aspects that have limited our understanding of the myriad of scenarios that might have been possible in precolonial contact situations in the Antilles and elsewhere, such as the ones that will be discussed in the present work.

In contrast to the typological types of interactions assumed by Rouse, it is considered here that people within the same culture or even within communities are involved in different levels of interaction that are highly variable in time and space. Therefore, when different people come into contact, there is a repertoire of choices that they have at their disposal which promote the development of alternative strategies for circumventing the impacts of such interactions (Gosden 2004). These choices entail the ability of agents and human collectivities to act intentionally in particular forms given the range of alternative ways of performing within their social, biological, and environmental possibilities. These new sets of choices are exercised for instance by establishing new trade networks or by controlling the access to particular sources of economically important materials. These choices can also entail acts of ideological accommodation and resistance by maintaining traditional practices in their cultural repertoires (e.g., lithic production, culinary traditions; Silliman 2001), as for instance will be shown here in the interactions between the Pre-Arawak peoples of Puerto Rico and the later immigrants to the island.

A recently postulated perspective known as colonialism will guide the present work (Gosden 2004; Silliman 2005). In this perspective, material culture plays a pivotal role in the definition of such relationships. It considers that power and its related material representations

are expressed in the material culture and that the circulation of symbols, ideas, and practices has an ideological as well as an economic effect on both incomers/outsiders and residents/locals. In this approach, the power relationships are determined by the dynamics in which the particular commodity or idea impacts the ways that social relations are established and reproduced in the networks articulated between individuals and/or social aggregates under interaction. Rather than focusing strictly on the use value of the transacted commodities, this approach places special emphasis on the ideological value of these elements of material culture (Appadurai 1986). The equivalences of these values are not static, but are rather variable through time and are dependent on the context of their negotiation.

According to Brumfiel (1992:551), this process of social negotiation "consists of conflicts and compromises among people with different problems and possibilities by virtue of their membership in different alliance networks." The fact that these alliances are defined at different levels (e.g., community, gender, age, faction) indicates that there is a multiplicity of scales in which these negotiations take place at any point in time. Due to the fact that these interactions might take shape in different ways and might affect different individuals and/or human collectivities in various fashions, the approach advocated here for the outcome of these negotiations is non-directional in nature. The chaotic nature of social relations results in a notion of history that is the cumulative outcome of, not only the structural and cultural constraints imposed on social agents, but also of the ways in which these agents manipulate and/or transform such structures in different contexts and scales which recursively constitute each other, as will be discussed in the next section.

From the Micro to the Macro and Vise Versa: Toward a Multiscalar Perspective

The aforementioned interactions take place in different, albeit mutually influential, scales. Unfortunately, in many cases the nature of these interactions has not been observed in detail in

the Antilles because of the application of Rouse's model which was designed to treat macro-scalar processes, such as migration, at wide geographic scales (Curet 2003, 2005; Keegan 2004; Rodríguez Ramos et al. 2008b). It is because of this that social and cultural processes that occur below the scale of Rouse's "cultures" have usually been unacknowledged or misinterpreted. This is particularly problematic when, in Rouse's model, a single style is present at any geographic location at a time, thus disregarding the importance of horizontal cultural and social plurality as an important element in the articulation of such interactions. As has been noted by Curet et al. (2004:60), the models that have adopted Rouse's framework "do not consider the inherent variability of social and political processes, and the mechanisms and strategies used by individuals or groups of individuals involved in changes at more localized levels." For instance, issues related to gender relations have been totally disregarded thus far in Antillean archaeology, while interactions registered at the level of the community are only beginning to be addressed in the past decade (e.g. Pagán Jiménez 2005; Siegel 1996; Torres 2001, 2005).

These issues make evident the need of dealing with these interactions from a multiscalar perspective, with the aim of trying to determine the reasons for social reproduction and change in particular contexts of action resulting from local and extra-local conditions (Nassaney and Sassaman 1995). This perspective underlines the dialectical nature of social dynamics that take place in different scales that constitute each other over the long-term. Because, as previously noted, individuals and communities operate within different but related webs of interactions, it is necessary to determine how such interactions reflect processes whose effects are derived from multiple scales of action, particularly when addressing patterns of historical reproduction and/or transformation.

In the present work, one of the aims is to defragment the spatio-temporal scales that have usually been applied to address some of issues in the archaeology of the island. The smallest scale of analysis in this study will be the community as represented by the sites. It is within communities that gender and class relationships are most clearly negotiated (Dobres 1995) while between the communities other intermediate levels of interaction such as exchange and alliance formation can be gleaned (Brumfiel 1992). Although in many cases the present study will use Rouse's category of style as a referent, the temporality of these interactions will be mostly based on the absolute chronology provided by the radiocarbon dates recovered at each of these abandoned communities (i.e., sites). The main reason for this is that not only some of the most influential types of interactions can only be observed if we use scales lower than the styles but also that none of the styles defined by Rouse adhere to his proposed temporalities, thus making evident the need to exert more chronological control to address these processes of interaction outside the chronological and spatial boundaries of the styles.

However, the community as a unit of analysis has limited utility if seen in a vacuum. As noted by Nassaney and Sassaman (1995; Sassaman 2005), there are processes affecting those communities that can only be observed if the scale of analysis is broadened to much larger spatio-temporal matrixes. Unfortunately, the blindfolds imposed by Rouse's model have limited the importance placed on processes that might have taken place at higher scales beyond what he defined as the Caribbean culture area. This is particularly evident when one takes into account the limited amount of studies that have paid careful attention to possible interactions that might have taken place between the inhabitants of the Antilles and those of surrounding continental regions beyond northeastern South America. In reaction to this, this work attempts to envisage how shifts in processes of interaction that occur at macro-regional scales affect local histories by

paying particular attention to the long-lived interactions that were sustained with the inhabitants of the Isthmo-Colombian area. As will be shown in this work, issues such as the introduction of agriculture and pottery production, the movement of shiny personal adornments, and the advent of religious routinization (*sensu* Oyuela-Caycedo 1998, 2002) noted in Puerto Rico not only reflect local events but are indicative of processes articulated within much wider interaction networks that stretched across the Caribbeanscape through millennia.

In some cases, however, the processes that take place on a macro-regional level are affected by particular events that create conditions that promote rapid cultural and/or social changes in groups that had long histories of continuity. These events might bring about changes that promote social reorganization, which as a side result may divert the influence of extra-local processes (Martin and Bawden 1996; Torrence 2002). As will be shown in this work, some of the changes that are observed in Puerto Rican archaeology might have been influenced by such events. As an example of this, I will focus on the drastic environmental event registered in Puerto Rico around A.D. 1000 that promoted marked changes in some of the communities, particularly those inhabiting the north-central part of the island.

In order to organize the myriad of historical processes that occur at the aforementioned different scales in a coherent way, a framework needs to be devised that will allow for structuring such processes in a meaningful manner. In Rouse's case, the boundaries of the periods in which the culture-history of Puerto Rico and the rest of the Antilles were divided was defined on the basis of changes in ceramic production and thus, as noted by Sued Badillo (1992:603), the history of our precolonial ancestors in such model has been "reduced to pottery decorations." However, in the present work I will resort to other forms of periodization, particularly to the framework proposed by Bentley (1996) for defining historical periods for

peoples in interaction. Within this framework, an emphasis is made in identifying periods that are historically relevant not only at a local level but also across the boundary lines of the societies and cultural regions involved in the webs of interaction under study. According to Bentley, any attempt on periodization that focuses on interaction must underline both continuities and change and to avoid the ethnocentric perspectives that have structured history in culture-area studies, which in most cases are also predicated upon events associated to the privileged sectors. The periods in which this dissertation will be segmented aim to situate as coherently and relationally as possible the multiscalar historical processes that took place in Puerto Rico, the Antilles, and the Greater Caribbean, as will be described in the next Chapters.

CHAPTER 3
THE METHOD, THE SAMPLE, THE CONTEXTS

As indicated in Chapter 1, a major objective of this study is to develop a data set that can be used to evaluate Rouse's chrono-cultural model for the island as well as to revisit some of the assumptions regarding the lifeways and dynamics of interaction of the precolonial peoples of Puerto Rico embedded in such framework. This will be accomplished primarily by analyzing the ways in which objective pieces were shaped or reduced through the employment of different manufacturing techniques, which are reflected on the negative signatures imprinted on the produced materials and their byproducts. As previously noted, the operational sequences in which these techniques are applied enact and produce technical traditions which are "simultaneously material, social, and symbolic" (Pfaffenberger 1988:236). This section will first describe the framework that guided the analysis of such technical traditions and then will outline the method developed for its application. Following this, I will present the radiocarbon database that serves as the chronological foundation of this work and will briefly describe the contexts from which the lithic samples were obtained.

Toward an Anthropological Approach to Lithic Technologies

The production of things made out of rocks is the longest-lived technological enterprise in the history of humankind. It not only served as a means for the extraction of energy from the environment but also provided a medium for the articulation of the traditions in which the operational protocols followed for the objectification of ideas into the material domain were enacted. The different people that moved into the Antilles carried some of such traditions and reproduced and reformulated them upon their arrival to the islands. Through time, with the influx of other ways of doing stone items and the endogenous reformulations of the original traditions, a myriad of ways of transforming rocks into objects were continually devised.

Unfortunately, the importance of understanding such technical traditions as important elements in the delineation of Antillean archaeology and culture-history has been overshadowed by a focus on ceramics.

In contrast, in the present work such technical traditions will take the center stage. I hereby analyze such traditions by delineating the distinct operational sequences involved in lithic production through time, from raw material selection to the manufacturing protocols by which these were transformed into "humanized" objects (Pfaffenberger 1988:244). As noted, these protocols are considered to be "social constructions which are made of choices" (Lemonnier 1989:526-527) and by studying and deciphering the choices observed in the technological formats involved in lithic production certain patterns will be exposed. The identification of the most recurrent manufacturing strategies chosen by precolonial knappers allows the characterization of the "social representations" (Lemonnier 1992:80) embedded in their technical traditions.

Culture and sociality are expressed in those choices, which begin with the acquisition of raw material either through direct or indirect procurement. This raw material is then reduced employing a series of techniques that produce diagnostic attributes in the parent mass as well as in the detached pieces that reflect, not only the constraints imposed by the raw materials, but also the tacit negotiations established by the knappers with the raw materials to deal with those limitations. The patterns reflected in those attributes are embedded in a "materially grounded arena within which social identities can be defined, expressed and mediated." (Dobres 1995:25). Therefore, by outlining the trajectories chosen by the knappers to produce their tools within those particular contexts of production and consumption one can envision the articulation of technological and/or ideological traditions and the dynamics involved in their continuous

negotiation, reproduction, and/or reformulation through time, as is the purpose of the present work.

An important aspect of this approach is its emphasis on the dynamic nature and directionality of stone tool production. It considers the life histories of stone tools as dynamic since they can change form, function, and meaning throughout their use life, as they could be either retooled, reshaped, resharpened, reused, or recontextualized depending of their life trajectories in the systemic context. For instance, a celt can be reused as a grinding stone by modifying its original morphology while it can also be retooled in order to extend its use life in its celt function by rearticulating its haft element. This is important since these artifacts can present morphologies that are the result of processes that may have obliterated their original traits, thus making difficult determining the original purpose of their production. In other cases, the mere act of recontextualizing the tool from a production to a consumption context by trade or any other mechanism may impart to it a different signification to that originally objectified in its manufacture. Therefore, the use of lithic products as illustrative of the social relations that promoted their production through the enactment of traditions can only be attained when we "unlock the choices made in regard to making and modifying them" (Dobres and Robb 2005:163) throughout their life histories. Within the present approach, this is accomplished by analyzing the end products and their contexts of recovery, as well as unaltered raw materials, discarded preforms, and all of the material produced during their manufacture.

The other important aspect is the directionality of stone tool manufacture, meaning that the size of the parent mass can only decline through the reduction-consumption-discard continuum. This aspect of lithic production is quite significant since, during the manufacturing sequence of a formal item or of extracting a single flake, the knapper needs to think ahead as each of the

reduction operations has direct implications for the ones to be taken further on. Thus, appropriate technical strategies need to be developed for reducing the parent mass not only in order to extract or produce the intended piece, but also to leave it in a condition suitable for further flake detachment, if necessary. As a result and contrary to other additive technologies such as ceramic production, raw material properties play an important, although by no means deterministic, role in the spectrum of possibilities that a knapper has for reducing a single parent mass (Pantel 1988).

Contrary to other lithic classification schemes which tend to restrict the concept of tool to retouched specimens and to collapse artifacts into formal tool categories based on presumed functions simply on the basis of their overall morphology, the technological approach advocated here emphasizes attribute states that are technologically significant irrespective of the ways that the artifacts were supposedly used. As has been stated elsewhere (Bartone and Crock 1998; de Mille 1995; Knippenberg 1995; Pantel 1988; Rodríguez Ramos 2001a, 2001b, 2006; Walker 1980, 1985), this is a rather important point in the Antilles, specially in Ceramic Age sites, where there is a generalized scarcity of retouched flaked specimens which limits the effectiveness of classification schemes based on the *function per morphology* approach for analyzing flaked materials. Moreover, many of the typologies that have been, and are still being, used for classifying flaked materials in Caribbean collections are based on continental taxonomies that allow little interpretive reach for studying the lithic artifacts produced in the islands (e.g., Febles 1988; Febles and Baena 1995; Kozlowski 1975). Fortunately, there is an increasing number of studies oriented towards establishing the operational sequences observed in lithic production in the Caribbean framed from a technological perspective that are emancipated from the typologies imported from other contexts.

Lithic Procurement Dynamics

The process of lithic production starts with the acquisition of raw materials with properties that make them appealing for their transformation into tools. These raw materials were obtained from sources that not only sported different types of rocks, but also required specific procurement dynamics in their prospection, selection, extraction, and transport. It has been a customary approach in lithic procurement studies to emphasize geologic source location, distance from the site, source extension, intra-source variability, mineralogy, and other physical properties, but rarely have the sources of raw materials been viewed from a phenomenological perspective that considers also the landscapes in which these were situated.

Understanding that lithic sources are contained within spaces imbued with meanings and where other transactions with the environment and with other people were also carried out may help relate stone acquisition to other superstructural and/or subsistence practices. For instance, calcite was mined from the exposed lenses in the interior of rock shelters and caves, which were also the contexts where the bats represented in ceramic iconography were observed as well as where the walls that served as canvasses for pictographs and petroglyphs were located. In other cases, in a trip to the coast to collect sandstones for their use as grinding slabs other activities such as fishing, the acquisition of sand to be used as temper for ceramic production, and the establishment of interactions with coastal peoples were also carried out. Therefore, the configuration of procurement landscapes not only has a direct bearing on the ways that the resources are collected, but might also influence how other activities are organized in relation to stone acquirement.

As is the case in the procurement and production of other items of material culture, different activities should have been scheduled in a systematic fashion to maximize the results of a procurement event as well as to get the necessary supplies for other tasks (e.g., house building,

food provisioning, production of medicines). Furthermore, in the production of a single stone implement different procurement contexts might have been visited and, in that case, indirectly interplayed in a singular operational sequence. Let us take for example the production of a celt. This process not only includes the flaking, pecking, and grinding but also the trip to the river to procure the objective piece and the pecking stone as well as the trip to the beach or to the sand bearing part of the river for collecting the abrasive agent to be used for their termination. In the cases where an extraneous rock is found at a site, its presence might be indicative of a myriad of social processes such as the establishment of equivalences (Polyani 1968) with the materials and/or information that were provided in exchange as well as the operation of a social and/or ideological structure that justified the efforts involved in obtaining such imported commodity. Obviously, all these extra processes involved in the production of a single item supercede the traditional lithic production notion of "reduction strategy" – tool manufacture *per se* - and involves a broader perspective that might relate other social practices to stone tool manufacture.

As a vital first step for understanding the procurement practices evidenced in the analyzed materials, it is necessary to establish the availability of local resources appropriate for tool production as well as the techniques involved in their obtainment. Only then will it be possible to determine which materials were imported from extraneous sources and infer the social and cultural practices that guided such a process. In order to determine the patterns of selection and procurement of the different materials, I conducted limited field reconnaissances around the sites from which the lithic collections analyzed in the present study were obtained. I also consulted the different geological quadrangles and relevant geological literature. Also, along with Eduardo Questell and Jeff Walker (Rodríguez Ramos et al. 2007; Walker et al. 2001), I conducted a lithic sourcing survey in the northwestern part of Puerto Rico that identified for the first time the

occurrence of high-quality cherts in that portion of the island. Sebastiaan Knippenberg (University of Leiden, Netherlands), Christian Stouvenot (Service Régional de l'Archéologie, Guadeloupe), and José Oliver (University College-London) provided me with samples of rock types from different localities in Antigua, St. Martin, Martinique, and the Dominican Republic that helped me in estimating the source areas of raw materials from other islands. I also made a short visit to Antigua, guided by Knippenberg, and witnessed the impressive Flinty Bay site as well as Coconut Hall, two of the major flint sources of the island.

Raw material types were separated strictly on the basis of macroscopic attributes notwithstanding the limitations of this approach for establishing definite raw material types and their sources (Luedke 1992). The morphological and physical characteristics taken into consideration include rock type, dominant color (based on the Munsell soil chart), color patterns, translucency, cortex type, inclusions, ubiquity of cleavage planes or other flaws. Although the macroscopic study of the physical properties and inclusions on lithics provides clues as to their probable provenance, definite information can be obtained only from the application of characterization analyses. Fortunately, the present study benefits from the Knippenberg's (2006) important trace element study of archaeological lithic materials obtained from Puerto Rico and the Lesser Antilles and his petrographic analyses of raw materials from different source locations. Further information about the provenance of some of the materials analyzed in this study come from George Harlow's x-ray diffraction studies of celts obtained from four sites of Puerto Rico that spanned between ca. 450 B.C. and A.D. 1000. Harlow's study was primarily aimed at determining the presence of jadeite celts amongst these materials as well as to establish their probable source area. The celts were selected from Punta Candelero, Rio Tanamá, La Hueca-Sorcé, and Tecla. As will be shown in Chapters 4 and 5, the data produced by Harlow in

this study, as well as in his published work on similar material recovered from Antigua (Harlow et al. 2006), has provided evidence for macro-regional engagements between the inhabitants of the Antilles and those of surrounding continental regions that will have profound implications for our understanding of the nature of their respective spheres of interaction and their geographic extent.

Lithic Production Dynamics

Once the raw materials entered the sites, these were reduced employing a series of reduction techniques that are reflected in both the finished implements and the debitage produced during their manufacture. In order to delineate the trajectories involved in the production of such items, this analysis followed standard lithic classification procedures for the initial separation of the materials into three general categories. These general categories are flaked, use-modified, and pecked and ground materials. As expected, many artifacts crosscut these categories because any combination of reduction techniques can be present in a single item. Therefore, I classified tools based the final reduction technique applied during their manufacture. That is, if a celt preform was manufactured by bifacial thinning but in later stages was pecked and then ground, it was classified as a ground artifact.

These major categories were further subdivided into five sub-categories, which allowed the definition of specific attribute states for each of them. For the flaked items, one sub-category included flakes and shatter (which also included unorientable crystal fragments) and another included cores. I separated the ground materials into two sub-categories: bifacial ground stone tools (i.e. celts and adzes) and other ground formal items (e.g., beads, *cemíes*, stone collars, netweights). This was done because ground materials tend to present the highest degree of formal variation, thus producing more cohesive types than the flaked and use-modified materials. Another reason for this separation was that previous studies have already addressed specific

typological information for these artifacts so I could compare them more efficiently (e.g., Harris 1983; Herrera Fritot 1964). Finally, a single category grouped all of the use-modified materials, which contained only those artifacts that did not present any intentional modification to their original morphology (e.g., hammerstones, nutting stones, edge-ground cobbles).

Because the analysis of all of the artifacts was attribute-based a series of nominal, ordinal and ratio scale variables were coded for each item. All of the lithic categories shared information regarding contextual data (unit, stratum, level, and feature ID), dimensional variables (measured in mm), weight (measured to the nearest .1g), raw material types, estimated procurement context, ubiquity of thermal alteration, and artifact condition. It is imperative to mention at this point that the format for this analysis was nurtured by the insights of Jeff Walker and Stan Ahler, who I immensely thank for their help.

Core-Flake Reduction: Individual Flake Analysis

As is common in most West Indian lithic assemblages, the overwhelming majority of the analyzed materials consisted of flakes, shatter, and cores. Flakes are defined in this study as the detached pieces from a core or a tool that are the result of the direct application of force to one of its edges. For any piece to be considered a flake or a flake fragment, it needs to present a clear distinction between its ventral and dorsal surfaces. I distinguished between flake fragments and undifferentiated flake fragments as in the former there was a clear indication of the portion of the flake that they represented while the latter could not be directly ascribed to any specific flake section, although they still present clear ventral and dorsal aspects. On the other hand, shatter was defined as unintentionally detached amorphous pieces of rock that present at least two flat faces and, in some cases, had cortex on more than one of those surfaces. A particular type of shatter identified in these collections consisted of unorientable crystal fragments. Even though these were not the products of flake production operations, I analyzed them using the same

criteria as I did for the rest of the shattered materials due to the fact that they both shared diffuse attribute sets.

During the course of the analysis, I identified three major ways in which flakes were produced. These were by the freehand technique, bipolar flaking, and through utilization. The first two of these are intentional flake production techniques while the last one includes those flakes that are an incidental byproduct of the use of tools in the systemic context. As previously mentioned, the application of the first two of the aforementioned techniques produce diagnostic attributes that give an indication of the type of reduction technique that promoted their removal from the core. However, this in no way means that in every case these manufacturing techniques produce mutually exclusive characteristics as it has been well documented that different reduction formats may create similar sets of technological attributes (Ahler 1989; Kuijt et al 1995; Walker 1980). Even so, there is still major agreement with the fact that the mechanics by which each of these techniques is applied, considering the area of applied force, the direction (angle) at which this force is loaded on to the parent mass, the type of counter resistance, the type of percussor, and the amount of applied force, all produce negative impressions on both the detached pieces and the objective pieces which enable one to infer with a great degree of certainty the type of technique that promoted flake initiation (Andrefsky 1998; Crabtree 1964; Odell 2004; Shafer 1973; Whittaker 1994).

Freehand flaking is defined as the direct application of force to a parent mass where the positive force load is the one from the hammer while the rebound force is the result of tensile stress. The employment of freehand flaking was observed in primary core reduction (flake production), unifacial or bifacial secondary reduction (tool production), and in tool resharpening (tool maintenance). Each of these processes presents variations that produce even more specific

attributes that evidence each of those reduction strategies. For instance, the process of primary core reduction by freehand flaking may be accomplished by the employment of different reduction strategies such as core slicing, random flake removal, and alternate flaking. Even though these techniques have traits that aid in differentiating one from another, they still share those features indicative of freehand flaking, flakes that include a straight or slightly curved profile, a pronounced bulb of percussion, a thick striking platform, and a defined striking point**.**

Bipolar flaking on the other hand consists of the application of force at approximately 90 degrees to a core that is supported over a stationary rigid surface (i.e., anvil). In the case of the Caribbean, the employment of this technique has been linked mostly to that of a core reduction (flake extraction) strategy, either in the case of splitting a nodule in half to create a suitable platform for freehand flaking or in the reduction of nodules, cores, flakes, and shatter for the production of grater teeth or any other micro-tools (e.g., drill bits). Bipolar flakes are distinguished by a combination of features that includes the presence of either ridged or pointed platforms with almost no surface area (Ahler 1993), a straight profile, either shattered or diffuse bulbs of force, crushing on both ends, and ridged sections parallel to their longitudinal axis. Even though typologies of bipolar flakes and cores have been developed (Binford and Quimby 1963; Dockall 1991; Shafer 1973), these have not been determined to offer any particular interpretative advantage as they have not been associated to specifically structured reductive strategies. Thus, I resolved to lump all bipolar flakes into a single code value.

I also made a distinction between flakes detached through resharpening episodes versus those produced as a result of use. This distinction, which was quite hard to define in many specimens, was based on the markedness of a striking point. In resharpening flakes, the point of impact should be clearer than in those detached through use due to the confinement of the

application of force by the use of a hammerstone. Since resharpening flakes are detached from the distal ends of tools, these usually preserve part of their working edges and ground portions around their perimeter. On the other hand, in those flakes extracted incidentally by use, the force load that caused their separation from the parent mass is diffused throughout the area of detachment making it difficult to determine the point of applied force. This might be a result of the fact that usually the object that is being worked has a larger surface area and is softer than the tool that is being used and thus there is no confined impact point. On the basis of the constitution of their dorsal aspects, I distinguished between those that resulted from pounding tools (battered dorsal sides) versus those from ground tools (ground dorsal surfaces). Due to the fact that these flakes were somewhat amorphous and did not present a specific striking point, I recorded only maximum length and weight for them. Since resharpening flakes are basically freehand flakes detached for a specific purpose, I recorded all of the attributes that were defined for the rest of the flakes.

With regards to dimensional variables, in complete flakes the maximum length was taken by resting the caliper on the platform and measuring the longest distance from it. Width was defined as the maximum dimension perpendicular to length while thickness was the maximum measurement between the ventral and dorsal sides at any portion of the flake. Finally, I coded maximum dimension, which consisted of the longest measurement between two points in any portion of the flake. In the case of flake fragments and shatter, I only recorded maximum dimensions and weight. These dimensional attributes were also supplemented by the use of size grades as an ordinal scale variable. This size grading procedure was based on the use of a sequence of hardware sieving screens with openings of 25.4 mm, 12.7 mm, 6.4 mm and 2.54 mm.

In complete flakes and in proximal flake fragments, I recorded the platform surface composition (absent, cortex covered, cortex plus facet, single facet, natural facet or cleavage plane, multiple facets, utilized surface [for resharpening flakes], zero area-pointed, zero area-lineal ridge, and crushed); and the ubiquity of platform modification and its type (none observed, trimmed, ground, faceted, trimmed and faceted). Ventral features were limited to the definition of a bulb of force, being either absent (in those that presented a proximal part but no defined bulb of force), diffuse, split, sheared or pronounced. Dorsal features included three variables: percentage of cortex (in an ordinal percentage scale from one to six) and the number of flake scars that measured at least 20 percent of the maximum length of the flake. In the cases of flakes and proximal flake fragments, I counted only dorsal cortex content, not including platform cortex. In shatter, I estimated cortex content considering their overall surface area.

Finally, I recorded post extraction modifications, which would be similar to secondary reduction processes. In the present case, I limited those to the ubiquity of retouch and its type and the presence or absence of use wear at 4X magnification (aided by the use of an Optivisor). With regards to the determination of wear patterns in flakes and shatter, it should be noted that in the so called "expedient" lithic technologies such as that analyzed in the present study, the identification of use-wear on the pieces is rather evasive due their short longevity in the systemic context. This is even more aggravated in the case of the West Indies where flakes are mostly related to the processing of soft vegetative materials, which makes it even more difficult to identify wear traces on the pieces, at least at the level of magnification used in the present study. I recognize the importance of use wear and hope that others will dedicate themselves to this line of inquiry in the near future in the Antilles. Fortunately, this study is complemented with Pagán Jiménez's (2003, 2006a, 2006b; Pagán Jiménez et al. 2005; Pagán Jiménez and Oliver 2007;

Pagán Jiménez and Rodríguez Ramos 2007) starch grain analyses as a guide for identifying some of the vegetative products that were processed with some of these tools.

Cores

Cores are defined as any mass of rock that sports evidence of flake removals and whose estimated primary purpose was to serve as a source of flakes. During the analysis, I identified several core types based primarily on the disposition of their striking platforms. The first core type identified was the tested nodule or cobble, which was defined as a piece that presented only one or two flake removals.

The rest of the cores were subdivided according to the flake extraction technique, as discussed earlier. The first to be described are freehand cores which include: 1) single platform cores, in which flakes were removed in one direction from a single platform; 2) inverted platform cores, in which there are two opposed platforms from which flakes are detached along a single axis; 3) bi-directional cores, in which flakes are removed in two directions, thus having two striking platforms; 4) multiple platform cores, in which there were various platforms and were flake removal followed no particular direction; 5) the core on flake, which are usually made over large flakes and where the negative scars of flake removals are the result of intentional flake detachment rather than flake retouch or tool manufacture (these are difficult to differentiate in many cases from retouched flakes but I based the distinction on the patterning and regularity of secondary flake removals and the size of the detached flakes); and 6) centripetal cores, in which there was indication of the removal of flakes towards the center of the core, thus presenting converging flake scar patterns.

The second core reduction technique was bipolar flaking. Here, the subdivisions were based on the size of the parent mass and its type. For instance, the non-exhausted bipolar core was separated from the exhausted bipolar core on the basis of its maximum length and thus, on

the estimated capacity of further extracting flakes from them. As indicated by Walker (1980) and as I have painfully experienced, bipolar cores are difficult to reduce further after 25 mm in maximum dimension. Obviously, bipolar cores could have been reduced to smaller sizes either by knappers with smaller fingers or by wrapping the cores as suggested by Shafer (1973) in other contexts, but lacking evidence of either of these processes I resolved to consider any core that measured less than 25 mm in maximum length as exhausted. I also determined that flakes (including also shatter) that are further reduced by the bipolar technique [bipolarized flakes, following Ahler (1993)], are considered cores as I am still not certain if these presented wedge-like traits due to their use in a wedge function or as a source of flakes. Aside from these two major flake-production techniques (freehand and bipolar), I also identified angular blocks of calcite that were seemingly crushed in the process of crystal removal. These were labeled crystal cores.

Core dimensions for all categories were based on four measurements. The first three were: length, which measured the distance from the primary striking platform towards the other core extreme (in cores with more than one platform I considered length as the longest dimension); width, which is the longest measure perpendicular to maximum length; and thickness, which is measured at about 90 degrees from, and perpendicular to, the width. I also recorded the maximum dimension of the cores, which was the longest measurement between any two points of the piece. In order to look at the level of core reduction intensity, I coded the number of flake scars on the face(s) of the cores (of at least 20 percent of the maximum length of the core) and residual cortex percentage on the core (estimated in a similar fashion as that of shatter). Finally, I determined if the cores presented severed surfaces as a result of another use besides as a source of flakes.

Core-Flake Reduction Formats

On the basis of previous analyses conducted in the island, I have identified several core-flake reduction protocols. Although it is acknowledged that these might have combined during flake extraction or tool production, I think that each of the core-flake extraction protocols present diagnostic features that might aid in identifying each one taking into consideration a combination of attributes that include platform configuration, ventral and dorsal features, and the types of negative impressions left on the cores designated to each of these reduction mechanisms. On the basis of these attributes, I included a category in the code lists of cores and flakes that read "intuitive reduction strategy."

This core-flake reduction framework is partially adapted from the ones developed by Collins (1975) and Shafer (1973) for reconstructing the life histories of cores. These analytical schemes are structured on a lineal reduction model, which was used to diagram the proposed reduction protocols observed in the analyzed collections (Figure 3-1). As shown, after parent masses are procured, they are first tested for determining their suitability for their intended reduction operations (I). Those objective pieces that do not present the desired qualities are discarded (tested pieces) while others continue their life as a core. These selected cores are then either hand held and reduced by a direct interaction with a hammerstone (freehand percussion) (IIA), or in other cases this is supplemented by the use of an anvil (bipolar flaking) (IIB). Other products show dual technological traits, thus marking a transition from one technique to another, in this case exclusively from freehand to bipolar flaking (mixed technologies-IIA/B). During that process, some products are discarded and thus enter the archaeological record. However, others continue in the systemic context, in which case the interaction changes from core-percussor to flake-percussor (flake retouch/tool production), flake-utilized surface (flake use) or core-utilized surface (utilized cores) (III). This process results in a deliberate edge alteration,

and is what usually is described as secondary modification processes. Finally, after these flakes, shatter, and cores are utilized they enter a fourth part of this sequence that is related to their ultimate discard (IV).

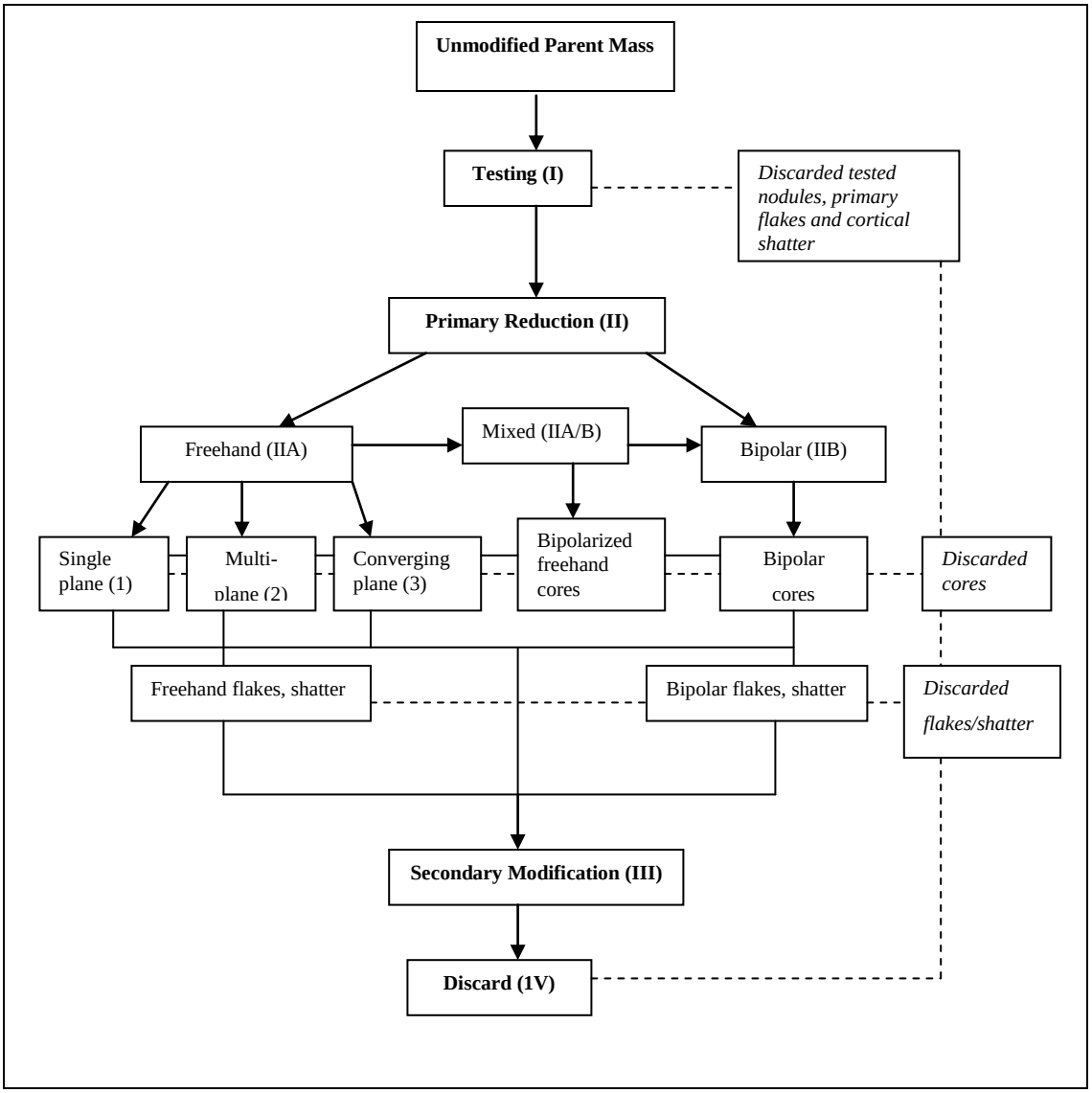

Figure 3-1. General core-flake reduction model.

During the analysis, I identified three general approaches to flake extraction by the freehand flaking technique (IIA). I based these divisions on the orientation of flake removals with respect to a hypothetical Cartesian plane as observed in the cores and the dorsal sides of flakes, in a similar fashion as that presented by Kuhn (1995) (Figure 3-2). These divisions

included single plane (IIA-1), multi-plane (IIA-2), and converging plane reduction (IIA-3). In order to make these distinctions, I relied primarily on core types and their related attributes even though I acknowledge the fact that their final state might only represent a skewed version of their life history, as more than one of these 'planes' could have been visited during different episodes of flake extraction. However, I focused on the main reduction orientation present within each core when discarded, which is taken to represent its main reduction format. I tried to link flakes to these particular flake production schemes even though I acknowledge the fact that different reduction operations may produce similar sets of technical traits. However, in some cases their form of extraction was readily evident and thus I acknowledged that in the flake typology, based primarily on the orientation of dorsal scars and their platform configuration.

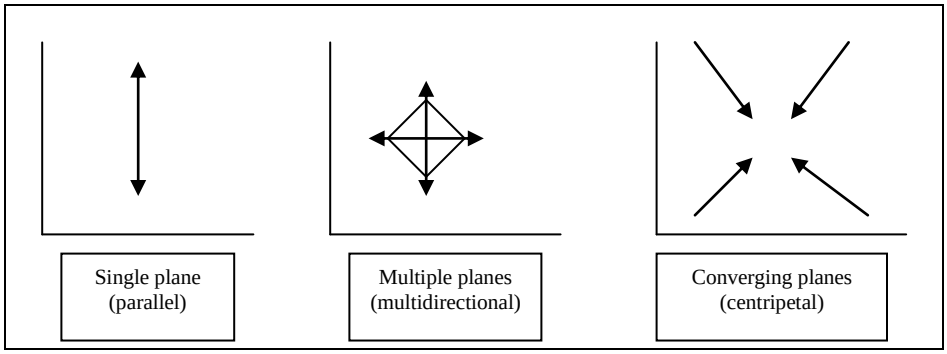

Figure 3-2. Core-flake reduction axes.

Aside from these freehand flaking strategies, I also observed the reduction of cores through the use of bipolar flaking (IIA). In the case of this form of reduction, it was easier to establish the technological affinity between cores and flakes (although sometimes it was rather difficult to distinguish between the two). Finally, other objective pieces presented a transition between freehand to bipolar flaking (no cases were observed the other way around), which I labeled mixed technologies following Ahler (1989) (IIA/B).

Pecked and Ground Materials

As previously mentioned, the sample of pecked and/or ground materials was divided into ground bifacial core tools (adzes and celts) and other ground formal artifacts (beads, cemíes, stone collars, etc.). The sample of bifacial ground tools was further subdivided into eight major subtypes on the basis of a hierarchical scheme based on a series of attributes designed to model their overall morphology. In the sample of other ground formal artifacts, formal typologies were created for dealing with three-pointed *cemíes*, netweights, and beads, while other particular artifacts were analyzed on an itemized basis.

Celts and adzes

Celts were distinguished from adzes on the basis of the tools' bit articulation (Shafer 1973). Ground bifaces with unifacially or irregularly beveled bits were termed adzes while bifacial ground tools with symmetrically beveled distal sections were called celts. Each of the defined types within each of these categories will be described in its respective section.

The first set of attributes recorded for these items were related to their dimensions. Length was defined as the longest distance from the bits to their proximal ends; width was defined as the maximum dimension perpendicular to length; and thickness was the maximum measurement between both faces of the artifact. I also recorded the maximum dimension that was the longest distance between any two points of the artifact.

Then, I moved to morphological attributes of the pieces. The chosen attributes were bit morphology, poll morphology, and cross-section morphology. Then I determined if the pieces presented a discernible haft element, the ubiquity of use and its intensity, and if there was any indication of reuse in any other fashion after their use-life in their original function expired.

Other formal items

Within this category are included other formal lithic artifacts. Since in most cases no formal attribute set has been defined for many of these types of artifacts, an effort was made to establish parameters for specific measurements. In the following paragraphs I will limit the discussion to the three most common artifact types classed under this category: beads/pendants, *cemíes*, and netweights.

Beads and pendants. Beads and pendants were divided in a hierarchical typology, which made a primary distinction on the basis of the number of incisions. The bead category (I) included those that present only one major in that is considered to define their longitudinal axis while pendants (II) were those that presented a transverse incision located at one of the extremes of the pieces. Some of the pendants also sported a longitudinal perforation. According to Fewkes (1907) and Rouse (1961) the transverse incision of these pendants was made to string them while the longitudinal ones were made for the insertion of feathers. After this initial distinction, these were subdivided on three size ranges. These were lamellar/tubular (A) ($1.5L \geq 1W$), discoid (B) ($1.5W \geq 1L$), and mid-range (C) ($1.5L < 1W$ or $1.5W < 1L$). The third typological state was based in the outline of the lateral margins of the pieces as seen in plan view. These were subdivided into convex (i.e., barrel shaped) (1), parallel (2) and biconical (3). The last category divided these pieces by the degree of termination that they presented into preform (1), simple (2) and complex (3). I considered as preforms those that present a definite overall form, but whose incisions had not been completed. Simple includes those beads that present a complete incision but present no additional decorative elements, while the complex ones are those that have additional decorative elements such as grooves or incisions. In addition to the previously described types, there were incised cobbles and fossils that did not present any additional modification to their overall morphology, which were defined as randomly shaped

beads (1D). Individual codes were given to the other pendants which had particular representational outlines, based on the general types defined by Fewkes (1907), Rouse (1961), and Narganes (1995).

Three-pointed *cemíes*. With the exception of one specimen, all of the analyzed trigonoliths in the analyzed collections could be included in Fewkes' (1907:111) type 4 that he defines as "smooth specimens, destitute of head, face, legs or incised superficial ornamentation." Within these, I further subdivided threepointers first on the basis of their geometric configuration (bidimensional [A] vs. three-dimensional [B]); their maximum width (from leg to leg, based on the criteria established by Walker 1993:209; small: 3 to 7cm (I); medium: 7-15 cm (II); large 15cm or more (III)); and degree of elaboration (coarse [pecked] (1), fine [ground and/or polished] (2), and decorated (3)). Length/height was the distance between the top of the apex (conoid projection) and the basal concavity; width was the measurement between the two extremes of the base perpendicular to the length; while the thickness was the distance between the two bellies of the piece in line with the apex.

Netweights. For netweights, the length was based on the longest dimension perpendicular to the notched margins; width as the distance between the two notched margins taken from their innermost sections; and thickness was maximum measure between both faces of the artifact.

Use-Modified Materials

Used-modified materials are usually difficult to analyze due to the suite of activities that might be present in a single item, as well as by their morphological heterogeneity. Notwithstanding these difficulties, I established some conventions to address dimensional attributes for these specimens. For these materials, I measured length as the distance between the major utilized portion and the opposite extreme of the item. In multifunctional implements, length was taken in the longest section of the tool projecting from the major utilized portion.

The width was the major distance perpendicular to length while the thickness was based on the major measurement perpendicular to length and parallel to width, at approximately 90 degrees from its width.

The selection of materials to be used without any intentional modification to their original form required that rocks with suitable morphologies be chosen for the intended tasks. Thus, it is quite important to make an estimate of the original morphology of the item. I classed these artifacts either as angular, spheroid, discoid, elongated, semicircular and irregularly shaped (random). Finally, I also addressed the estimated use intensity by the creation of a three-level ordinal scale variable (faint, moderate, intense).

Radiocarbon Database

In addition to the analysis of the lithic materials, the present work is also based on a radiocarbon inventory from Puerto Rico. At present, I have been able to obtain around 560 assays from various locations on the island that were found in cultural resource management (CRM) reports, academic publications, and the generosity of colleagues who have provided unpublished results. Unfortunately, not every region is equally represented in the database, as there is a geographic skewness of dated sites towards those located from central to eastern Puerto Rico, especially in the coastal plains as opposed to interior mountains. In addition, the number of dates that have been collected from different sites is highly variable. For example, there are sites such as Paso del Indio and La Hueca-Sorcé that have more than 40 assays, while others like Lilly Caribe and Praderas only have two assays. This shows that the data are biased at the site-specific and geographic levels, indicating the need to construct a more representative chronology for the island as a whole.

Another source of problems for interassemblage temporal comparisons with this database has been the dissimilar, and mostly ambiguous, ways in which pottery classes, types, or styles

have been defined and the particular chrono-cultural indexes assumed in the different models developed for the island. For instance, Chanlatte and Narganes' model does not consider styles as an important category; they instead refer to analytical units that make reference to "cultures" (i.e., *cultura Huecoide*, *cultura Saladoide*) while, as noted in the previous Chapter, Rouse defined each culture by its style (Oliver 1999). This constitutes a major problem for comparison as, for instance, Chanlatte lumps what Rouse terms the Hacienda Grande and the Cuevas into a single category (i.e., *cultura Saladoide/Agro II*), while Rouse considers each of those two styles to be distinct cultures that share a single evolutionary path. In other cases, site assignments to specific series, subseries, or styles based largely on pottery are provided in the reports. But, these associations are not based on detailed analyses, thus limiting the resolution and comparability of their insertions into particular chrono-cultural slots. The scale of resolution in the temporal placement of sites has also been variable, as some chrono-cultural designations are left at the level of series, while in others the pottery styles have been recognized. Further problems for assigning sites to particular time periods or cultures are encountered when contexts that present mixed pottery styles are dated, which are quite commonly represented in the database. These are all issues that demand further attention, as they impose marked limitations on the levels of analyses that can be made with the available data.

The ways in which such dates have been collected and reported for different sites have also been highly variable, thus also limiting the comparability of the data (see Fitzpatrick 2006). However, due to the high quantity of CRM projects conducted on the island, a significant number of radiocarbon assays have been recovered, which allows a more conservative analysis of the suite of dates that were used in this study. To increase the level of resolution of the database, I followed Spriggs' (1989) "chronometric hygiene" approach using a number of

criteria applied by Liston (2005; see also Fitzpatrick [2006]). I excluded from this analysis those assays that: (1) lacked provenience information; (2) did not overlap at a 2σ range with the rest of the dates recovered from associated contexts within the sites; (3) were made from materials that tend to provide unreliable results, particularly those that that inhabit karst haystack hills of the island (e.g., land snails) due to problems with carbon uptake that can introduce age anomalies in such samples (Goodfriend and Hood 1983); (4) were not associated with materials defined at the style level; (5) were justifiably declared anomalous by its excavators; or, (6) contained only one date from a site. The dates were calibrated using the datasets (IntCal 04 and Marine04) provided in the most recent version of the CALIB program (CALIB 5.0.1; Stuiver et al. 2005). No Delta-R correction was applied to marine shell samples during calibration. A calibrated mean (cal.) of the 2σ ranges will be used as a temporal referent for the assays in this work, following Prentiss et al. (2003).

Nature of the Sample

There were several criteria that were established for the selection of the lithic collections that form the backbone of the present study. The selected sample was derived from sites with well defined contexts whose sediments were sieved using at least ¼-inch screens, were radiocarbon dated, and have all the information related to artifact provenience (maps, photos, field notes, and drawings). Also, an effort was made in getting as many samples as possible from sites in which I have participated in some capacity during fieldwork and/or laboratory work in order to have a more informed sense of the contexts of the analyzed collections. To the extent possible, the selection of collections was also aimed at getting the highest degree of temporal representation possible. In this sense, the studied samples presented in this work represent most of the precolonial history of Puerto Rico (Figure 3-3). In total, 10 sites were selected from which more than 8500 lithic artifacts were analyzed (Figure 3-4; Table 3-1). Although the number of

sites does not seem too significant, it should be noted that some of these presented more than one component, thereby amplifying the representativeness of the different periods of the precolonial history of the island addressed in this work.

Table 3-1. General categories of analyzed materials by site.

Site	Core-flake reduction		Use-Modified	Pecked/Ground		Total
	Cores	Flakes/ Shatter		Celts/ Adzes	Other Ground	
Paso del Indio	184	2036	455	63	169	2907
Puerto Ferro	7	72	8	1	4	92
La Hueca	345	1219	256	86	22	1928
Punta Candelero	221	1040	292	23	49	1635
Punta Guayanés	42	359	174	14	5	594
Río Tanamá	59	689	34	7	24	813
Lilly-Caribe	2	77	4	-	1	84
Praderas	12	137	19	16	18	202
Finca Doña Rosa	28	256	48	1	4	327
Vega Nelo Vargas	7	123	8	1	-	139
Total	907	6008	1298	212	296	8721

Unfortunately, not every period is equally represented in this study, particularly those dated to Pre-Arawak times (Figure 3-3). Therefore, I made an effort to revise the pertinent literature of Pre-Arawak contexts available from the island in order to fill to the extent possible the voids in the data that might exist. Also, although the backbone of this study was based on the sites that will be described below, this study has also benefited from my lithic analyses and detailed inspection of collections obtained from contexts associated with most of the cultural complexes identified in the island thus far, spanning Pre-Arawak contexts (e.g., Cueva la Tembladera, Pozuelo, La Josefa, Maruca), those associated to the Hacienda Grande/La Hueca manifestations (Maisabel), the Cuevas/Monserrate styles (La Mina, Martineau, Isla de Cabras), the Pure Ostiones style (Salto Arriba, Cueva Juan Miguel, Cerro Las Mesas), the Santa Elena Style (Turabo Clusters, Rio Grande Estates) and the Capá/Esperanza styles (Finca Valencia, La Trocha). I now offer a brief description of the sites included in this study.

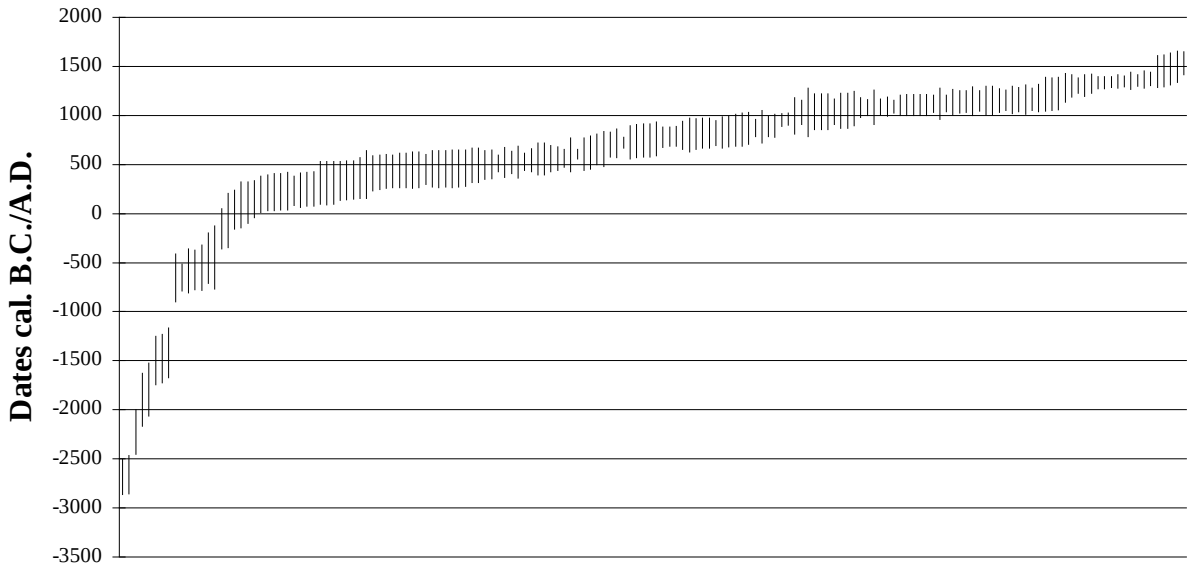

Figure 3-3. Plot of 2σ ranges of calibrated radiocarbon dates of the sites included in this study.

Paso del Indio

Paso del Indio is located on an active alluvial valley in the Municipality of Vega Baja, in north-central Puerto Rico (García Goyco 1998; García Goyco and Maurás Casillas 1993; Walker 2005). Archaeological excavations at this site, directed by Osvaldo García Goyco and Adalberto Maurás Casillas with technical assistance from Jeff Walker, resulted in the documentation of the longest history of occupations in the Antilles at a single location, spanning a period between cal. 2690 B.C. to cal. A.D. 1440. Our evaluation of the alluvial stratigraphy of this site has demonstrated the presence of a classic A/C horizon sequence within which the major occupations were sealed (Clark et al. 2003; Rodríguez Ramos 2003a; Walker 2005). Three distinct Pre-Arawak occupations were documented, which extended to a depth of around 3.5 m below the surface. These dated to between cal. 2690 B.C. and cal. 2670 B.C. (lithostratigraphic unit A), cal. 660 B.C. and cal. 450 B.C. (lithostratigraphic unit B), and cal. A.D. 90 (lithostratigraphic unit C). These were followed by an occupation related to Cuevas style ceramics (lithostratigraphic unit D; cal. A.D. 450 to cal. A.D. 800), another that had Pure

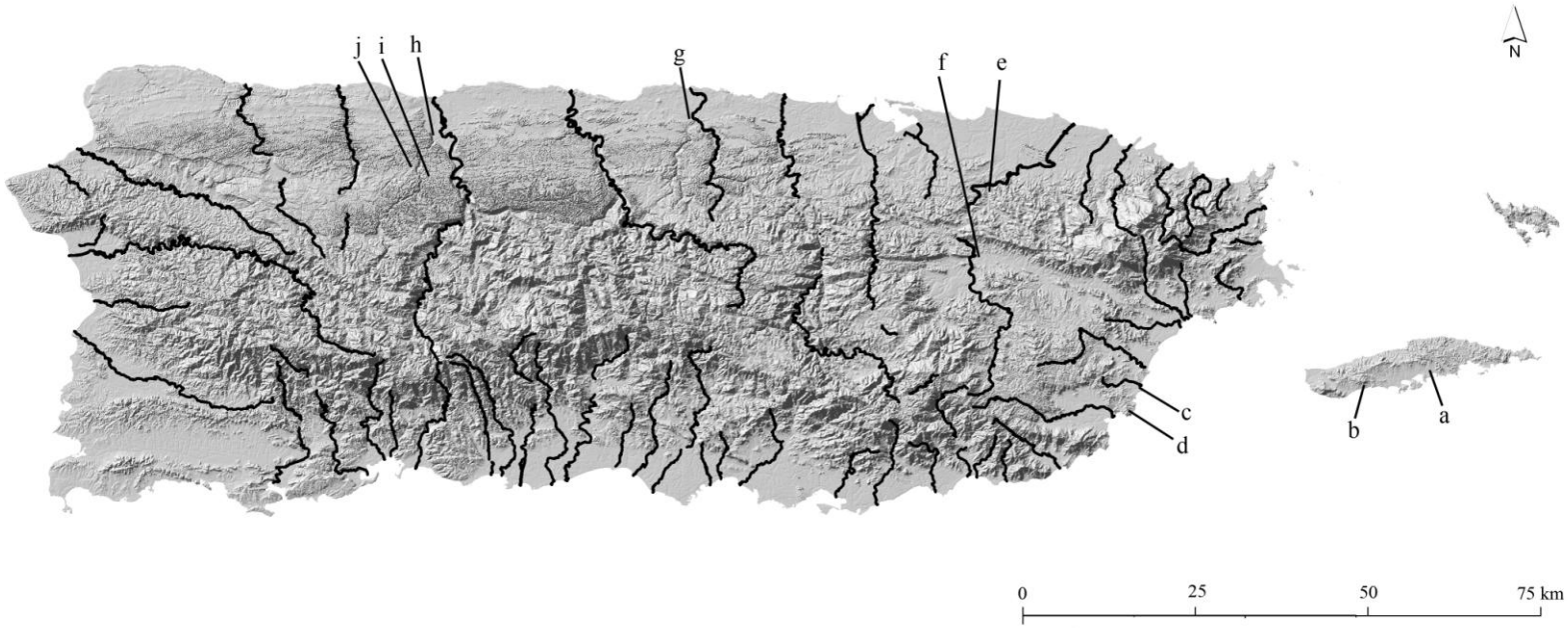

Figure 3-4. Location of selected sites from which lithic collections were analyzed in the present work. (a) Puerto Ferro; (b) La Hueca-Sorcé; (c) Punta Candelero; (d) Punta Guayanés; (e) Lilly-Caribe; (f) Praderas; (g) Paso del Indio; (h) Río Tanamá; (i) Vega de Nelo Vargas; (j) Finca de Doña Rosa.

Ostiones pottery (lithostratigraphic unit E; circa A.D. 850 to cal. AD 1000), followed by another layer that had Modified Ostiones/Santa Elena styles (lithostratigraphic units F and G; cal. A.D. 1000 to cal. A.D. 1300). The latest precolonial occupation being related to Capá style ceramics (lithostratigraphic unit G; cal. A.D. 1300 to cal. A.D. 1440). To top it all, this site also had an early colonial component.

La Hueca-Sorcé

La Hueca-Sorcé rests on the southwestern section of the island of Vieques, which is located approximately 14 km east of the southeastern fringe of Puerto Rico proper (Figure 1-1). This site itself is located about 650 m from the coast on three coastal terraces that descend gradually towards the Caribbean Sea. La Hueca-Sorcé was first discovered in 1977 when investigations in search of the route of entrance of the earliest ceramic immigrants to Puerto Rico were conducted under the direction of Luis Chanlatte and Yvonne Narganes (Chanlatte 1980). As a result of Chanlatte's initial discovery, ongoing systematic excavations have been conducted in this site that covers a total area of approximately 2 km^2. At present, seven deposits associated to the Huecoide complex have been detected as well as another 14 middens that contain archaeological materials defined as part of the Hacienda Grande style, both of which are spatially segregated from each other. More detailed chronological and spatial information about this site will be provided in Chapter 4.

Puerto Ferro

Located in the island of Vieques, Puerto Ferro is one of the oldest sites recorded in the Antilles, with dates that range between cal. 2330 B.C. and cal. 460 B.C. Excavations directed by Luis Chanlatte at the site revealed the presence of Pre-Arawak materials in a rather shallow residual soil layer, whose cultural deposits extended about 25 cm below the surface (Chanlatte 1991). This site, which housed the remains of the famous *Hombre de Puerto Ferro*, also

presented a marked quantity of shell and coral remains. The lithic materials that were analyzed were obtained from seven 1 x 1 meter excavation units that were placed to the south of a group of massive diorite boulders that provide this site its unique character.

Punta Candelero

The site of Punta Candelero lies in the Municipality of Humacao, located on the eastern end of Puerto Rico. It is separated from La Hueca by the Vieques Sound and, as described by Rodríguez López (1987), under certain atmospheric conditions both sites are within sight of each other. Punta Candelero nestles on an embayed beach peninsula that intrudes at least 1 km seaward. The site is located over the ridges of a chain of elongated dunes that rise up to 2 m above sea level, thus protecting the area from the ocean beatings and the flood events of the river. The site area was estimated to extend 110 m (N-S axis) by 180 m (E-W axis), including both the LH and the Cuevas style components, both of which are stratigraphically and/or spatially segregated from each other. This site contains an LH component whose archaeological materials were deposited in five middens. Other two middens that contained Cuevas style materials were later recovered. The materials analyzed in this study also include the recent excavations at the site directed by Marlene Ramos (2007), which were remitted to its Cuevas component. More information about this site will be provided in Chapter 4.

Punta Guayanés

Punta Guayanés is a coastal site located on the fringe between the Humacao and Yabucoa municipalities, just four km south of Punta Candelero. Our excavations of the site, which were directed by Marlene Ramos (2006), presented deposits that went down to 60 cm below the surface. The analyzed materials were obtained from a hillside midden deposit, from which Cuevas style materials were uncovered. The dates for this site ranged between cal. A.D. 500 and cal. A.D. 890.

Rio Tanamá

The Rio Tanamá site is located in north-central Puerto Rico in the Municipality of Arecibo. It was excavated by SEARCH, under the direction of Betsy Carlson (2007). This site, situated in an alluvial valley north of Rio Tanamá, is composed of two distinct core areas that are separated from each other by a modern road. The northern sector (AR-39) presented a wide array of materials that were obtained from a pit feature. This area contains pottery that presents a mixture of Cuevas and Pure Ostiones styles with dates that ranged between cal. A.D. 440 and cal. A.D. 790. The southern portion of the site (AR-38) presented a marked amount of postmolds and several human burials. This location was associated to a Capá/Esperanza deposit, with a minimal intrusion of Modified Ostiones and Boca Chica style materials, with dates that ranged between cal. A.D. 1060 and cal. A.D. 1410.

Praderas

Located in the Municipality of Gurabo, Praderas was the focus of Phase II excavations directed by Juan González Colón. This site is located in an active alluvial valley at the confluence of the Rio Gurabo and the Rio Valenciano. According to González Colón (2006), materials associated to the Monserrate style were obtained in depths up to 60 cm below the surface from two 2 x 1 m recovery units. These materials are associated to dates between cal. A.D. 1030 and cal. A.D. 1100. A mitigation of this site is currently under way, being directed by Virginia Rivera, which has documented the presence of Cuevas pottery mixed with that of the Monserrate style.

Lilly-Caribe

Lilly-Caribe is located in the Municipality of Carolina, on the northeastern portion of Puerto Rico. The evaluation of the site was directed by Marlene Ramos (2002) in response to the expansion of the Lilly Pharmaceutical plant. Situated in an alluvial valley south of the Rio

Grande de Loiza, this site presented mixed ceramic styles including the Cuevas, Monserrate, and Pure Ostiones. The two radiocarbon assays recovered from this site provided the same date of cal. A.D. 1330.

Finca de Doña Rosa (UTU-44)

This site has been described as a farmstead located in a small terrace on a ridge top that is situated on the western margin of the Rio Tanamá. The excavations of this site were conducted as part of the Utuado-Caguana project directed by Jose Oliver (University College-London) and Juan Rivera Fontán (Instituto de Cultura Puertorriqueña). The archaeological materials were obtained from a midden that went down to 1.10 m below the surface. The lower layer of the site presented Modified Ostiones style pottery, dated between cal. A.D. 1090 and cal. A.D. 1150 (Oliver et al. 2001). This layer was overlaid by a cultural stratum that contained a mixture of Modified Ostiones and Capá style pottery, dated between cal. A.D. 1150 and cal. A.D. 1220. The upper layer presented a predominance of Capá pottery, with minimal quantities of that representative of the Modified Ostiones style, with dates that went up to cal. A.D. 1330.

Vega de Nelo Vargas (UTU-27)

The Vega de Nelo Vargas site was also uncovered as part of the Utuado-Caguana project. It is located in the karst interior of the island, at around 2 Km northeast of Caguana, one of the most impressive civic-ceremonial sites documented in the Antilles. This site has been characterized by Oliver et al. (1998, 2001) as a farmstead located on a small valley area embedded between the haystack hills (i.e., mogotes). This site contains a stone enclosure, commonly known as *batey* that is surrounded by limestone slabs with petroglyps. Most of the materials were recovered from a small hillside midden deposit that, according to Oliver et al. (2001), was associated to a single household. The midden contains pottery associated to the Capá style, dated between cal. A.D. 1340 and cal. A.D. 1420.

CHAPTER 4
DISCOVERY OF PUERTO RICO AND THE LIFEWAYS OF OUR EARLIEST ANCESTORS

Around 5000 B.C., the inhabitants of some the coastal areas of the Americas that faced the Caribbean Sea embarked in the first long-distance maritime movements registered in this hemisphere. These voyages were directed to a group of islands whose territories marked the northern boundary of the Caribbeanscape, a fluid space that has united people from such continental regions with those of the Antillean archipelago for more than 7000 years. Among the destinations that were reached in those voyages of discovery was the island of Puerto Rico, where they landed by at least 4000 B.C.

Common wisdom regarding the lifeways of those initial discoverers of the island is that they were "food gatherers rather than food producers and lacked pottery." (Rouse and Alegría 1990:1). Even though it has been mentioned that at least some of these Pre-Arawak migrants to the Antilles, particularly the ones from Cuba and Hispaniola, should have been more "complex" than what was initially established, the generalized conception amongst Antilleanist researchers still is that these were "hunters-fishers" (de la Rosa 2003:143) that "did not make ceramics or practice agriculture" (Callaghan 2003:324). In the cases in which higher degrees of social complexity have been hypothesized for these peoples (e.g., Curet 2003; Keegan 1994; Wilson et al. 1998), a limited set of data derived mostly from Cuba and Hispaniola has been presented to support such ideas. Thus, in this Chapter I intend to provide additional evidence for such a proposition on the basis of the recently generated data from Puerto Rico, which underlines the need to reconsider the assumptions upon which the imagery of the "Archaic Tradition of Puerto Rico" (Alegría et al. 1955) has been built. I start by providing a historical overview of the construction of the current vision about the first inhabitants of the island on the basis of limited ethnohistoric accounts of foraging groups from Cuba and Haiti as well as of the import of models

of hunter-gatherers that inhabited continental settings. Then I provide the first comprehensive description of the lithic production traditions that are observed in Pre-Arawak contexts from Puerto Rico. This, together with other lines of evidence heretofore unconsidered in detail, will be used to critically evaluate some of the assumptions embedded in the conceptions of our earliest ancestors that were assumed in Rouse's (1952, 1992; Rouse and Alegría 1990) definition of the Coroso complex, which has served as the archaeological basis to model the "Archaic Tradition of Puerto Rico." This will show that the antecedent conditions assumed in Rouse's model for explaining the articulation of the later cultural landscape of the island are not supported by the recently generated data. This evidence recovered from Puerto Rico not only has implications at the local level but also for other surrounding regions as well. The last section of this Chapter expands the scale of analysis by exploring the drastic impact that this evidence from the island has on a major macro-scalar archaeological issue, which is the maritime dispersal of early botanical complexes in the Neotropics.

The Initial Construction of the "Archaic": From Cuba to Puerto Rico

On Columbus' second voyage to the Americas he sailed along southwestern Cuba where Diego, his Lucayan translator, established contact with one old "savage" whose language was unintelligible to him. This has commonly been considered the earliest encounter with the cave-dwelling societies that later came to be known as the Guanahatabey or Ciboney culture. Additional early Spanish accounts about the existence of these groups inhabiting the western section of Cuba as well as the Guacayarima peninsula in southwestern Haiti provided more detailed and suspiciously consistent depictions of these peoples (Keegan 1989a). Although these descriptions were limited to groups inhabiting Cuba and Haiti, it is often assumed that they represent all of the Pre-Arawak groups of the Caribbean. In this sense they have been

instrumental in the construction of the current perception of the "Archaic Cultural Tradition of Puerto Rico" (Alegría et al. 1955).

One of the first uses of these ethnohistoric accounts was in the adoption of cultural nomenclatures to designate archaeological deposits devoid of pottery. The first to assign the term Ciboney to aceramic deposits was Cosculluela (1918) after his excavations in the Ciénaga de Zapata in Cuba. A couple of years later, Harrington (1921) adopted the term Ciboney to assign the aceramic remains that were usually identified in the interior of rock shelters and coastal shell middens. For him the Ciboney culture "were 'very simple' primitive people who had occupied the whole island of Cuba from the same unknown date in the distant past, were often cave-dwellers, were contemporaries of the *Megalocnus*, and probably descendants of Montane's 'Homo Cubensis'" (Harrington 1921:411). His depiction of these societies had marked repercussions because, even though previous scholars had already established the presence of a pre-Taíno horizon in Cuba (e.g., Fewkes 1908; de la Torre 1904, cited in Pichardo 1945:18), it was Harrington who conducted the first systematic study of aceramic deposits at an island-wide level, which served as the basis for later investigations on these assemblages in the Caribbean.

The applicability of the term Ciboney was put to question more than two decades later, paradoxically, by Cosculluela (1946), who then considered that the term that should be applied to these cultures should be Guanahatabey, as they were originally identified in Velázquez's account. His revision was based on the notion that, even though the term Ciboney seemed to be an appropriate referential concept because it contained the prefix *ciba*, which meant stone in Arawak (Arrom 2000), its use in the accounts of Las Casas made reference to enslaved Sub-Taínos (Cosculluela 1946:14).

Up to now, there has been a markedly inconsistent application of the cultural terms used to make reference to these Pre-Arawak peoples. For instance, while some still use the term Ciboney to make reference to the cultures that were "relics" of the first inhabitants of the islands (González 1995; Lalueza et al. 2003; Osgood 1942), others use that term to refer to the Sub-Taíno peoples of Cuba as did Cosculluela (e.g., Alegría 1981), and yet others to identify the latest manifestations of this culture (i.e., the Cayo Redondo manifestation; de la Rosa 2003). Other scholars have used the term Ciboney as a generic concept to refer to all the indigenous peoples of Cuba (e.g., Coll y Toste 1897). The term Guanahatabey has also been used as a general reference to Pre-Arawak cultures (Alonso 1995), whereas others have limited it to its earliest manifestations (i.e., Guayabo Blanco manifestation; de la Rosa 2003). As noted by Alegría (1981), these inconsistent uses of cultural nomenclatures have led to a great degree of confusion in the archaeological literature of the islands.

While debates regarding the nomenclature and phases of Pre-Arawak deposits began in Cuba in the first half of the 20th century, in Puerto Rico the study of aceramic deposits had stagnated partly as a result of the lack of reference to the presence of cave-dwelling societies in the island in the ethnohistoric accounts. This is implicit in Fewkes' (1907:41) comment about the presence of these groups in Puerto Rico:

> While the existence of cave dwellers the most savage in the neighboring islands, Cuba and Haiti, might lead to conjecture that there were also cave people in Porto Rico, when Columbus discovered the island the majority of the inhabitants were not troglodytic, but lived in the open country and resorted to the numerous caves only for sepulture of the dead or for religious rites.

In the late 1930s, Rouse (1952) conducted his survey in Puerto Rico and worked on several deposits lacking ceramics, which he identified tentatively as the Coroso culture. At that time he thought that if this culture indeed existed, it should have occupied the island approximately between A.D. 849 and 929 based on the rates of accumulation of refuse and average depths of

the middens (Rouse 1952:564-565). He remained cautious, however, in assigning such deposits to a Pre-Arawak culture because of the presence of indigenous ceramics and colonial materials in the middens, which suggested the possibility that these represented activity areas of later societies (Rouse 1952:562, 557; Rouse and Alegría 1990:25). Even so, Rouse (1952:568) hypothesized that:

> The preceramic (Coroso) Indians of Period I - if they existed at all - were probably hunters and fishermen, like the Ciboney Indians of Hispaniola and Cuba. They can be assumed to have entered Porto Rico from Hispaniola, settling only in the parts of the coastal area in which conditions were best suited to their mode of life.

It was not until the work of Ricardo Alegría in the Cueva María de la Cruz in northeastern Puerto Rico in the late 1940s that a formal discovery of a Pre-Arawak context in the island was made. This led him to structure the first synthesis of what he termed the "Archaic Cultural Tradition of Puerto Rico." (Alegría 1955, 1965; Alegría et. al. 1955). Alegría (1965:246) indicated that this tradition was characterized by "the absence of agriculture and pottery, seminomadic living in small bands, frequent use of caves for shelter and burial, extended burials, absence of cranial deformation, use of hematite or red ocher, and crude artifacts made on conch, shell, flint, and other stones." Alegría (1965:246) further added that:

> Evidence of these early inhabitants corroborates the leading historical sources of the conquest, which mention or describe the last survivors. In the late 15th century these Indians were inhabiting the Peninsula de Guanahatabeyes (Guanahacabibes) on the extreme western coast of Cuba and the Peninsula of Guacayarima in western Hispaniola."

In this way, a direct historical connection was asserted with the cave-dwelling societies described in the aforementioned ethnohistoric accounts and the aceramic archaeological record of Puerto Rico.

The initial characterization of the earliest societies of Puerto Rico was also nurtured with the evolutionary models that were in vogue at that time, specifically the one developed by Phillips and Willey (1953), in which the constituents of the traditional "Archaic Culture" were

defined (Alegría et al. 1955:113; Dávila Dávila 1985:6). Those models, which were based on cultures of big-game hunters that occupied continental settings, provided most of the elements that are, until this day, current in the construction of most of the interpretations that have been generated about these societies, as will be observed in the next sections.

Rethinking the Pre-Arawak Landscape of Puerto Rico

The Timing of the Discovery of the Island

According to Rouse's (1992) most recent scheme, the arrival of Pre-Arawak societies to Puerto Rico occurred sometime around 1000 B.C. (Figure 2-2). He considered that these peoples, whom he associated to the Coroso complex, belonged to the Corosan Ortoiroid subseries. This subseries derived from the Ortoiroid series developed in Trinidad, from where they supposedly migrated to the island via the Lesser Antilles. He further contended that the population of Coroso people in Puerto Rico "was so small and so widely dispersed as to be easily displaced or assimilated" upon the arrival of the producers of LH and Hacienda Grande pottery around 400 B.C. (Rouse 1992:69-70). Therefore, Rouse suggested that these "Archaic" people lived here for just about six centuries before they disappeared as a result of what he called the "the first repeopling" of the islands (Rouse 1992:71).

However, the available evidence indicates not only that the discovery of Puerto Rico was registered around three millennia earlier than suggested by Rouse, but also that the island was continuously inhabited for at least 35 centuries before the arrival of the people grouped under the Cedrosan Saladoid subseries. The earliest assay that we have from Puerto Rico was obtained from the Angostura site, located in the north-central portion of the island, which dates back to cal. 4900 B.C. (Ayes Suárez 1988). Further evidence for early human presence in north-central Puerto Rico comes from the Hato Viejo site that dated to cal. 3190 B.C. (Ayes Suárez and Dávila Dávila 1993) and from the paleoenvironmental studies conducted in Laguna Tortuguero, which

documented human induced forest fires in the area starting around cal. 3300 B.C. (Burney et al. 1994). The more than 60 dates that have been collected thus far from Pre-Arawak contexts present a continuous temporal spread that extends all the way to cal. A.D. 190 (Yanuel 9 site, Tronolone et al. 1984) (Figure 4-1). This indicates that these peoples continued living in the island for at least 600 years after than the timing of disappearance proposed in Rouse's model.

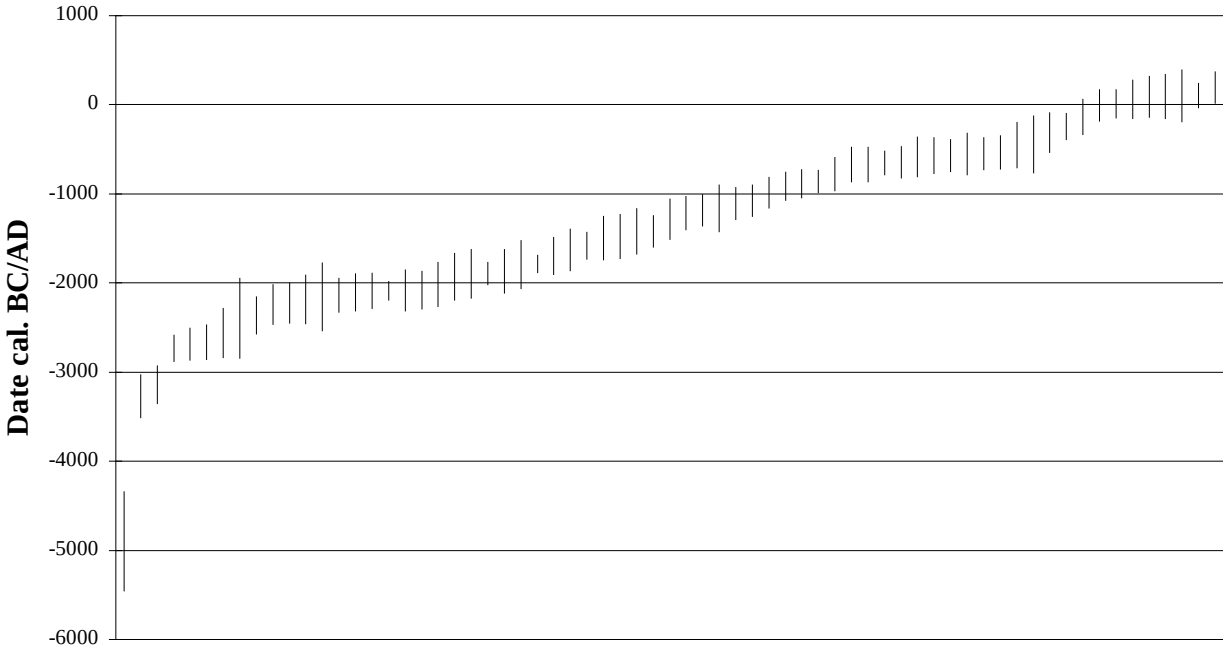

Figure 4-1. Plot of calibrated radiocarbon dates of Pre-Arawak contexts in Puerto Rico.

The early dates for the intrusion of these groups to Puerto Rico also puts to the question Rouse's contention about the directionality of their migration. Rouse (1992:62) argued, on the basis of his analysis of the radiocarbon assays recovered from the Lesser Antilles, that "This sequence of dates indicates a movement from south to north during the second millennium B.C. By 1000 B.C. the Ortoiroid peoples had apparently reached Puerto Rico and established a frontier with the Casimiroid peoples in Hispaniola." However, the dates from Puerto Rico actually predate the oldest available dates from the Lesser Antilles (with the exception of

Trinidad, which at that time was part of South America) by more than one millennium. For instance, Fitzpatrick's (2006) recent survey of radiocarbon assays has shown than in the northern Lesser Antilles the earliest dates go back to ca. 1900-1800 B.C., while in the southern Lesser Antilles these date to ca. 900-400 B.C. Therefore, this places a big question mark on both the origin the first inhabitants of Puerto Rico as deriving from northeastern South America via Trinidad as well as the direction of their spread toward the island through the Lesser Antilles. Furthermore, the earliest date from Puerto Rico is as early or even earlier than the oldest available ones from Cuba (cal. 3990 B.C.; Levisa site; Tabío 1995), Haiti (cal. 4430 B.C.; Vignier III; Moore 1991), and the Dominican Republic (cal. 3320 B.C.; Barrera Mordán site; Rouse and Allaire 1978), thus also making problematic tracing the earliest movements of these peoples from either of those territories. Further insights on this matter will be provided in the last section of this Chapter.

Traditions of Doing Stone Things in Pre-Arawak Times

Identifying distinct Pre-Arawak cultural complexes on the basis of the definition of lithic production traditions has become debatable on the island. Some scholars have indicated that the dissimilarities in artifact assemblages are the result of the convergence in the island of culturally distinct traditions of lithic making (e.g., Veloz Maggiolo 1993), while others have argued that the observed variability might indicate functional rather than cultural differences (Lundberg 1980). Pantel (1988, 1991) suggested that differences in the flaked lithic assemblages might relate to variability in raw material sources instead of distinct stone working traditions.

Unfortunately, the small quantity of detailed studies of Pre-Arawak assemblages has limited the evaluation of each of these perspectives in more detail. In the present discussion, I will try to piece together such scarce data in order to provide the first comprehensive description of the major technological styles observed in the core-flake, pecked-ground, and use-modified

subsystems from Pre-Arawak contexts of Puerto Rico. This discussion will be based primarily on the analysis of the lithics from Puerto Ferro, Paso del Indio, and the sites discovered during our lithic survey on the northwestern portion of the island (Rodríguez Ramos et al. 2007; Walker et al. 2001). These data will be supplemented with the available information from other sites in order to provide a more rounded perspective about the lithic traditions observed in the island during Pre-Arawak times. Hopefully, future detailed studies of Pre-Arawak lithic assemblages will allow a better understanding of the variability of these assemblages with higher degrees of temporal and spatial resolution in order to determine if distinct lithic traditions might be discerned.

Core-flake reduction

Rouse (1992:62) argued that the lithic production behaviors in what he termed the Ortoiroid series, to which the Coroso complex belongs, resulted in "small numbers of artifacts, all simple types with so few traces of manufacture that it is hard to find sufficient diagnostic traits." However, when considering the whole operational sequences presented in core-flake reduction, some major patterns begin to emerge which signal the application of several systematic flaking protocols. These technological formats seem to have been reproduced through time and in various geomorphic settings, as will be noted below.

Procurement dynamics. The protocols of obtaining natural objective pieces for their transformation into flaked artifacts seem to present two major patterns. The first is reflected in the procurement of cherts. This type of raw material is ubiquitous in Pre-Arawak sites from the island. Despite its presence, most habitation sites present a markedly low representation of tested nodules or cores of this raw material type. This seems to indicate that chert flake extraction occurred in most cases off-site (production contexts), rather than transporting raw materials to the places where tools were to be employed (consumption contexts). This is the case

in Puerto Ferro where, although 22 per cent of the complete freehand flakes were made of chert, there were no chert cores observed in the collection. Furthermore, there were no primary (i.e., cortex covered dorsal sides) freehand flakes or cortical shatter in this collection that might indicate their intra-site extraction from cores. The almost total absence of chert cores in sites that present a predominance of secondary and interior chert flakes has also been noted in most, if not all, other Pre-Arawak habitation sites such as Maruca (Febles 2004), Angostura (Ayes Suárez 1988; Ayes Suárez and Dávila Dávila 1993), Cueva la Tembladera (Martínez 1994), Cueva Caracoles (Dávila Dávila 2003), and Cueva Gemelos (Dávila Dávila 1981), among others. An exception to this rule are those sites that were located near chert bearing areas (e.g., VOA-1, Espenshade et al. [1986]; Ortiz site, Koski-Karell [1993]), where the whole operational sequence in which this raw material was involved was represented in those locations.

In our lithic sourcing survey on northwestern Puerto Rico we were able to document the presence of several loci where the production of chert flakes was observed. These sites were Quebrada La Salle, Central La Plata, La Planicie, Los Rayos, and Quebrada Grande (Rodríguez Ramos et al. 2007; Walker et al. 2001). These flake production activity areas tended to present a marked representation of discarded cores and cortex bearing flakes (Figure 4-2) and shatter, as well as low representations of utilized and/or retouched flakes. These sites also lack subsistence remains or any other elements that might signal their use for any other activity besides chert flake production. This case can also be suggested for other sites in Puerto Rico such as Cerrillos (Pantel 1988). This indicates the existence of focal contexts for the exploitation of this type of rock in the two chert-bearing areas of the island, located in its northwestern and southwestern portions, from where the extracted flakes were moved to the consumption contexts, some of which were located more than 170 km away (in the case of Puerto Ferro) (Rodríguez Ramos

2002a, 2002b). Thus far, the only method of procurement documented in Pre-Arawak contexts is the hand picking of nodular materials from residual sources, as there is no evidence for the mining of cherts from outcrops.

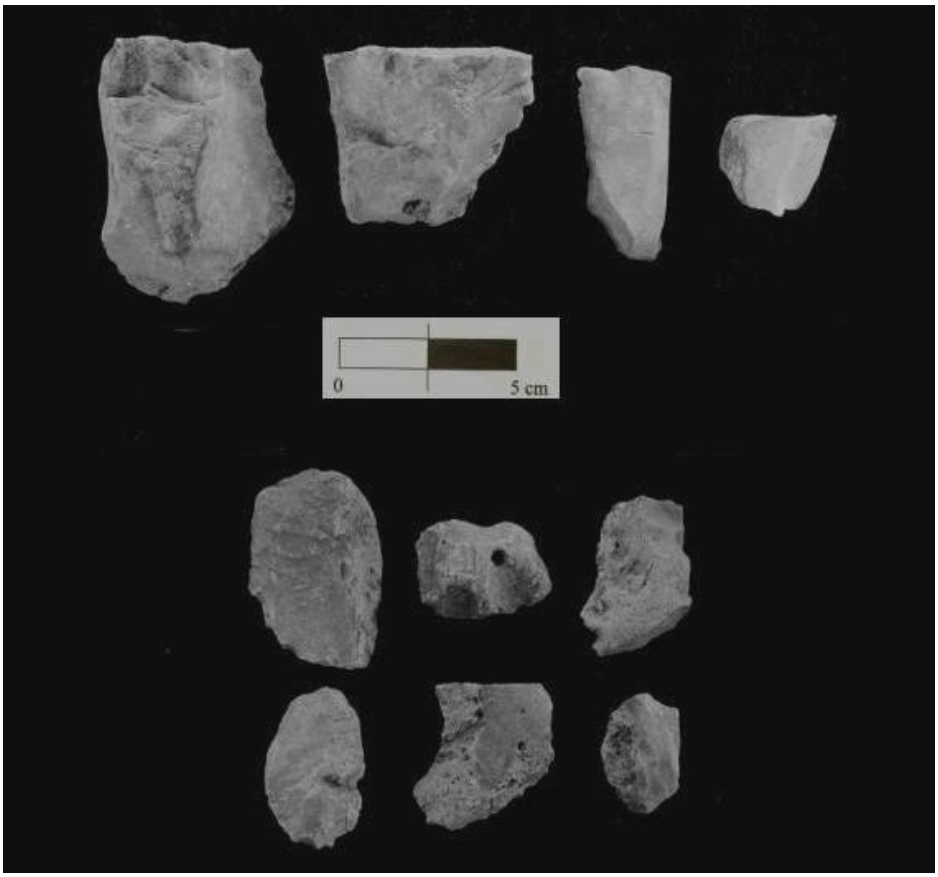

Figure 4-2. Single platform cores and cortex bearing flakes from La Planicie site, Moca.

In the case of the procurement of local products, the objective pieces were brought to the sites for their local reduction. This is the case in Puerto Ferro where cores made of locally available milky quartz were present at the site, as well as cortical flakes and cortex bearing shatter of this raw material. The intra-site reduction of local materials was also observed in Paso del Indio as well as in other sites such as Cueva Tembladera (Martínez 1994), Cueva Gemelos (Dávila Dávila 1981), and Angostura (Ayes Suárez 1988). In the selection of objective pieces there seem to be some generalized criteria that were exercised in the different contexts, particularly the emphasis on the obtainment of angular cobbles or nodules that presented a flat

surface that served as the striking platform, which was usually located along the thinnest axis of the piece. This pattern was observed both in Paso del Indio and Puerto Ferro, although the local materials that were consumed in the former site were meta-volcanic cobbles obtained from the Río Indio while in the latter were angular milky quartz nodules that were available in the area. This indicates that the selection of objective pieces for freehand flake extraction adhered to similar criteria irrespectively of the particular type of raw material that was locally available in the different contexts.

Production dynamics. Despite any differences that may be discerned in the protocols of procurement of imported cherts versus local materials, the primary freehand format observed in Pre-Arawak contexts throughout the island for flake production adheres to a parallel flaking protocol irrespective of the particular raw material that was employed. However, there are some differences in the core-setup practices observed in the reduction of cherts versus the locally available materials. The freehand reduction of meta-volcanic cobbles follows a systematic protocol that I have called the cobble slicing technique (Rodríguez Ramos 2005a), which was observed originally in later contexts. This technique involves the selection of blocky cobbles with one (single platform) or two (inverted platform) opposed flat surfaces, which serve as their striking platforms (Figure 4-3). In some cases, in order to create flat surfaces from cobbles that do not present them naturally, these are split either by throwing or bipolarly. Also, in some cases flat surfaces are created by the extraction of rather massive and thick freehand flakes that eventually serve as cores (core-on-flakes). Then a sequence of flakes is detached in slices from one end of the cobble to the other extreme along one of its faces. This initial slice, when extracted from complete cobbles, results in the production of a corner-struck flake that usually presents a cortical platform and a natural dorsal ridge (i.e., core initiation flake), and then a set of

secondary flakes with cortical platforms, unidirectional ridges, and diverse degrees of cortex cover (Figure 4-3). The following slices produce flakes with cortical platforms and a lack of dorsal cortex cover. In the cases of split cobbles and core-on-flakes, the detached flakes tend to be similar in form and technological attributes as those obtained from complete cobbles, with the main difference being the lack of cortex on their platforms (which tend to be single-faceted).

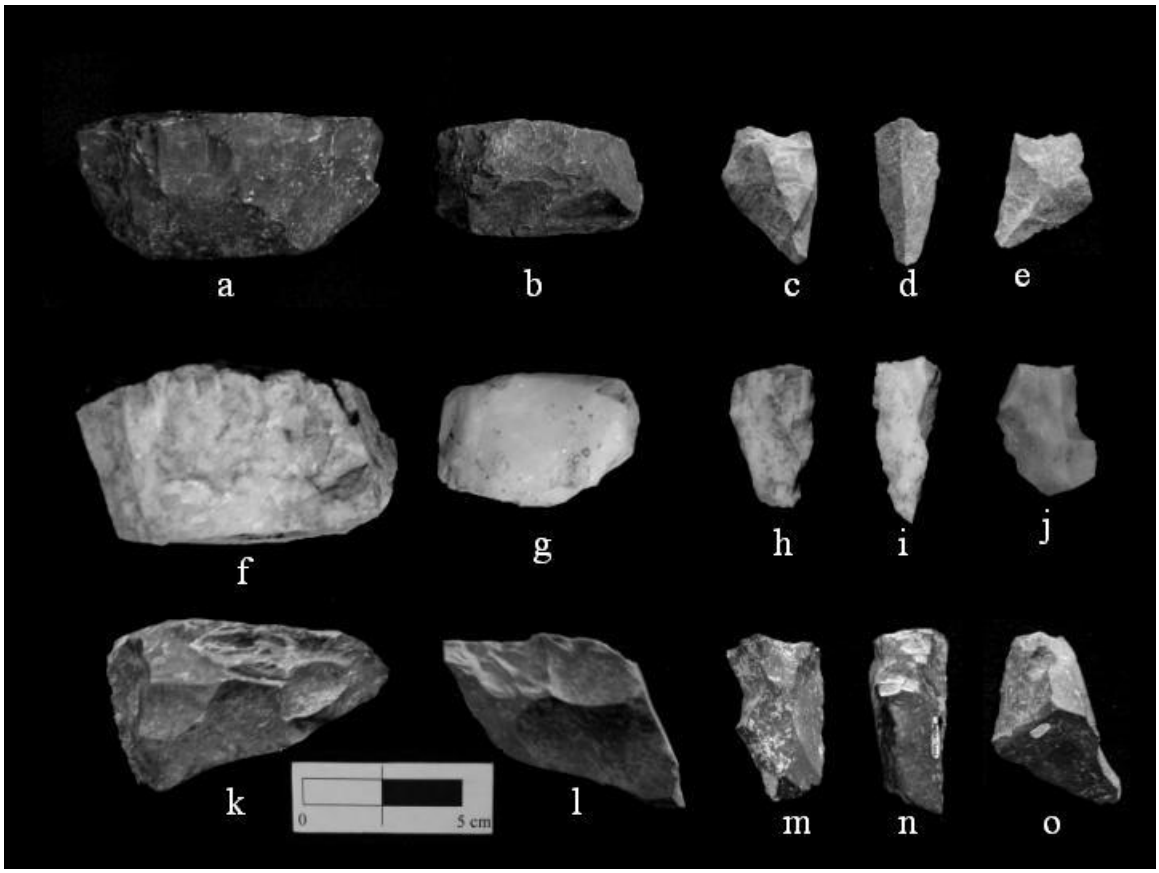

Figure 4-3. Cores and flakes made by the cobble-slicing technique. (a-e) Cueva la Tembladera; (f-j) Puerto Ferro; (k-o) Maruca.

The cores almost invariably present shorter dimensions along their length than their width, due to the fact that the flakes are extracted along their shorter face. In a significant amount of cases, the platforms of the flakes are prepared by trimming. Some of the flakes produced by this technique also present axial splitting. The reasons for this longitudinal fragmentation of the

bulbs of force may include the presence of impurities or cleavage planes in the platform area or the application of amounts of force that exceed the elastic capacities of the material.

The flakes that can be attributed to this process present a combination of features that include: cortical or naturally faceted flat platforms, in some cases prepared by trimming; dorsal surfaces with flake scars that run parallel to their longitudinal axis; and, a relatively high incidence of flakes with axially split bulbs of force. The cores that were used in their pristine state commonly present an ovoid or cylindrical morphology while the ones that were first split and then reduced are usually conical in form.

The application of this flaking protocol resulted in some cases in the production of massive flakes that measure more than 20 cm in maximum length. In limited tests that I have conducted, I have noted that in order to extract these massive flakes it is necessary to support the cores on the ground or some other soft surface (i.e., wood). An advantage of this practice would have been the lessening of the cushioning effect (Shafer 1973) created when flaking hard materials hand held, thus minimizing hinge and step fracturing of the pieces. By resting the cores over a surface, the knappers also increased flaking efficiency by having more control over the flaking angle. In fact, this floor resting might explain why some of these massive freehand flakes presented a rather straight profile and diffuse bulbs. In this case, I do not think that this core support was actually done on a stone anvil, as no distal crushing is observed in neither the cores nor the flakes.

In the case of nodular cherts, flat platforms were prepared by splitting the objective piece either bipolarly or through the detachment of a core tablet in order to create the necessary angle for flake detachment (e.g. Figure 4-2a). As previously noted (Rodríguez Ramos 2005a; Rodríguez Ramos et al. 2007), the purpose of this reduction protocol seems to have been

threefold. First, it served for economizing purposes because it resulted in the creation of two potential cores with straight platforms from only one parent mass, and as a result the number of flakes that could be obtained from a single nodule could be doubled. Also, the process of splitting a nodule into two halves served for creating two decorticated surfaces, in which the applied blows were much more predictable and, thus, efficient because neither their trajectory nor their force was diffused by the pillow effect which is created by cortex on percussion platforms. Finally, another purpose could have been that the process of segmenting an ovoid nodule produces two potential conical segments, a morphology that eases flaking operations.

After splitting the nodule into two segments, flakes were extracted following a parallel flaking format similar to the one previously described for the cobble slicing technique. In a minority of cases, the ventral surfaces of thick freehand flakes were also employed as striking platforms resulting in the production of core-on flakes, as was observed in one specimen from Paso del Indio. In either case, flakes tend to have flat decorticated platforms usually prepared by trimming, with parallel dorsal scar patterns and different degrees of cortex content depending on their reduction state (Figure 4-4). As was the case in the cobble-slicing technique, flakes tend to be extracted by applying the blow in line with a ridge producing flakes with plano-convex cross-sections. It is very important to note that although the mechanics of this flaking protocol operate in a similar fashion as a true-blade technology (Collins 1999; Kooyman 2000), its purpose was not necessarily aimed at producing flakes with blade proportions (length twice its width) but rather to extract flakes with straight and parallel durable edges that could be used with little or no secondary modification. The similarities in the mechanics observed in the parallel core-flake reduction of cherts and other raw materials resulted in the creation of flakes with almost identical morphologies in both materials.

Figure 4-4. Chert parallel flakes. (a-f) Quebrada la Salle; (g-l) Maruca; (m-p and w-y) Cueva la Tembladera; (r-v and z-C) Puerto Ferro.

In the reduction of cherts and local materials, the application of a parallel freehand flaking format most commonly results in the production of cores with single or inverted platforms from which flakes were detached along a single axis. Another parallel in the reduction of imported chert and locally available stones is the application of trimming as the primary platform preparation method used to remove unwanted portions of platform material, in order to avoid the diffusion of the force of impact during flake detachment or the collapse of the striking surface. In the analyzed collections, no piece presented other forms of platform preparation such as faceting or grinding.

Other much less represented forms of freehand flaking have also been noted, particularly the extraction of flakes following a centripetal flaking format. This for instance was observed in the form of a discoidal core produced over locally available milky quartz in Puerto Ferro, which

presented flake scars projecting from the margins of both of its faces. As a result, the flakes produced by this technique tend to present bifacial platforms and converging dorsal scar patterns. Only one of such flakes was observed in Puerto Ferro and none in Paso del Indio. The application of this technique in Pre-Arawak contexts has also been noted by Febles (2004) in Maruca, where it was represented by the presence of four discoidal cores (Figure 4-5a-d) and several flakes with converging dorsal scar patterns (Figure 4-5e-h).

An interesting fact is the documentation of the application of bipolar flaking in some of these contexts. In Puerto Ferro, this technique is represented by the presence of a bipolar flake and a bipolar core, both produced on milky quartz (Figure 4-5o-p). The application of the bipolar technique for core-flake reduction was also noted by Tronolone et al. (1984) in Vieques. Febles (2004) has also documented the presence of bipolar flaking amongst the materials from Maruca (Figure 4-5i-n), which he has associated to the Playita microlithic industry that he considers to be derived from the western lithic co-tradition observed in the southeastern portion of the United States. It should be noted, however, that in contrast to later sites where there is a marked incidence of bipolar products, the application of this technique seems to have been of secondary importance in Pre-Arawak contexts. The reasons for the application of bipolar flaking in these contexts is not clear at the moment, as the limited evidence that I have at hand of this technique does not allow to me determine if it was employed in the production of the *pieces esquillée* (i.e., wood and/or bone splitting wedges), or to produce microliths for their insertion in composite tools such as grater boards as has been suggested for later contexts.

As previously noted, the flakes detached by the aforementioned techniques were employed with little or no modification. This low incidence of secondary flaking was considered by Pantel (1991:160) to be one of the key features in Pre-Arawak assemblages of, not only Puerto Rico,

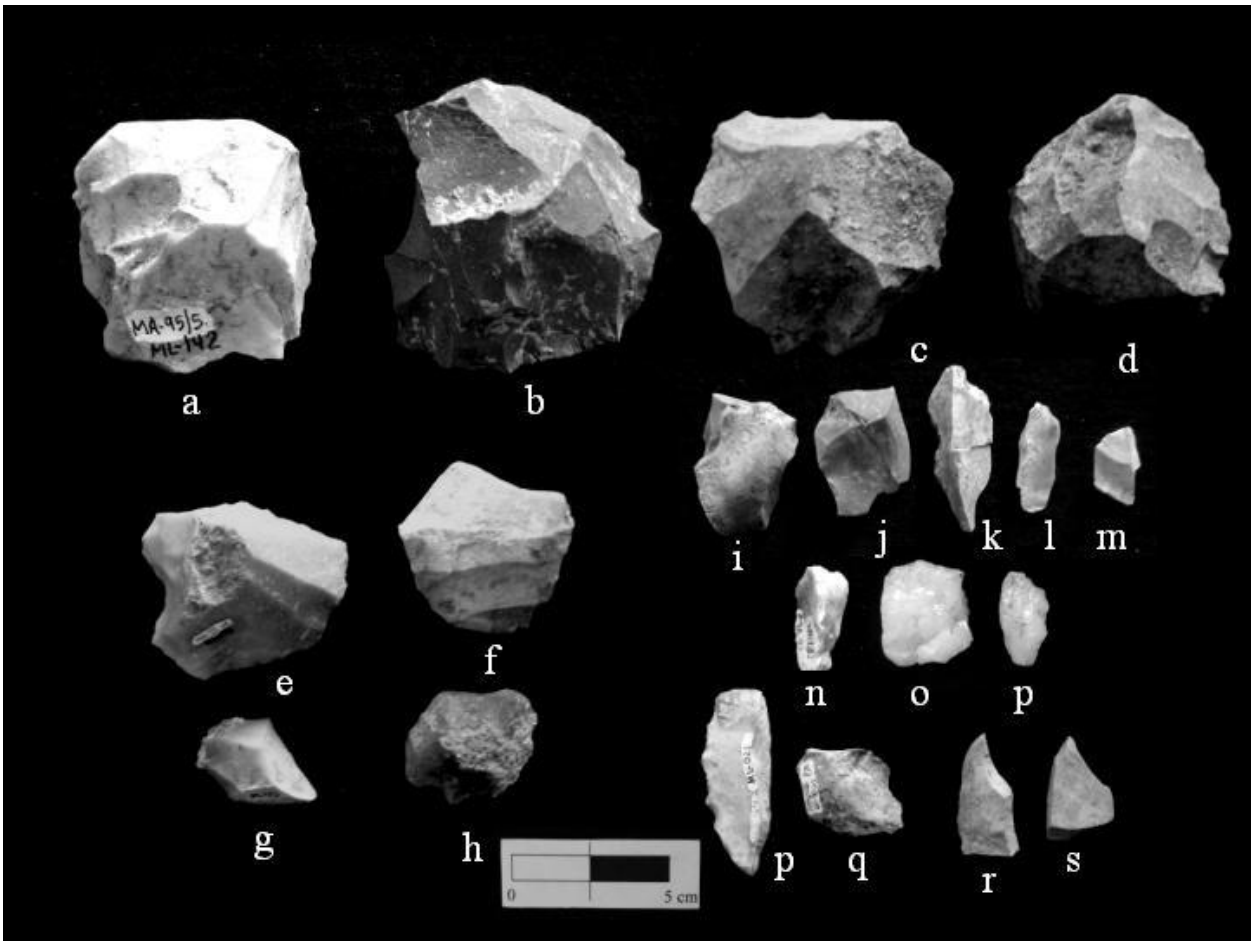

Figure 4-5. Other core-flake reduction formats and types of retouched flakes. (a-d) discoidal cores, Maruca; (e-h) flakes with converging dorsal scar patterns, Maruca; (i-p) bipolar flakes and cores, Maruca and Puerto Ferro; (p) denticulate retouch, Maruca; (q) incurvate retouch, Cueva la Tembladera; (r-s) burin retouch, Maruca.

but also the Greater Antilles in general. In the cases were post-extraction manipulations have been observed they are mostly limited to abrupt unifacial retouches circumscribed to the margins of the tools, applied to create incurvate (Figure 4-5q) or denticulate working edges (Figure 4-5p). Febles (2004) has also noted the application of a burin retouch to isolate pointed projections in some of these flakes (Figure 4-5r-s). There is only scant evidence for the manufacture of bifacial flaked-stone tools, being mostly derived from irregularly flaked nodules or thick flakes, which results in the production of wedge-like pieces (Febles 2004) similar to those documented by

Ranere (1975) in Panama. Therefore, flaking operations have been mostly limited to core reduction for producing flakes as final products, which were most likely used as hand-held tools.

Pecked and ground materials

In addition to chipped stone, Pre-Arawak assemblages on the island contain a marked variety of ground implements. The application of grinding as a manufacturing technique seems to have been carried out since the earliest occupations of Puerto Rico that, as mentioned before, go back to at least 4000 BC. This indicates that the available evidence does not support Rouse's (1992:51) separation of Lithic (4000 – 2000 B.C.) from Archaic (2000 – 400 B.C.) assemblages as indicative of two distinct developmental stages because some Pre-Arawak contexts bear indications of the application of pecking and grinding techniques from the earliest phases of occupation of the island that go back to what he considered to be Lithic times.

Celts. Amongst the ground implements there is limited evidence for the production of celts although Rouse (1992:66) understood that "The Coroso culture lacks this type of artifact." Yet, one massive petaloid celt that was highly weathered was recovered from lithostratigraphic unit A in Paso del Indio, which dated to between cal. 2870 B.C. and cal. 2470 B.C. (Figure 4-6a). Other bifacially ground celts have been recovered from Angostura (Ayes Suárez 1988), Ortiz site (Koski-Karell 1993), Cueva Tembladera (Martínez 1994), and Caño Hondo (Figueredo 1976). This production of ground stone woodworking tools seems to have been supplemented by the manufacture of shell celts and gouges, which have been recovered from several sites on the island (e.g., Dávila Dávila 2003; Febles 2004; Figueredo 1976; Tronolone et al. 1984). These have been found in a different array of contexts, from the interior of the island to coastal settings, and present reduction protocols that to a great degree overlap with those evidenced amongst the lithic materials.

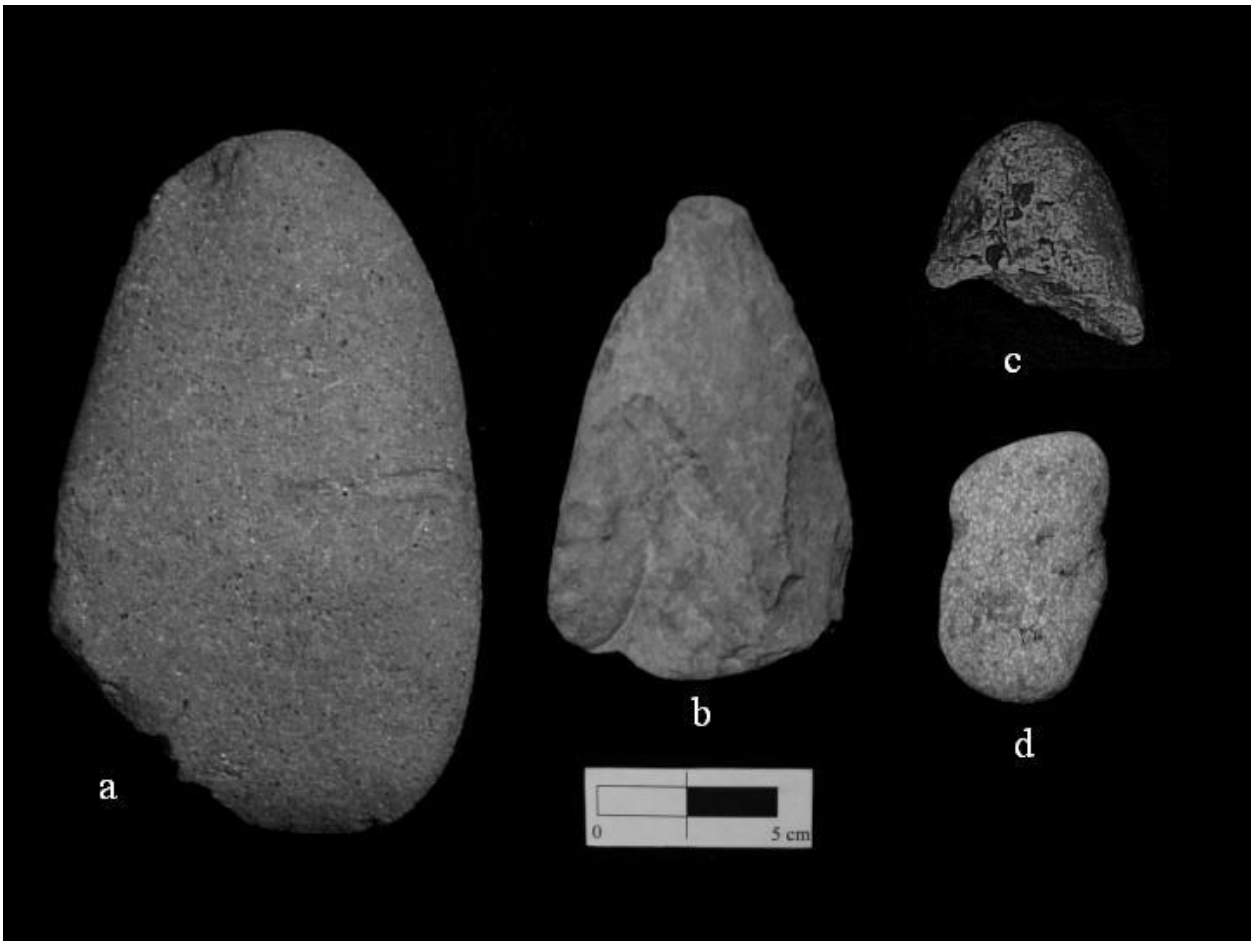

Figure 4-6. Ground tools from Pre-Arawak contexts. (a) biconvex celt, Paso del Indio; (b) celt preform, Puerto Ferro; (c) poll fragment of a biconvex celt made of radiolarian limestone, Paso del Indio; (d) netweight, Puerto Ferro.

In the production of celts, mostly meta-volcanic materials available at the vicinity of the sites were used although in most cases there is no evidence for their local reduction in the form of discarded preforms or bifacial thinning flakes. This seems to indicate that these items were most commonly produced off-site or in unsampled portions of those settlements. However, a deviation to this norm was observed in Puerto Ferro were a celt preform was uncovered (Figure 4-6b). This preform presents lateral intrusive flaking imparted in order to provide the tool with its overall shape as well as to thin it to the desired breadth. As is observed in the finished item from Paso del Indio and in those reported from Caño Hondo (Figueredo 1976) and Angostura (Ayes Suárez and Dávila Dávila 1993), grinding was used in some cases as a termination

procedure to smooth out the irregularities produced by the negative scars left by the flaking. Another interesting case is the recovery in Paso del Indio of the poll end of a celt that was produced over radiolarian limestone (Figure 4-6c), a material whose occurrence has been limited to the island of Saint Martin (Knippenberg 1999b, 2006) that is located around 350 km east of the site.

Other ground materials. Another formal artifact observed in Pre-Arawak contexts is the netweight. These were produced on cobbles to which marginal notches were imparted by flaking and/or pecking-grinding. A piece from Puerto Ferro was made of diorite and presents two lateral notches prepared by flaking and then smoothed by grinding (Figure 4-6d). Netweights have also been observed in other Pre-Arawak contexts such as in Angostura and Hato Viejo (Ayes Suárez 1988). The presence of these implements is of marked importance since they serve as indirect evidence for the use of tended facilities such as nets for increasing fish capture by procurement events. These are also important because they have been found in some cases in interior contexts which indicate their probable use for the exploitation of rivers, thus allowing these peoples to master one of the biggest challenges of living in interior settings in the Antilles, which was the consistent obtainment of meat (i.e., protein) in inland contexts. Another type of implement for hunting and/or fishing documented in these contexts is the bone point. For example, Ayes Suárez and Dávila Dávila (1993:93) report finding three points made of stingray spines in the Angostura site.

Among the most chrono-diagnostic ground tool are the conical manos. These are hand-held made on fine-grained metavolcanic stones that present a three-pointed morphology, some of which show a tantalizing similarity with some simple *cemí* versions found in the Dominican Republic. The most elaborated ones, recovered from Cayo Cofresí (Veloz et al. 1975), present a

high degree of polishing on most of their body surfaces as a termination technique. Coarser conical manos have also been recovered from Puerto Ferro and Maruca (Figure 4-7). An interesting observation is that these present a wear pattern that is indistinguishable from that observed in edge-ground cobbles (Rodríguez Ramos 2005b; see below). This might indicate that these were actually stylized versions of a tool that was previously modified only by the use to which it was submitted.

Figure 4-7. Conical manos from Puerto Ferro and Maruca.

In addition to the utilitarian ground materials there is evidence in Puerto Rico for the production of an array of artwork that included personal adornments as well as other sumptuary items. The degree of elaboration observed in the production of some of these pieces makes questionable Rouse's (1992:67) indication that these peoples "had no interest in art." Rather, these earliest inhabitants of the island were knowledgeable of the production of artwork that

shows different degrees of sculpturing complexity in different raw materials that included not only stone, but also shell and bone.

The assertion of identity through the reproduction of some types of personal adornments has been observed in quite distinct contexts that crosscut island boundaries. This is the case of a type of wearable art that has commonly been known as *bobitos*, which are pendants that present the use of confined peripheral grinding to accentuate geometric decorative patterns (Figure 4-8a-d). Most of these items show a spiraled morphology that in some cases ends with a conical projection in their distal area (Ayes Suárez 1992). Interestingly, the overall shape of these pieces is extremely similar to the spiral shell that encases gastropods such as *Megalomastoma* sp., a type of *caracol* that is ubiquitous in the northern part of Puerto Rico and was consumed in Pre-Arawak sites from that part of the island (Dávila Dávila 1981; Martínez 1994; Sanders et al. 2001). These pendants have been found in archaeological sites located in a rockshelter in Mona Island (Cueva de los Caracoles; Dávila Dávila 2003), in the karst interior of Puerto Rico (Ángeles; Ayes Suárez 1992), as well as in an alluvial valley in the north-central portion of the island (Angostura; Ayes Suárez 1988). In the latter two cases, the raw materials on which these were made (meta-volcanic stones) are available near the sites where these have been found. However, one of the pieces from Mona Island is particularly interesting because it is made of basalt while that island is completely sedimentary, which indicates that these pieces were imported from Puerto Rico (Ayes Suárez 1992:13).

Additional examples of personal adornments made from imported materials were documented by Ayes Suárez (1988, 1994; Ayes Suárez and Dávila Dávila 1995) who reports finding two serpetinite pendants in the Angostura site, one recovered from Mound A and another

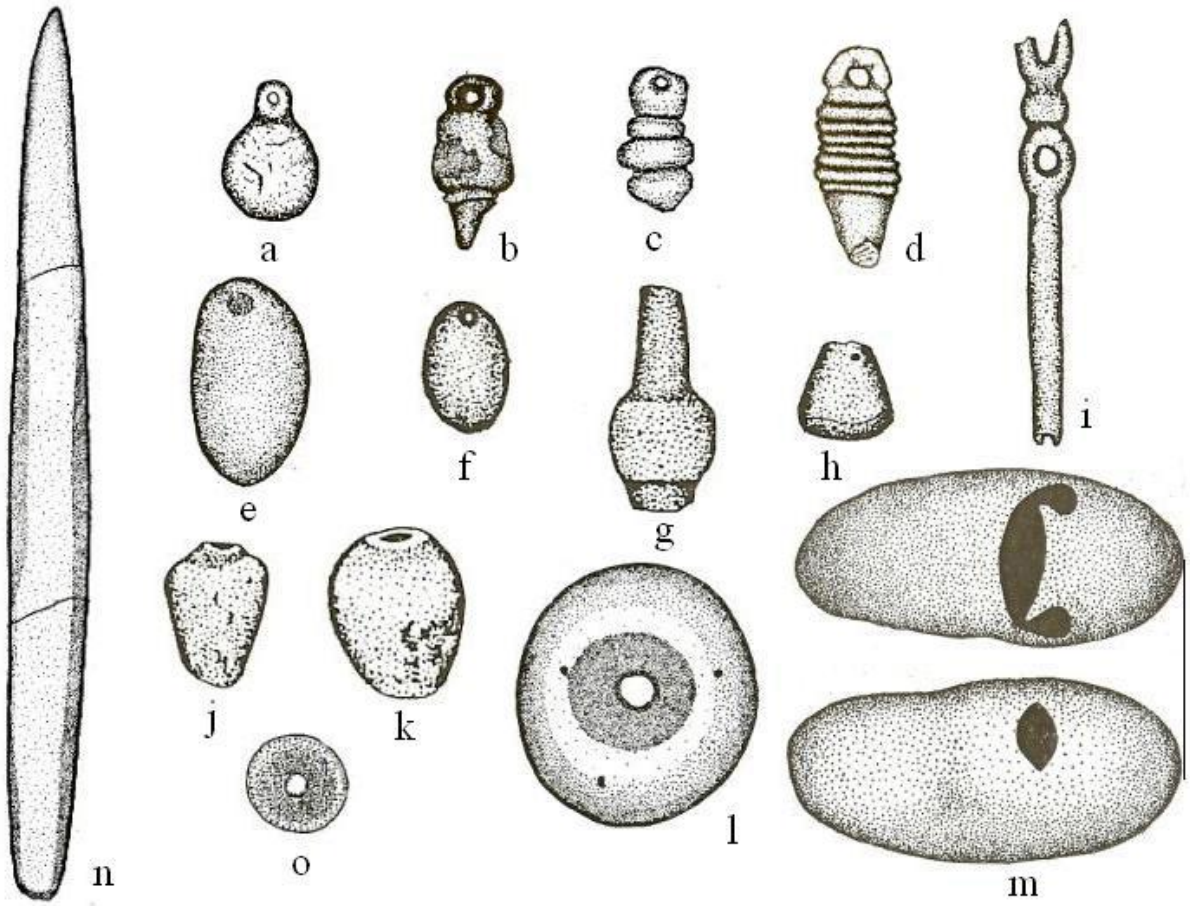

Figure 4-8. Personal adornments and other sumptuary materials from Pre-Arawak contexts in Puerto Rico. (Not to scale). (a) *bobito* pendant, Angeles, length = 3.5 cm, after Ayes Suárez 1992, Figure 2c; (b) *bobito* pendant, Cueva de los Caracoles, length = 4 cm, after Ayes Suárez 1992, Figure 2a; (c) *bobito* pendant, Angostura, length = 2.6 cm, after Ayes Suárez 1988, Figure 7; (d) *bobito* pendant, Cueva de los Caracoles, length = 8.3 cm, after Ayes Suárez 1992, Figure 2b; (e) randomly shaped bead, Angostura, length = 5 cm, after Ayes Suárez 1992, Figure 1e; (f) randomly shaped bead, Angostura, length = 2.2 cm, after Ayes Suárez 1992, Figure 1f; (g) enigmatic object of manatee bone, Angostura, length = 4.2 cm, after Ayes Suárez 1992, Figure 1d; (h) bead of *Strombus* sp., Angostura, length = 2 cm, after Ayes Suárez 1992, Figure 1c; (i) pendant made of manatee bone, Angostura, length = 9 cm, after Ayes Suárez 1992, Figure 1g; (j) bead of *Conus* sp., Angostura, length = 2.6 cm, after Ayes Suárez, Figure 1b; (k) bead of *Conus* sp., Angostura, length = 2.8 cm, after Ayes Suárez 1992, Figure 1a; (l) doughnut-shaped implement, Angostura, 5.4 cm, after Ayes Suárez and Dávila Dávila 1993, Figure 011; (m) engraved cobble, La Pesa, diameter = 22 cm, after Ayes Suárez 1991a, Figure 1; (n) stone dagger, Angostura, length = 27.6 cm, after Ayes Suárez and Dávila Dávila 1993, Figure 002; (o) bead of fish vertebrae, length = 1.2 cm, after Ayes Suárez 1992, Figure 6.

from Mound B in association with a burial (Figure 4-8c). Koski-Karell (1993:3) also reports the presence of several "oval-shaped amulets" made of serpentinite at the Ortiz site. The geological occurrence of this type of raw material is limited to the western portion of Puerto Rico, in contexts located around 100 km southwest of Angostura.

Another type of personal adornments is the stone bead. An example of a discoidal bead comes from Puerto Ferro in the form of a basalt piece that sports a biconical incision as well as an incised line that encircles one of its faces (Figure 4-9a). Other forms of wearable art consist of randomly shaped beads made on waterworn meta-volcanic and quartz pebbles that present one major biconical incision (Figure 4-8e-f). Two examples of these were recovered from Angostura (Ayes Suárez 1992). Dávila Dávila (1981) also reports the presence of a bead made on a stalactite fragment recovered from Cueva Gemelos.

The application of grinding in Pre-Arawak contexts for the production of personal adornments has also been noted in other raw materials, namely shell, coral, and bone. Three artifacts made of portions of *Conus* sp. (Figure 4-8j-k) and *Strombus* sp. (Figure 4-8h) shells were uncovered from Angostura and Hato Viejo (Ayes Suárez 1992). Three beads made of *Cyphoma* sp. shells were uncovered from Maruca (Febles 2004), although Bill Keegan (personal communication 2007) argues that these may have actually been fishing lures and not personal adornments. Other materials that have served to reproduce emblems of identity in various contexts have been the shark teeth and fish vertebrae (Ayes Suárez and Dávila Dávila 1993; Martínez 1994) (Figure 4-8o). Also, the use of manatee bone has been documented by Ayes Suárez and Dávila Dávila (1993) in the production of two unique composite pendants recovered from the Angostura site (Figure 4-8g and i). One of these is particularly interesting because of the application of bone working techniques for the creation of negative spaces within the piece

(Figure 4-8i). To my knowledge, this is the only Pre-Arawak context were manatee bone has been used for the production of personal adornments and where these particular types of pendants have been uncovered in the Antilles thus far.

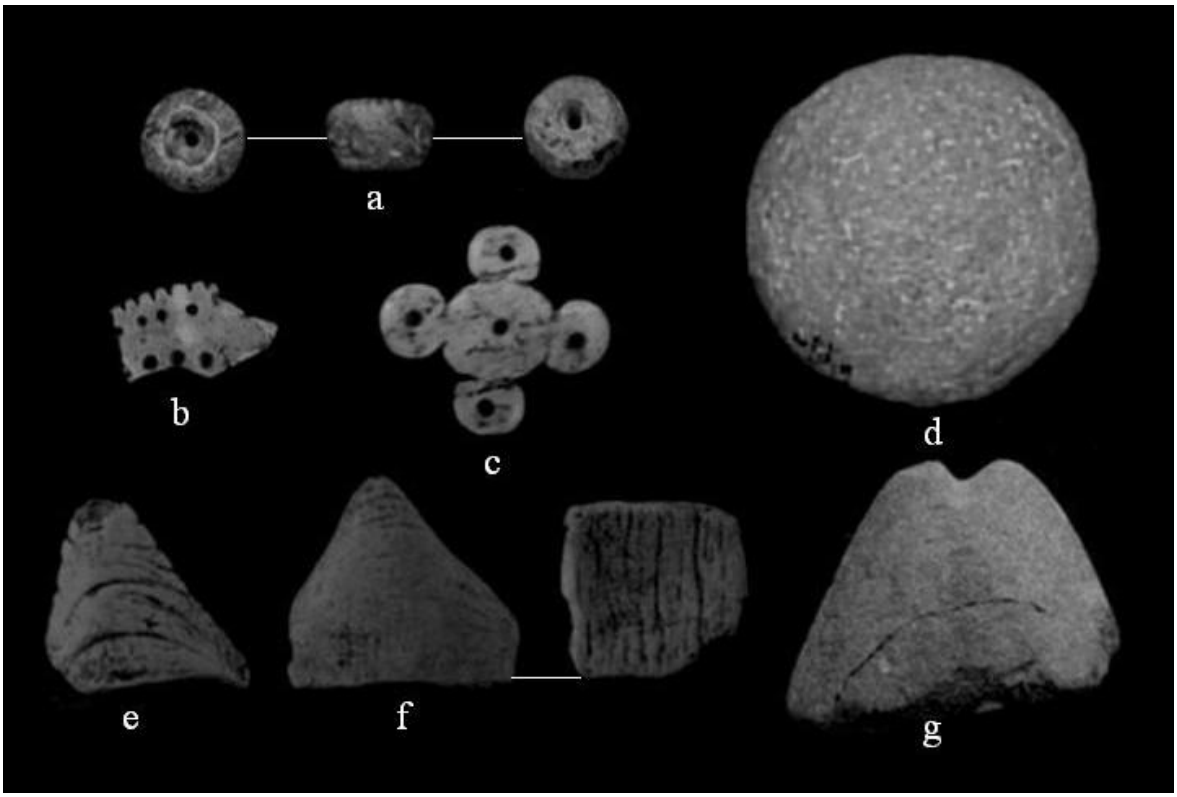

Figure 4-9. Sumptuary materials from Pre-Arawak contexts. (Not to scale). (a) engraved discoidal bead, Puerto Ferro, width = 2.3 cm; (b) mother of pearl pendant with serrated edges, Maruca, length = 2.6 cm, courtesy of Miguel Rodríguez; (c) fused-circles pendant, Maruca, length = 4.6 cm, courtesy of Miguel Rodríguez; (d) stone sphere, Paso del Indio, diameter = 4.8 cm; (e) shell three-pointer, Puerto Ferro, height = 1.4 cm; (f) shell three-pointer, Puerto Ferro, height = 1.6 cm; (g) peg-shaped stone, Puerto Ferro, length = 6.8 cm.

From the Maruca site, three unique shell adornments were recovered. Two of these are made on mother of pearls (whether *Pinctada* sp., *Pteria* sp., or *Codakia* sp. is unknown at the moment). These have a curved serrated edge and several incisions on their bodies (Figure 4-9b). These are quite similar to some of the mother of pearl pendants found in LH deposits (e.g., Chanlatte and Narganes 2005:44). This is the first instance in which mother of pearls has been documented in Pre-Arawak contexts of the Antilles. Another unique piece produced over a

Strombus sp. shell was recovered from this site (Figure 4-9c). It consists of a composite pendant that presents four fused circles (one of them is missing, but is recreated in Figure 4-9c) encircling another larger central one. Each of these circular sections presents a central orifice. Whether these are for stringing, for adding feathers, or a representation similar to the Capá eye is still uncertain. Interestingly, as was observed by Jaime Pagán Jiménez (personal communication 2007) this piece presents a tantalizing similarity to the famous petroglyph popularly known as the *Sol Taíno de Jayuya*.

Upon the inspection of the materials from Puerto Ferro housed at the Museo del Parque de las Ciencias, I observed two pieces that present a remarkable similarity to what are commonly known as *protocemíes* (i.e., proto-cemíes) made of the spines of *Strombus* sp. shells (Figure 4-9e-f). These presented the common three-pointed morphology observed in these items, as well as evidence of grinding in their areas of detachment. The pointed projection in one of these (Figure 4-9f) was further accentuated by grinding, as is also observed in the three-pointers recovered from later contexts. Due to the fact that these have been the only ones of these types of pieces reported thus far from Pre-Arawak contexts of the island makes tentative the determination if these were *protocemíes* or not although that possibility should not be discarded *a priori*, as will be discussed later.

Another type of artifact that has been reported from various Pre-Arawak contexts of Puerto Rico is the stone sphere (Figure 4-9d). These pieces are usually made of meta-volcanic stones that present almost perfectly circular morphologies. Some of these, like the one obtained from lithostratigraphic unit B of Paso del Indio, have a rather coarse texture while others seem to have been further terminated by grinding. In addition to Paso del Indio, these spheres have been found as offerings in a burial at the Ortiz site (Koski-Karell 1993). The use of stone spheres as

burial offerings was also noted in a cache of these items found at the bottom of the Île à Rat in Haiti (Bill Keegan personal communication 2007).

The lithic collection from Puerto Ferro contained an artifact made out of basalt that presented a ground concavity that isolated two eared projections (Figure 4-9g). Although this piece is fragmented, it seems to be markedly similar to the ones described by Rouse (1960c, Figure 10; 1992, Figure 17e) as peg-shaped stones recovered from Cayo Redondo in Cuba and Couri in Hispaniola. Koski-Karell (1993) also reports the finding of one of these peg-shaped items in association to a burial at the Ortiz site. Another interesting piece was recovered by Ayes Suárez (1991a) from La Línea site in Ciales. It consists of a cobble that presents an engraved representation seemingly zoomorphic in shape (Figure 4-8m), which is thus far unique in Puerto Rico and the Antilles. Such representation is tantalizingly similar in overall shape to the LH avian pendants, which will be described in Chapter 5. Ayes Suárez and Dávila Dávila (1993) also report a doughnut-shaped stone ring quite similar to the ones reported in the Greater Antilles, Colombia, and Florida (Figure 4-8l). The particular function of this item, whether utilitarian and/or sumptuary, remains uncertain.

A very interesting find is that of a stone dagger recovered from Angostura between 70 and 80 cm below the surface (Ayes Suárez and Dávila Dávila1993) (Figure 4-8n). This piece presented an elongated form with a tapering end whose shape was seemingly accentuated by pecking. It measures almost 28 cm in maximum length. Together with another dagger recovered in Arecibo (Ayes Suárez 1991b), these constitute the only finds of this type of implement in Pre-Arawak contexts of the Antilles outside Cuba and Hispaniola.

The use of these personal adornments and ritual paraphernalia was complemented with the common use of ochre, which is ubiquitous in most Pre-Arawak contexts of the island as Rouse

(1992) and Alegría et al. (1955) had originally noted. This, together with the finding of unmodified quartz and calcite crystals at several locations (Ayes Suárez 1992; Dávila Dávila 1981; Figueredo 1976), were part of the social paraphernalia employed by at least some of the people that inhabited the island in Pre-Arawak times.

Use-modified materials

Most Pre-Arawak sites have also produced a great assortment of materials modified simply by the uses to which these were submitted. Artifacts such as percussors, grinding slabs, pestles, manos, mortars, milling stones (Figure 4-10c), and edge-battered stones (Figure 4-10e) are usually found in these contexts all around the island. These tend to be highly variable in shape and raw material, these traits being mostly dependent on the types of objective pieces that are locally available. One of the few use-modified materials that present recurrent forms are the discoid nutting stones, which sport a confined pitted depression in the center of one or both of their faces, coupled with peripheral battering around its margins (Figure 4-10f). These are commonly thought to be associated to the splitting of corozo (*Acrocomia media*) nuts. The use of use-modified stones is complemented by the employment of coral. Amongst the coral materials, the most salient ones are the *limas* (i.e., files), which are ubiquitous in most sites of the island.

The most commonly reproduced material modified by use in almost all Pre-Arawak contexts from Puerto Rico has been the edge-ground cobble. This tool type consists of an ellipsoidal or half-moon shaped cobble, in most cases of a meta-volcanic material, that presents a ground facet along its longest and thinnest margin (Figure 4-10a-b, d). This faceted section tends to be convex in cross-section, presenting a distinct boundary with both faces of the artifact. In addition to the faceted margin, most specimens tend to show battering marks on one of their ends, usually the one with the most pointed form.

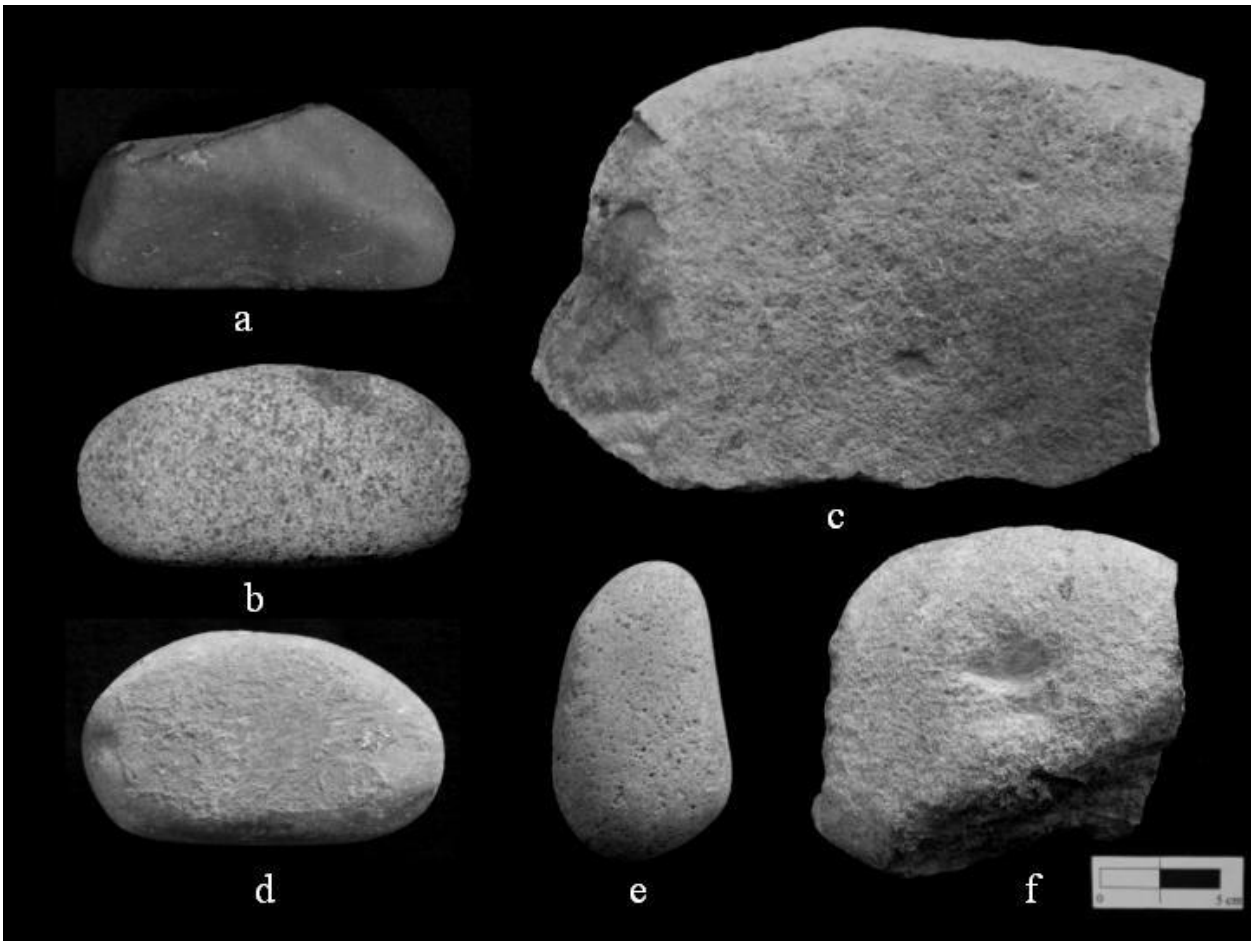

Figure 4-10. Use modified materials. (a) edge-ground cobble, Paso del Indio; (b) edge-ground cobble, Puerto Ferro; (c) millingstone, Maruca; (d) edge-ground cobble, Maruca; (e) edge-battered cobble, Puerto Ferro; (f) nuttingstones, Maruca).

Alegría et al. (1955) were the first to document the presence of this artifact type in their excavations at the Cueva Maria de la Cruz site located in the northeastern part of the island. Additional work in Pre-Arawak sites of the island led to the recovery of edge-ground cobbles in coastal sites (Figueroa 1991; Veloz Maggiolo et al. 1975), as well as in inland rock shelters (Dávila Dávila 1981; 2003; Martínez 1994) and open-air locations (Ayes Suárez 1988; Figueredo 1976; Tronolone et. al. 1984). In Puerto Rico, most Pre-Arawak sites have been ascribed to the Corosan Ortoiroid subseries, and it has been agreed that the "Edge grinders are diagnostic of the subseries" (Rouse 1992:66). Albeit the chrono-cultural emphasis placed on this type of artifact, its use(s) have never been formally tested in the Antilles. The only suggestions about its

function have been based on morphological criteria, usually being generically defined as "grinding stones." However, no direct evidence of this proposed use nor of the type(s) of material(s) that were processed with these implements had been provided.

Interestingly, recent evidence of starch grain residues found in the faceted margins of edge-ground cobbles recovered from early sites in the Isthmo-Colombian area have indicated the presence of tubers such as manioc (*Manihot esculenta*), sweet potatoes (*Ipomea batatas*), and tannia (*Xanthosoma* sp.) (Aceituno Bocanegra 2002; Piperno and Holst 1998; Piperno and Pearsall 1998). In some cases, maize (*Zea mays* spp.) starch grains were also recovered from these artifacts as well as from the milling stones over which these were used. The ubiquitous occurrence of this type of implement in "Tropical Archaic" sites of the Isthmo-Colombian region in association to such a botanical complex has lead to its consideration as the "most typical plant-processing lithic tool found in the early and middle Holocene sites in the Humid tropics" (Piperno and Pearsall 1998:187). Several tests conducted by Ranere (1975) indicate the possibility that processing tubers with cobble tools might produce the type of wear observed on edge-ground cobbles. The information generated by Ranere's tests and the aforementioned starch grain studies are particularly intriguing, because the evidence from Puerto Rico and the rest of the Antilles indicated that domesticated plants such as those represented in the starch residues on the tools from the Isthmo-Colombian area, particularly in Panama and Colombia, were not available for consumption for the Pre-Arawak populations of the insular Caribbean.

In order to determine if the function of this type of implement could be attributed to the processing of such cultivated foodstuffs in the Antilles, I conducted an experimental work aimed at replicating the usewear that it commonly presents (Rodríguez Ramos 2005b). This study revealed that the processing of domesticated tubers such as manioc and sweet potatoes resulted

in the creation of the facet that characterizes these tools. This experiment also demonstrated that the processing of soaked corn also could have produced the marginal ablation commonly observed in edge-ground cobbles. This evidence led me to postulate that all of these cultigens, and perhaps others as well, were introduced to the Antilles during Pre-Arawak times, and that these were accompanied by a culinary emphasis on the production of edible pastes from those crops that could have been transformed into meals using different recipes. However, the indirect evidence produced in such experimental work was less than sufficient for reaching a definite conclusion on the issue of the introduction of agriculture to the Antilles. Stronger evidence was needed and, as will be described below, fortunately it has been generated recently in several contexts from Puerto Rico.

The Introduction of Agriculture and Pottery Production

One of the most deeply rooted assumptions in Rouse's (1992:84) model for Antillean archaeology has been that the introduction of pottery-making traditions was the result of the incoming of Cedrosan Saladoid migrants to the islands, who "may also be credited with the introduction of agriculture." This appreciation still continues to be prevalent in Antillean archaeology in general (e.g., Callaghan 2003; de la Rosa 2003) and in Puerto Rico in particular (e.g., Dávila Dávila 2003:40; Robiou Lamarche 2003:36). Although the practice of arboriculture as evidenced by the presence of flowering plants (including yellow sapote [*Poutevia campechiana*], sapodilla [*Manilkara zapota*], and avocado [*Persea Americana*]) introduced from Central America and/or Colombia in Pre-Arawak contexts of Puerto Rico and the Virgin Islands has been suggested (Newsom 1993; Rouse and Alegría 1990, citing Hugh Cutter), the common perspective continues to be that these were "hunter-gatherer" societies (Newsom and Wing 2004:121). However, recent microbotanical evidence indicates not only the existence of limited gardening and arboriculture, but that the introduction of the most important domesticated crops

and the advent of pottery-making techniques (although not necessarily in tandem) were registered in Puerto Rico and the Greater Antilles much prior to the arrival of Cedrosan societies to the islands.

Pagán Jiménez et al.'s (2005) starch grain analysis of Pre-Arawak stone tools from two sites in Puerto Rico, Puerto Ferro and Maruca, has replicated the aforementioned Isthmo-Colombian findings by producing the first direct evidence in the Antilles for the cultivation and processing of a tantalizingly similar assemblage of plants, which includes introduced cultivars such as maize, sweet potatoes, tannia, and beans (*Leguminosae*/*Fabaceae*). Starch grains from wild, probably tended, resources also documented during this period in the Isthmo-Colombian area such as yam and zamia (*Zamia portorricencis*), as well as others such as jackbeans (*Canavalia* sp.) and achira (*Canna* sp.) were also recovered in Pagán Jiménez et al.'s (2005) study. Others have also produced additional evidence for the presence of imported cultivars such as maize and endemic products such as zamia in Pre-Arawak contexts of Puerto Rico and the Dominican Republic (Fortuna 1980, 1981; Newsom and Pearsall 2003; Siegel et al. 2005; Veloz Maggiolo 1980). Evidence for the use of palms such as corozo has been found in the macrobotanical (Newsom 1993) and microbotanical record (Pagán Jiménez et al. 2005) of Puerto Rico. All of this evidence conclusively indicates that the *origins of agriculture in the Antilles predate the entrance of both LH and Cedrosan Saladoid societies to the islands* (Newsom 1993; Pagán Jiménez 2002; Pagán Jiménez and Rodríguez Ramos 2007; Rodriguez Ramos 2005b). The identification of these early cultivars in the Greater Antilles should not be surprising if we take into consideration the widespread evidence of their presence in northwestern South America and Central America during this period, as has been previously noted (Newsom and Pearsall 2003; Pagán Jiménez 2002; Pagán Jiménez et al. 2005; Rodríguez Ramos 2002a, 2005a, 2005b,

2005c; Wilson et al. 1998). Further insights on this matter will be provided at the end of this chapter.

The cultivation of these plants in Puerto Rico seems also to have been associated with land-clearing practices. This early evidence for forest clearance has been established on the basis of marked increases in particulate charcoal counts documented in northern Puerto Rico as early as cal. 3300 B.C. (Burney et al. 1994). This early date for anthropogenic landscape alterations is in the temporal range of early Pre-Arawak sites located in the proximity of Burney et al.'s study such as Angostura and Hato Nuevo, whose earliest dates go back to at least between ca. 4000 B.C. and 3300 B.C. respectively (Ayes Suárez 1988). The presence of edge-ground cobbles at both of these early sites, coupled with Burney et al.'s dates for slash and burning activities in such an early context, suggests that although the oldest direct evidence in Puerto Rico of domesticated plants such as maize goes back to cal. 1600 B.C. (Newsom and Pearsall 2003; Siegel et al. 2005), these cultivation practices and culinary techniques were probably introduced to the Greater Antilles since the initial occupation of the island around at least 4000 B.C. This indicates that the initial phytocultural transformations of the Antillean landscape were carried out by the first people that settled Puerto Rico and perhaps other islands from their initial arrivals or shortly afterwards (Oliver 2005a; Pagán Jiménez et al. 2005; Rodríguez Ramos 2005c). These transformations not only altered the vegetative cover of the island but might have also had effects in zoological landscape, an aspect that should be considered further as an important element in the extinction of some of the animal species that inhabited the islands in earlier times (Grayson 2001; Steadman et al. 1984).

In addition to the documentation of agricultural practices, evidence from Puerto Rico also indicates that pottery production also preceded the advent of Cedrosan societies to the island.

However, there is no evidence thus far to indicate that pottery production entered along with agricultural practices to the island, so at this point these seem to reflect two independent processes. This early pottery can be attributed to what we termed the "Pre-Arawak Pottery Horizon" of the Antilles (Rodríguez Ramos et al. 2008a). The first to mention the presence of pottery in association with what he later termed the Coroso culture was Rouse (1952) in his island-wide survey. For instance, he mentions the presence of pottery in some of the middens found at the Jobos site (Rouse 1952:538), where he observed "several Indian sherds on the surface of one heap," but it was considered to be deposited there after those sites were abandoned. Pottery was found three decades later at the Pre-Arawak Cueva Gemelos site but it was also considered to be intrusive (Dávila Dávila 1981:177; see also Dávila Dávila 2003:40). It was not until the work of Martínez (1994) at the Cueva La Tembladera site in the north-central portion of the island that the presence of "crude" pottery was established as having been produced by the "Archaic" inhabitants of the island. Other works in the north-central portion of Puerto Rico (e.g., Ayes Suárez 1989, 1996; Rodríguez and Ayes Suárez 1997) have mentioned the presence of pottery in Pre-Arawak contexts, although detailed published reports and radiocarbon assays of the contexts in which those pottery fragments has been uncovered are lacking.

More recently, a revision of the work at the Paso del Indio site led to the discovery of highly weathered pottery in two lithostratigraphic units that were sealed under 2.0 to 2.5 m of sediment (Figure 4-11). This pottery, originally classified as "Ostionoid," was found in two recovery units (8I-D and 8I-E) where two distinct Pre-Arawak components were documented, one dated back to between cal. 660 B.C. and cal. 450 B.C. (lithostratigraphic unit B) and the other to cal. A.D. 90 (lithostratigraphic unit C) (Clark et al. 2003; García Goyco 1998; Walker

Figure 4-11. Pre-Arawak pottery from lithostratigraphic unit B of the Paso del Indio site.

2005). Classic Pre-Arawak materials such as an edge-ground cobble and a stone sphere, among others, were uncovered in lithostratigraphic unit B, thus lending further credence to the association of the pottery materials to a Pre-Arawak context. Two sherds were found in an even earlier component located in unit 8I-C dated to cal. 2690 B.C., which led García Goyco (1998) to postulate the possibility that these indeed corresponded to an early occupation of pottery-making peoples in the site. Unfortunately, the use of heavy machinery and the small area excavated where such an early date was found limit the resolution of this early context.

A brief review of the available literature from Puerto Rico indicates the probable existence of additional "Archaic" sites in which pottery has been uncovered but has been considered "intrusive," mostly because they are associated to earlier dates than what has been considered acceptable for "Ostionoid" contexts (circa A.D. 600). For example, Siegel and Joseph (1993:45)

obtained a date of cal. 220 B.C. from the Palmar de Animas site in "close" proximity to a pottery fragment described (with the assistance of the late Irving Rouse) as "transitional between Esperanza and Capá, based on the complexity of the incising and paste characteristics." However, after selecting this sample as suitable for dating, Siegel and Joseph (1993:45) considered this date to be too early (i.e., "out of range") for this type of pottery and argued that "The best interpretation for this anomalous date in connection with an Esperanza deposit is that a fire occurred naturally in the vicinity of VB-27 prior to human occupation of the area." Although such explanation is possible, the fact that only one sample was submitted for dating definitely limits the determination of its temporal placement. Nevertheless, this case serves as an example of the commonplace consideration of the "intrusive" nature of pottery when found in "Archaic" sites and the definition of early dates for "Ostionoid" contexts as "anomalous." These types of interpretations could partly explain the low number of these sites on Puerto Rico and the rest of the Antilles (Rodríguez Ramos 2005a; Rodríguez Ramos et al. 2008a).

The evidence, although not necessarily in tandem, of cultivation practices in early contexts of the island as well as the presence of pottery indicates that at least some Pre-Arawak groups of operated in systems of delayed returns (Woodburn 1988), rather than on immediate return economies as has been argued thus far. This has implications on the way we visualize their articulation with the natural and the social landscapes, which is the topic of the next section.

Building Place

The previously presented evidence provides an indication of a much more complex set of relationships between peoples and their landscapes of action than what was previously thought (Pagán Jiménez et al. 2005). Several locations where paleoenvironmental studies have been conducted in northern Puerto Rico (Burney et al. 1994; Siegel et al. 2005) and in Vieques (Sara et al. 2003; see also Lundberg [1989] for an example from St. Thomas) show evidence of

human-induced disturbances to the environment in Pre-Arawak times. Particularly, the early evidence for anthropogenic alterations of the environment of Puerto Rico is not only indicative of cultivation practices but might also be related to the construction of what Rindos (1984) has labeled agrolocalities. These are built landscapes that served both to humanize the distribution of important resources and to enact a sense of territoriality in such groups. This indicates than rather than their spatiality being driven by the distribution of biotic resources as is often assumed in hunter-gatherer societies, these people were capable of manipulating the environment and transforming it into an artifact of their own making (Rodríguez Ramos 2005c). This led them to produce the first intentional transformations of the landscape of Puerto Rico.

Some of these domesticated spaces remained as important places for long periods of time. The articulation of anthropogenic spaces that remained in the memories of these peoples is underlined by the redundancy of occupations observed in many of these contexts. For instance, in sites located in the four cardinal points of Puerto Rico from which more than four radiocarbon assays have been obtained, the dates indicate that they continued to be places that were reoccupied and/or revisited through millennia (Figure 4-12). As will be shown in Chapter 5, some of these places continued to constitute humanized territories in much later times, an aspect whose importance in the articulation of discourses of ancestry in some of these groups has not been considered in detail thus far.

Higher degrees of territoriality and/or sedentism might also be indicated by the presence of multiple burials in some of these sites. For instance, in the Ortiz site five burials were unearthed, four of which constituted a multiple burial event (Koski-Karell 1993). In Maruca, a total of 11 burials of both adults and children have been uncovered, some being communal while others were individually interred (Crespo Torres 2004; Rodríguez López 2004). The delimitation of

these burial spaces suggests that a formal sense of place was in effect, at least for some Pre-Arawak groups. Interestingly, 90 percent of the burials from Maruca were placed in an east-west orientation, which according to Crespo Torres (2004:1.9) indicates the adherence to some sort of

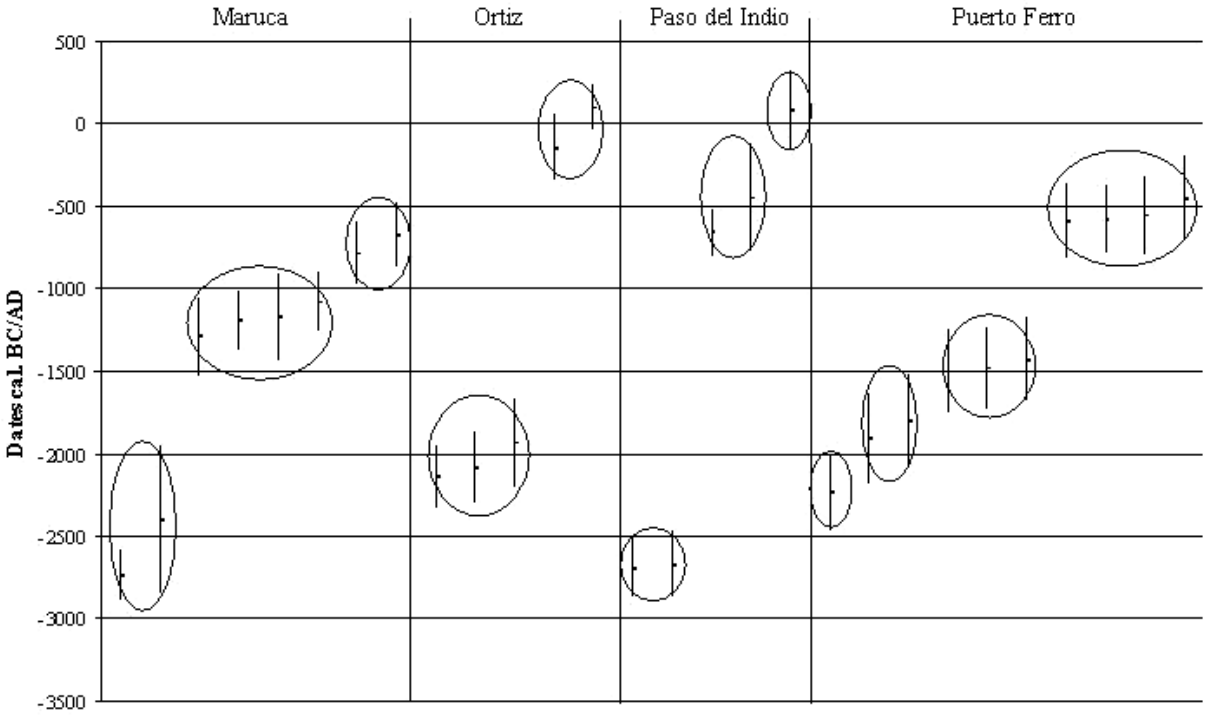

Figure 4-12. Plot of 2σ ranges of radiocarbon dates as indicative of occupational redundancy in Paso del Indio, Ortiz, Puerto Ferro, and Maruca sites.

cosmological principle in which such a geographic axis of interment played an important role, at least in this particular situation. The burials from Maisabel also show segregation by sex, the women being interred in an area separated by 8 meters from that of the men (Crespo Torres 2004:1.9). A similar segregation of interments by gender was noted by Sassaman (2004a:98) in the Stallings Island, which led him to suggest that "the layout of mortuary space was highly structured and thus indicative of social identity, possibly rank."

It should be noted that the data recently generated from Puerto Rico support Rouse's (1992:66) and Alegría et al.'s (1955) early indication that the interment of "Corpses, with bodies

extended…" is the most commonly primary burial practice observed in Pre-Arawak contexts of the island. These interments usually present the corpses fully extended face up with the arms placed parallel to the bodies. However, there is also evidence of burials in the flexed position, as are the cases of the burial from Puerto Ferro and also of an individual from Maruca (which interestingly was the one that was not interred in a east-west orientation). Rouse and Alegría (1990) also documented the presence of secondary burials in Cueva María de la Cruz, some of which were dug through the refuse middens into the subsoil. The presence of secondary burials and isolated bones (identified by Luna Calderón 1996 as residual burials) is also ubiquitous in most, if not all, Pre-Arawak sites of the islands.

Other sites contain multiple middens, which might signal the definition of social landscapes that reflect extended occupations rather than repeated visits for exploiting specific resources, as has been argued thus far (Ayes Suárez and Dávila Dávila 1993; Espenshade et al. 1986). For instance, the Angostura site presents four middens that form a horseshoe shape (Figure 4-13) quite similar in configuration to other concentric community plans documented in the island in Cedrosan Saladoid sites (e.g., Rodríguez López 1997; Siegel 1992). Furthermore, some of these habitation sites such as Maruca and Angostura present the entire lithic repertoire, which indicates that a wide range of activities was carried out in these locations. Some pieces, like the stationary millingstones observed in Maruca and Angostura, provide evidence of implements that are not commonly observed in sites related to highly mobile groups. If these peoples where highly mobile it would also be expected that they incurred in lithic curation behaviors, particularly those obtained from extralocal sources such as chert (Parry and Kelly 1987). However, this is not the case as there is little evidence for strategies of curation in these artifacts, which are rather expedient in their manufacture and use. It is interesting to note that the

only trait that seems to differentiate some of these sites from others commonly identified as villages or homesteads has been the absence of ceramics. However, just as the absence of ceramics does not mean that a site dates to Pre-Arawak times (Lundberg 1985), the mere lack of pottery should not necessarily indicate that these were not permanent residential areas.

With regards to their residential practices, it has been commonly argued that the small-scale Pre-Arawak groups of Puerto Rico dwelled primarily in natural shelters and that these were not permanent refuges but transitory spaces as "they moved from place to place to perform different activities" (Rouse 1992:66). Open-air middens are commonly regarded as activity areas indicative of subsistence activities of groups whose residential base was located elsewhere (e.g., Dávila Dávila 2003; Espenshade 1986; Figueroa 1991; Tronolone et al. 1984; Veloz et al. 1975). The fact that these people resided primarily in natural shelters was partly based on the notion that they lacked the technological ability to construct formal living units. In the cases where the occupation of open-air locations has been suggested, the type of structure that has been mentioned is merely the expedient wind-breaker (e.g., Rouse 1956; Sanoja and Vargas 1999). However, when one analyzes the archaeological evidence that has been used thus far for establishing the residential patterns of these societies, it becomes evident that such propositions are unfounded because of the marked absence of archaeological excavations in open air sites aimed at exposing features in contexts outside midden areas that might provide some information about the ubiquity of permanent residences. At the same time, this has restricted the establishment of the internal configuration of each of these sites, and thus limited our ability to determine if these resulted from domestic activities or if they are indicative of transitional spaces or specialized activity areas. The need for open excavations is warranted following the discovery of several postmolds in the Maruca site of southern Puerto Rico (Rodríguez López

2004), which indicates that these societies indeed had the technological ability to construct formal residential units.

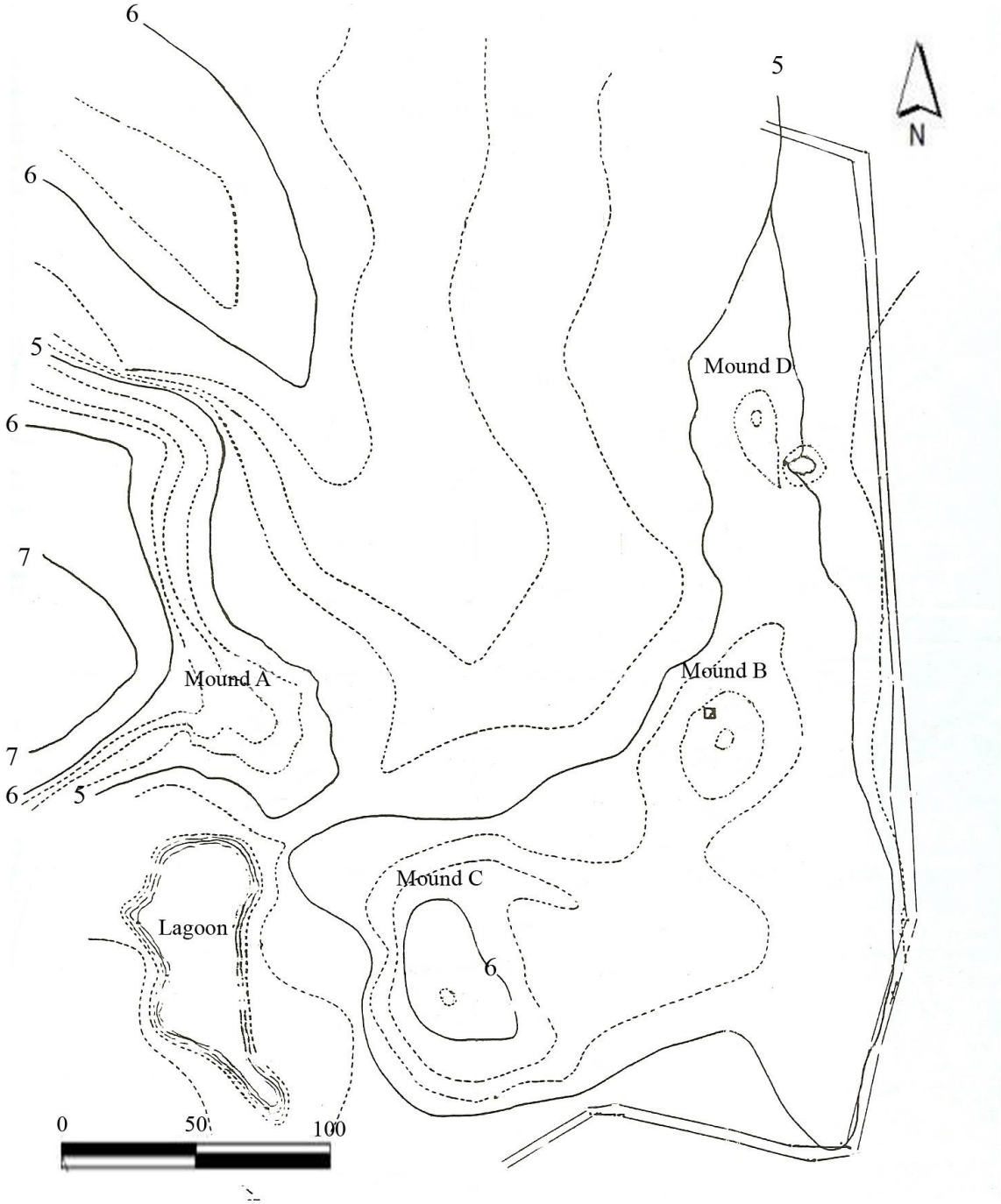

Figure 4-13. Concentric community plan of Angostura, Barceloneta. (Modified from Ayes Suárez and Dávila Dávila 1993, Map 1). Contours of 1 m with supplementary contours of .25 m. Map by Luis Berríos Montes.

Also, the habitation contexts have commonly been considered to be short-lived based on the notion that people needed to move their residential locations constantly in order to exploit shifting food sources. This type of pattern is derived from models of land-based hunters and gatherers that inhabited continental settings, in which the demands imposed by the movement of their protein sources or by seasonal changes required them to relocate their residential base constantly. However, Pantel (1996) has noted that the insular landscape of the Antilles lacks marked seasonality and macrofauna, and also contains ecotonal areas where several habitats intersect thus providing the opportunity to exploit a variety of food sources from a focal residential position. Also, the exploitation of resources from mangrove strands, lacustrine environments, and the sea provided abundant and predictable sources of protein in permanent locations. All of these natural features of the islands provided an environmental matrix that could have sustained higher degrees of residential stability, even without the benefits of agriculture, as has been also noted in other contexts (Arnold 1996; Hayden 1994; Marquardt 1985; Sassaman 2004b).

Another issue that needs to be addressed is the choice of settlement locations observed in Pre-Arawak sites on the island. Previously, it was thought that the earliest inhabitants of Puerto Rico established residence in coastal rock shelters and, for a short time in coastal locations that lacked attractive agricultural qualities (Rouse 1956). However, the available evidence seems to suggest that at least some of the earliest occupations of the island were in active alluvial valleys. This has been the case for Maruca (Rodríguez López 2004), Angostura (Ayes Suárez Dávila and Dávila 1993), Coquí (Alvarado 1992), and Paso del Indio (García Goyco and Maurás Casillas 1993; Walker 2005) sites. Unfortunately, it is difficult to find such sites due to the sedimentation regime that is dominant in such contexts, which tends to result in deeply buried deposits. This

became apparent at Paso del Indio where the three distinct Pre-Arawak occupations occur from 2.5 m to 4 m below the surface (Walker 2005). If this is the case, what we have is a very partial view of these early sites due to the lack of deep excavations on the island.

Another source of bias in the number and distribution of sites is the effects that eustatic sea level changes have had on the Puerto Rican shoreline. Vega (1990) has noted that the retreating nature of the northern shoreline of the island might have resulted in the burial of some coastal sites under almost 6 m of water. He argues, based on a model of "Estimated Shoreline Migration," that this should have affected not only Pre-Arawak sites but Ceramic Age ones as well, as he observed in his excavations of a submerged "Ostionoid" site on the northern coast of the island (Vega 1981). In the south of Puerto Rico, however, the case seems to be the contrary. In that portion of the island, a prograding coast has resulted in the actual location of sites in areas that are more inland than when they were occupied. This could be the case at sites in the coastal plain such as Jobos and Maruca, among others, which are now located up to 1.5 km inland. Thus, the dynamic nature of some of the contexts that where inhabited by the earliest peoples of Puerto Rico needs to be considered when statements about their choice of settlement locations as well as their population estimates are addressed in the future.

Pre-Arawak Socialities

It has commonly been stated that Pre-Arawak groups were organized with structural systems of acephalous bands, in which social transactions were articulated on the basis of an ethos of reciprocity and its ensuing symmetrical access and distribution of goods and power. The assumption that all Pre-Arawak peoples were organized in communist band societies has led to the implicit adoption of other social aspects, such as their relative population sizes. For instance, Espenshade et al. (1986:101) state "Lithic/Archaic people (as Rouse suggests) were living in a fishing/gathering mode of high mobility. Population density was probably very low in

this period throughout the island." However, the parameters for making such estimations are not clear, especially when one considers that some Pre-Arawak sites have dimensions that would indicate the presence of village-sized populations, based on the site-size criterion established by Tronolone et al. (1984) and Curet (1998). Also, the Angostura site is composed of four middens that expand across more than .5 square kilometers (Ayes Suárez and Dávila Dávila1993), which is also larger than some other residential sites in later times such as Punta Candelero, Tibes, and Maisabel. Rather than on hard data, the suggestion that these groups had small population densities has been based on the notion that the "size of the Ciboney population was limited by its primitive mode of subsistence" (Rouse 1956:167), which at the same time required high degrees of mobility.

Other models have been advanced to address the variability in the lifeways of Pre-Arawak populations. One of these is the "*modos de vida*" framework developed by the Arqueología Social school (e.g., Veloz Maggiolo and Pantel 1988). Even though this model has been the most careful attempt to define structural variations in these societies in the Caribbean, this social typology has been based primarily on distinct adaptive strategies within a single hunting and gathering mode of life, as expressed in the differences in the protein sources that were exploited, the variability in the artifact repertoires, and the location of sites. Nevertheless, the structural configuration of those societies and their levels of complexity are deemed to be similar in this model, all being considered groups of "stable bands" with systems of "reciprocal solidarity" which shared the "collective product" (Sanoja and Vargas 1999:148).

Up to this point, no real attempts have been made to address systematically the level of social complexity of these societies. This is understandable, as the evidence that has been collected thus far does not have the necessary resolution to make precise inferences about this

issue. However, there are some preliminary ideas that might be put forward and revised with future evidence.

A first aspect that might have promoted the development of higher levels of complexity is the relatively rich environment of Puerto Rico and the rest of the Greater Antilles. If, as argued by Hayden (1994) and Wiessner (2002), higher levels of complexity tend to be reached in areas of resource abundance, reliability, and predictability, then the presence of food-rich areas such as mangrove strands, lacustrine environments, reefs, large rivers, and the ocean might have provided a suitable context for the emergence of social asymmetry in Pre-Arawak times. This, in combination to the previously discussed agricultural capacities, show that food intake was not necessarily a limiting factor for these peoples, as has been commonly assumed.

Also, if we look at the technological organization of these societies, it is evident that at least some Pre-Arawak groups were manufacturing artifact repertoires whose protocols of production were as demanding technically as those observed in later Ceramic Age societies. An example of one of these is the production of tended implements such as fishnets, as evidenced indirectly by the presence of netweights. These netweights also serve as indirect evidence for the presence of some sort of basketry or textile production, although the complexity of that technology is unknown at present. Also, the aforementioned production of ground stone and shell tools followed similar operational sequences as those observed in later contexts, from the procurement of the raw materials to the reduction strategies utilized in their production. Some of the products produced by grinding include ones that could be considered prestige items, such as the stone daggers, conical manos, stone spheres, and stylized beads and pendants, among others.

Ayes Suárez (1988) and Koski-Karell (1993) indicate the presence of grave offerings on particular individuals Angostura and the Ortiz sites respectively, which may also serve as an

indicator that some degree of vertical social differentiation was in place, at least in some Pre-Arawak groups. In the case of Angostura, the offering consists of a pendant made of serpentinite, an exotic raw material obtained from a source located at least 100 km southwest of the site, which underlines its possible role as a prestige-enhancing commodity. At the Ortiz site, the associated material is a peg-shaped dagger that quite possibly served as a status marker. This differential mortuary treatment very likely denotes an asymmetrical access to prestige that was much more than situational, perhaps reflecting a structure ranking that resulted from an achieved or an ascribed status of the individual. The presence some form of vertical differentiation within at least some of these Pre-Arawak communities is further noted by the concentric layout of Angostura, a type of community plan that have been argued elsewhere to reproduce "structures of ranking" (Sassaman 2004a:99; see also Heckenberger 2004).

The presence of ground materials most likely produced for heavy-duty woodworking tasks, such as shell and stone celts and gouges, could be related to the manufacture of canoes. Currently, the notion is that "Archaic" people had simpler canoe-making abilities than the later migrants to the islands, and thus that they basically constructed rafts for ocean transport (Rouse 1952). However, as has been noted by Vega (1990:32), for now there is no reason to assume that the Pre-Arawak peoples were less adept at canoe making than later societies, when one takes into consideration that the tool kits associated with the construction of wooden vessels found in the earlier sites are as complex as those produced by the later inhabitants of the island.

Also, the production of watercraft designed for open-sea traveling that allowed these people to move between the islands is evidenced by the translocation of raw materials (e.g., chert and metavolcanic stones) and the ideological principles objectified in lapidary artwork (e.g., *bobito* pendants) between Puerto Rico and Mona Island, which are separated by one of the most

treacherous maritime stretches of the Caribbean Sea. Furthermore, the construction of canoes requires elaborate technologies that promote a complex number of relationships between the individuals that participate in their manufacture, which in many cases have also strong ritual meanings attached to them (Robiou Lamarche 1993; Vega 1995; Wilbert 1977). In the case of the Warao, which has been the maritime nonagricultural society most often used as analog of the Pre-Arawak peoples of the Antilles (e.g., Boomert 2000), there is a differential status conferred to the canoe builder with the greatest technological and ideological knowledge involved in their construction (Wilbert 1977). This makes evident that the production, use, and ownership of these canoes may have entailed a web of social relations that were much more complex than previously thought, which might have also influenced the operation other types of activities that involved their use such as exchange and food procurement, among others, as has been noted in other contexts (Arnold 1995; Gamble 2002; Kirch 1984; Yesner 1980).

Another aspect that might denote the socio-political articulation of some of these groups at the regional level is suggested by the presence of intra and inter-island exchange networks. For instance, although limited, the evidence from Puerto Ferro indicates the obtainment of lithic raw materials from at least three different areas: the cherts most likely obtained from the western portion of Puerto Rico, silicified tuff obtained from eastern Puerto Rico, and milky quartz procured from sources in the vicinity of the site. This underlines the long distances in which these products were being moved through the sea and the fact that there were probably several interaction spheres operating simultaneously for the movement of such materials in the island. This movement of lithic materials is also noted in Angostura where Ayes Suárez and Dávila Dávila (1993) observed a marked shift from the procurement of local resources to the obtainment of extralocal raw materials for flaked tool production in the latest occupations of the site, which

might indicate the consolidation of trade partnerships and/or higher degrees of political integration at a regional level. Some of these materials were obtained from sources that are outside the ethnographically recognized macro-regional range of movement of foraging societies (Kelly 1995:112), some being provenient from areas that are at least 170 km away from their contexts of consumption (in the case of Puerto Ferro). This seemingly indicates that they were not obtained through embedded procurement but rather by exchange or logistically organized procurement ventures. The import of chert flakes to some of these distant locations has been noted even in cases were locally available materials that presented similar mechanical qualities were available, such as the milky quartz in the case of Puerto Ferro, thus indicating that the reasons for their obtainment were not necessarily a result of the local scarcity of useful materials. Additional evidence for the movement of serpentinite for its use in the production of personal adornments also signals the fact that these long-distance translocations of materials were not limited to utilitarian goods but also included the movement of rocks for the manufacture of prestige commodities. This shows that the circulation of lithic materials served as an agent for the inter-societal interactions that were likely involved in the formation of alliances between groups or as commodities for other types of social engagements.

The assumption that Pre-Arawak societies were "largely circumscribed to island boundaries" (Oliver 1992:25) has been questioned by the documentation of inter-island circulation of stone raw materials (Febles 2004, citing Walker; Rodriguez 2001a, 2001b). For instance, the Maruca site yielded the import of flakes from Antigua (located around 500 km east of the site) and probably the Dominican Republic (located approximately 300 km west). As was the case noted for the island, this flint seems to have arrived in the form of flakes produced by a parallel flaking format, perhaps again denoting a pattern of interaction that emphasized the

movement of flakes produced by such a technological protocol as commodities between these groups that crosscut island boundaries. The import of materials from outside Puerto Rico was also observed at Paso del Indio by the aforementioned finding of the poll end of celt made of radiolarian limestone from Saint Martin. This again indicates the spatially extensive range of the interaction networks of at least some of these groups or social factions.

These peoples seem not only to have been moving lithic raw materials, but also were also translocating faunal elements. This shows that Pre-Arawak peoples were not only the first to alter the botanical landscape of the island but also the ones that began to modify its faunal constitution. For instance, Narganes (2004) reports the finding of *jutía* (*Heterposomis insulans*) at the Maruca site (see also Lundberg [1989] for an example from Krum Bay in St. Thomas), while Dávila Dávila (1981) identified the presence of *Isolodobon portorricencis* in Cueva Dolores and tentatively in Cueva de los Caracoles (Dávila Dávila 2003). Veloz et al. (1975) also report the finding of *jutía* in the Cayo Cofresí site, although the species is not indicated. The fact that the *Isolodobon portorricencis* is endemic to the Hispaniola (Woods 1990) indicates that they were probably translocated to the island during Pre-Arawak times, perhaps in conjunction with other materials and information. This evidence not only shows that various types of elements were being moved between the islands, but that these interactions were multidirectional, involving peoples from territories east and west of Puerto Rico. These inter-island interactions could have perhaps planted the seeds for the development of Rouse's Vieques and Mona sound passage areas.

Furthermore, as argued previously (Rodríguez Ramos 2002a), these exchange networks may have reached continental Circum-Caribbean contexts through transoceanic voyages, a point that seems feasible according to Callaghan's (1990, 1995, 2003) modeling of navigational routes

in the Caribbean. This is indicated by the finding of an obsidian blade in Maruca (Febles 2004), a material whose nearest geological occurrences are in Central America. Furthermore, as will be noted in the last section of this chapter, the introduced botanical complex documented in Puerto Rico was very likely derived from the Isthmo-Colombian area (Pagán Jiménez et al. 2005; Rodríguez Ramos 2005b), which indicates tight relationships between the inhabitants of these regions at these early times.

Even though these are preliminary observations, they might show that higher levels of complexity operated for at least some groups in Pre-Arawak times. Curet (2003) has argued that we should start considering updated models for addressing the complexity of hunters and gatherer in Puerto Rico and the rest of the Caribbean. Among other possibilities, he mentioned the "complex hunters and gatherers" concept as defined by Arnold (1996). However, when one considers that the organizational requirements established by Arnold are indistinguishable from those that characterize chiefdom level societies, it becomes evident that such a model, although plausible, is well beyond the reach of the data in hand. I would argue more in line with Woodburn (1982) that we could be facing a situation for which no ethnographic parallel exists, and thus that we should start building models commensurate with our particular situation. This situation was the result of both, internal processes operating at the intra-island and Antillean levels as well as other processes that were embedded in much wider scales of action, as will be noted in the next section.

Things that Grow: The Maritime Dispersal of Early Cultivars in the Neo-Tropics

As previously noted, the inhabitants of Puerto Rico were involved in a multifaceted and multidirectional web of interactions that was not only limited to the archipelago but also extended to extra-Antillean regions. Amongst these, some of the most strongly delineated vectors of interaction seem to have been established with the Isthmo-Colombian area. As is the

case of Puerto Rico, in the Isthmo-Colombian area (most notably in Panama and Colombia) this period is characterized by the cultivation of an assemblage of plants that includes tubers such as manioc, sweet potato, and tannia, as well as grains such as maize with dates that go back to at least 5000 B.C. (Aceituno Bocanegra 2002; Cooke 2005; Piperno 1998). Wild resources including yams and zamia seem also to have been part of the vegetative repertoire consumed in Panama during the mid-Holocene (Dickau 2005). As is observed in Puerto Rico, these plants have been associated with an artifact assemblage whose most salient feature is the edge-ground-cobble (Piperno and Pearsall 1998; Ranere and Cooke 1996). The cultivation of this cluster of plants has also been related to slash and burning activities, as is indicated by changes in particulate charcoal concentrations and increases in secondary vegetation at several locations in Panama and Colombia that signal the intentional human disturbance of the landscape (Cooke 2005:141; Dickau 2005:8; Piperno 1998:422-423; Raymond 1998:14-15).

The available evidence indicates that the techniques of cultivation and culinary traditions associated to this assortment of plants seem to have spread relatively rapidly between Central and South America. For instance, manioc had made its way from South America into Lowland Belize by 3400 B.C. (Neff et al. 2006; Pohl et al. 1996), while maize spread south to Ecuador from Mesoamerica by around 5000 B.C. (Piperno and Pearsall 1998; Raymond 1998). Albeit the long-distance in which these early cultivars diffused in a relatively short term, Dickau (2005:6) indicates that these "dispersed via overland routes in the Neotropics" while Cooke and Sánchez (2001:29) argue that the available data provides no evidence for their maritime dissemination, particularly when taking into consideration that the exploitation of the sea during this period was confined to areas adjacent to the coast where "simple techniques of fishing and gathering were sufficient."

However, the early evidence for the introduction of such botanical complex in Puerto Rico in association to the cultivation practices and culinary protocols associated to its processing makes imminent that the long-distance maritime movement of these early agricultural traditions be considered as a mechanism such dispersal in more detail, as was originally suggested by Lathrap (1987), Sears (1977), and Riley et al. (1990). This is further pointed by the fact that the only insular contexts in the Caribbean basin where this cluster of cultigens and cultivation practices has been documented in association with the edge-ground-cobble during this early period are in the Greater Antilles, particularly in Puerto Rico and the Dominican Republic, while being totally absent thus far in the Lesser Antilles. Although this might be due to a sampling bias, the fact that thus far there are no Pre-Arawak sites that predate those of Puerto Rico in any of the Lesser Antilles with the exception of Trinidad (which is a continental island) suggests the probability that these cultigens, as well as the culinary repertoire associated with their processing, were brought directly to the Greater Antilles from the isthmian portion of Central America and/or northwestern South America. This is further indicated by the fact that the currently available evidence from northeastern South America does not yet indicate the presence of this assemblage of cultigens predating those documented in Puerto Rico (Perry 2005), while there is no evidence for the edge-ground cobble in association to this repertoire of cultivated plants north of Panama (Ranere and Cook 1996; Rodríguez Ramos 2005b). If, as Piperno and Pearsall (1998:316, cited in Dickau 2005:36) argue, "the spread of entire plant complexes is often indicative of population migration rather than diffusion between groups," then the Puerto Rican evidence indicates the importance of population movements as an agent of early crop dispersals in the Neotropics, in addition of the down-the-line transference of cultivars commonly suggested as the main mechanism for such spread (e.g., Cooke 2005; Dickau 2005).

The spatial circumscription of the combination of the edge-ground cobble/millingstone complex with the aforementioned botanical assemblage to the Isthmo-Colombian region and Puerto Rico as well as the reported similarities between the assemblages observed in those areas (e.g., Lundberg 1989; Rodríguez Ramos 2005b) during this period provides support for the possibility of early direct displacements to the island from that area, as had been previously proposed by Alegría et al. (1955), Callaghan (1990), Veloz Maggiolo (1972, 1993), and Willey (1976), among others. Furthermore, the available evidence of these anthropogenic alterations of the Puerto Rican landscape in association to such botanical complex predates the earliest occurrence of such practice in the Caribbean portion of Mesoamerica and is just a millennia later than their earliest appearance in the Isthmo-Colombian area, thus underlining the quick pace in which these early botanical traditions dispersed to the Antilles.

In the Caribbean watershed of the Isthmo-Colombian area, particularly in Panama and Colombia, some of these cultigens have also been found in association to early pottery complexes, with dates that go back to around 4000 B.C. in northern Colombia (Langebaek and Dever 2000; Oyuela-Caycedo 1995), 3000 B.C. in Panama (although Griggs [2005] indicates that it might have been even earlier in the Caribbean coast, going back to 5000 B.C.), and 2000 B.C. in Costa Rica (Hoopes 1994). As was previously noted, in the Antilles it was traditionally thought that pottery production was introduced to the islands by the Cedrosan Saladoid immigrants from Venezuela (Rouse 1992). However, in addition to the finding of pottery in Puerto Rico, there is evidence the production of early ceramics also in Hispaniola and Cuba, which can all be grouped within what we termed the Pre-Arawak Pottery Horizon (Rodríguez Ramos et al. 2008a). The earliest dates for this ancient pottery in Cuba go back to 2160 B.C. (Jouravleva 2002; see also Ulloa and Valcárcel 2002), while in the Dominican Republic it has

been documented as early as 1500 B.C. (Atiles and López 2005). As previously noted, in Puerto Rico there is pottery in contexts dated to at least 600 B.C., and probably much earlier (García Goyco 1998; Rodríguez Ramos et al. 2008a). Thus far there is no evidence for the production of pottery in the Lesser Antilles in contexts predating those of the Greater Antilles. As has been the case in other early contexts of pottery manufacture (e.g., Hayden 1995; Hoopes 1995; Bonzani and Oyuela-Caycedo 2006; Sassaman 1993), we have associated the introduction of this technology to the production of serving vessels that were probably used in integrative activities such as sharing and/or feasting (Rodríguez Ramos et al. 2008a). Although this early Antillean pottery might have resulted from its independent invention, based on the aforementioned evidence for isthmo-Antillean relationships, it is also possible that its origin resulted at least in part from the trans-Caribbean transferal of early pottery traditions due to the interactions and/or movement of peoples between these areas (Meggers and Evans 1983; Rodríguez Ramos 2002a; Rodríguez Ramos and Pagán Jimenez 2006, 2007; Veloz 1993). In fact, the similarities observed between the early pottery complexes of the Dominican Republic with those documented in northwestern Venezuela and Colombia was pivotal to Arvelo and Wagner's (1984) and Zucchi's (1984) postulations of direct interactions between these areas during Pre-Arawak times.

Although these long-distance maritime translocations of plant management techniques, cultigens, pottery production technologies, and social aggregates (although not necessarily in tandem) seems implausible at first glance, the computer modeling of navigational routes to the Greater Antilles performed by Callaghan (1995, 2003) has demonstrated that these open-sea crossings during Pre-Arawak times from northern South America were not only possible but also easier than navigating around the islands of the Lesser Antilles due to the harsh ocean currents observed in the inter-island passages. Callaghan (2008) has also noted that there are currents that

connect islands such as the Puerto Rico, Hispaniola, and Antigua with the Caribbean coasts of Costa Rica and Panama, thus providing further support for the possibility of the existence of direct trans-Caribbean vectors of interaction between any of these areas.

If the possibility for these long-distance undertakings is taken into consideration, then the motivations that the ancient inhabitants of such continental areas had to embark in those open-sea crossings and the effects that such a process had on those early societies (both the ones that migrated and the ones that stayed in their homeland) are issues deserving of joint attention by those of us working in Puerto Rico and the rest of Antilles and in the aforereferenced continental regions. Furthermore, this evidence would underline the importance of maritime dispersals of these early agricultural traditions in the Neotropics, which would argue against previous formulations in the Isthmo-Colombian area regarding the "reliance on the inland resources of savanna, forest, and riverine settings in Panama and Colombia." prior to 3000 BC (Raymond 1998:18) and the notion that "As far as we know, the interaction of these preceramic and early ceramic people with the sea was limited to the exploitation of habitats close to the coast…" (Cooke and Sánchez 2001:29; see also Cooke 2005:142). Furthermore, the Antillean evidence provides support for Griggs' (2005:304-305) proposal that the spread of these cultivation practices between the Pacific and the Caribbean watershed of the isthmus might have occurred earlier than previously suggested, at around 5000 B.C.

Although it is possible that some of those early movements into Puerto Rico and the Greater Antilles responded to environmental demands created either by the anthropogenic depletion of critical resources (Griggs 2005) and/or climactic changes (Cooke 2005:146; Oyuela-Caycedo 1996) that were registered in the Isthmo-Colombian region during this time, it is also possible that other social processes were involved in the decision to move into the islands. If we

take into consideration that the societies that inhabited both the Isthmo-Colombian area during the mid-Holocene were towards the path to higher levels of complexity, then it is possible that some of those treks into the Antilles were performed as "non-utilitarian mobility strategies" (Whallon 2005) that formed part of the prestige enhancing activities of emerging leaders or social factions within those groups, employed as a means of achieving vertical mobility. Interestingly, it has been argued that in northwestern South America this rise to complexity took place in coastal areas in association to an increasing use of oceanic resources (Scheinsohn 2003:354) and the articulation of maritime-based interaction networks (Tykot and Staller 2002:675). This maritime emphasis at this time is also observed in Panama, where starting around 5000 B.C. there was an increase in the number of sites and settlement sizes in association to a more intense exploitation of coastal resources (Dickau 2005:76).

As previously noted, the evidence from Puerto Rico and the Greater Antilles also indicates higher levels of complexity for these societies than previously thought. In fact, as noted by Kirch (1984) any canoe society involved in long voyages of discovery and settling of new territories requires a structure of rank with a designated leader to direct those ventures. Thus, it is quite possible that at least some of the early complex societies that inhabited Puerto Rico and other Antilles during this time were involved in the long-distance maritime transit of cultigens and pottery traditions, which might have even resulted in the early spread of crops such as maize into the southeastern portion of the United States from the insular Caribbean as had been suggested by Lathrap (1987), Riley (1990), and Sears (1977), among others. It this is the case, then this would indicate the participation of the earliest inhabitants of Puerto Rico in the macro-regional processes involved in the articulation of what Ford (1969) labeled the "Colonial Formative" registered between Colombia and southeastern United States, which served as the foundation for

later cultural developments and interactions within and between these areas, some of which will be discussed in the next Chapters.

CHAPTER 5
COMING, GOING, AND INTERACTING: AN ALTERNATIVE PERSPECTIVE ON THE "LA HUECA PROBLEM"

After around 3500 years of Pre-Arawak occupations and interactions in Puerto Rico, other groups of people began to make their entrance to the Antilles. It is generally considered, on the basis of Rouse's (1992) model, that those groups migrated from a single ancestral area that has been traced to the mouth of the Orinoco. These migrants, grouped by Rouse (1992) within the Cedrosan Saladoid subseries, moved from that area into the Lesser Antilles, eventually reaching Puerto Rico around 400 B.C. As noted in Chapter 1, one of the main assumptions in Rouse's (1992) model is that the development of such peoples in ethnic isolation eventually gave rise to the Taíno culture making them their sole "ancestors" (Rouse 1992:37). This single-migration hypothesis remained largely unquestioned until Luis Chanlatte and Yvonne Narganes' discovery of La Hueca-Sorcé site on the island of Vieques, which contained an artifactual repertoire without precedent in the Caribbean archaeological record. Taking note of the extreme dissimilarities that these materials exhibited with regards to ceramic decoration and lapidary iconography when compared to the other early Cedrosan assemblage found at the site, represented by the Hacienda Grande style, they postulated that a different migration of pottery-making people, named by them the Huecoide (heretofore labeled LH), ventured into the Antilles prior to the Cedrosan expansion from South America (Chanlatte and Narganes 1980).

This discovery remained unique in the West Indies until 1985, when Miguel Rodríguez López (1987) excavated another site on the eastern coast of Puerto Rico known as Punta Candelero. This site not only yielded a replica of the LH assemblage discovered by Chanlatte and Narganes, but also added the novelty of containing such material without any relation to other Hacienda Grande deposits as was the case in La Hueca-Sorcé. This obviously seemed to indicate that these materials represented an independent cultural entity and not necessarily a

specialized social unit within the Cedrosan Saladoid as was being postulated at the time by other Caribbeanist archaeologists. Moreover, this discovery ignited a one of the most significant challenges to Rouse's (1992) single migration hypothesis by raising the possibility of another population movement to Puerto Rico and the Lesser Antilles. This debate has been labeled by Oliver (1999) the "La Hueca Problem."

Unfortunately, as noted by Petersen et al. (2004:62), this "issue is still unresolved in a satisfactory matter" partly due to the almost exclusive focus placed on the comparison of the ceramic decorative styles, as that has been the dominant unit of analysis in the study of the pre-Columbian cultures of the Caribbean. Therefore, in order to add another dimension to this discussion, this chapter focuses on the analysis of the technological traditions expressed in the manufacture of core-flake, pecked-ground, and use modified utilitarian lithics from these two important sites. The detection of the internal dynamics of stone tool manufacture in the materials from the aforementioned two sites are used for eliciting the technological styles reflected in lithic production in the LH complex, from raw material procurement to the reduction sequences involved in formal and non-formal utilitarian tool production. The comparison of the LH technological styles to the ones evidenced in the lithic materials recovered in association to Hacienda Grande and Cuevas pottery from La Hueca-Sorcé and Punta Candelero respectively serves to establish the similarities and differences of the lithic traditions between these two complexes and how significant they are. This comparison offers a high resolution as the inter-assemblage variability that may arise from differential raw material availability is excluded as both manifestations were enacted in the same geographic locations and thus their producers operated under similar environmental constrains. Therefore, taking into consideration the conservative nature of lithic technology in the Antilles, it is expected that both cultural

manifestations would reflect the production of similar utilitarian stone tool kits if they indeed diverged from a single ancestral tradition in the northern Lesser Antilles, as stated in Rouse's (1992, 1999) most recent model.

The "La Hueca problem" has brought to light many issues that had been regarded as resolved prior to the discovery of this cultural complex. Therefore, in order to offer a holistic perspective on this matter, I start this chapter by providing a thorough description of this problem. I divide its discussion on the several areas of disagreement so a more integral conception is attained on the subject. Within this discussion, I describe the major lithic production protocols observed in Cedrosan sites in order to provide a foundation for the eventual comparison between LH and Cedrosan assemblages. Then, I describe the technological protocols observed in the lithics from the LH component from La Hueca-Sorcé and Punta Candelero in order to elicit the major technological styles observed in stone tool manufacture observed in this complex at these two sites. With the use of this lithic data, I then examine the similarities and differences in the technological traditions involved in the production of utilitarian lithics in order to determine if these simply reflect a variation of a Cedrosan technological style or distinct practices of lithic making. The lithic data also allows addressing the possible interactions that were sustained by the inhabitants of these two communities with other groups living in the island and other Antillean locations. This aspect will be particularly informed by the results of Knippenberg's (1999c, 2006) trace element study on some of the materials from La Hueca-Sorcé, which provides a basis for determining the sources of some of the cherts and the raw materials used for making bifacial ground tools (i.e., celts and adzes) that were imported to that site. Although the lithic evidence presented provides a good body of data to delve into this debate, it is evident that if we circumscribe our scope to Puerto Rico and the

Antilles we will have only a partial view of it. Therefore, this chapter closes by expanding the scale of analysis to other surrounding continental regions. This last section includes the results of George Harlow's (2007) characterization study of several celts and adzes from these two sites and others from the island. This, in conjunction with my inspection of materials housed at various museums in Costa Rica and the detailed review of other lines of evidence shows that, not only the LH, but also the Cedrosan inhabitants of Puerto Rico and the rest of the Antilles were involved in far more reaching spheres of interaction than previously envisioned, which seem to have had much more consequential effects on the reasons for the incoming of these societies to the islands and the articulation of their lifeways and traditions as represented on their material culture.

Multifaceted Overview of the "La Hueca Problem"

The debate surrounding the LH manifestation was introduced to the Antilles by Chanlatte and Narganes (1980) when they presented the first results of their excavations of La Hueca-Sorcé at the VIIIth International Congress for Caribbean Archaeology. Framed strictly from a ceramic-based culture-historical perspective, from thereon the paramount argument has been whether the differences observed between LH and what Rouse termed the Cedrosan Saladoid subseries are a result of the entrance of two groups of people to the West Indies proceeding from different areas of South America thus constituting two different series in Rouse's terms, or if those differences arose after the Cedrosan Saladoid were already settled in the islands therefore representing an intra-Antillean divergence (a social unit, style, or sub-series).

Prior to the discovery of La Hueca-Sorcé, the most widely accepted notion, as put forward by Rouse (1952, 1964), was that all the cultural manifestations of ceramic bearing groups in the insular Caribbean were the result of a single migration of groups associated to the Saladoid series that ventured from the Lower Orinoco River Valley of Venezuela. The Saladoid series

supposedly flourished in the Saladero site located in the Lower Orinoco River Basin. According to Rouse, a Ronquinian Saladoid sub-series ramified from the Saladoid series in the Middle Orinoco area. During their northward movement through the Orinoco into northern part of Venezuela, a new Cedrosan Saladoid sub-series branched from the Ronquinian Saladoid. This supposedly took place somewhere between the northeastern section of Venezuela and the northwestern coast of the Guianas. From there, at around the time of Christ, the Cedrosan Saladoid sub-series bifurcated to the west of Venezuela and to the north towards Trinidad and then into the rest of the Antilles.

After reaching the Antilles, Rouse estimated that this population movement followed a unidirectional northbound trajectory through the Leeward and the Windward islands, reaching Puerto Rico and eventually stopping in the southeastern tip of the Dominican Republic. Rouse contended that these peoples settled in islands of high topographic relief for their forest vegetation and high-energy rivers, therefore bypassing smaller land masses along the way. During this migration process, the Cedrosan Saladoid were ramifying into different styles in discrete regions by divergent evolution and totally absorbed or eliminated the Ortoiroid groups that they met in the way. Prior to Chanlatte's discovery, Rouse's model established that the earliest complex of the Saladoid series in Puerto Rico was represented by the Hacienda Grande style, which later evolved into the Cuevas style.

After the discovery of La Hueca-Sorcé site, Chanlatte and Narganes (1980) proposed quite a different scenario to that advocated by Rouse. They contended that the *Huecoide* manifestation (which they also call Agro-I) originated on the northeastern coast of Venezuela and not as a result of an Antillean divergence of the Cedrosan Saladoid as proposed by Rouse. For Chanlatte and Narganes, the *Huecoides* were the descendants of societies that proceeded from the Andean

areas of Peru, Ecuador, or Colombia, where the use of ZIC (zone incised crosshatched ware) was evidenced as early as 3,000 BC (Chanlatte 1983). Supporting some of their evidence with a previous two migration hypothesis put forward by Lathrap (1970), Chanlatte (1983) later argued that the Río Guapo site of north-central Venezuela represents the type site for the LH manifestation in the continent. They also argue that the LH, while still in the continent, established contact with coastal Pre-Arawak groups of the Manicuaroid series incorporating from them their maritime expertise in fishing and navigation. They also acquired their skills in lithic technologies and the manufacture of shell implements. After this initial contact with those continental groups, the *Huecoides* moved to the Lesser Antilles and then reached Vieques and Puerto Rico.

Chanlatte and Narganes (1980) initially argued, and still do, that the Cedrosan Saladoid represent a separate and roughly later migration from South America. They basically agree with Rouse with regards to their area of descent and the dates of occupation of the islands but understand that it was when they reached the northeastern coast of Venezuela that the Cedrosan Saladoid and the LH people established contact. Therefore, for them it was while these two groups were still in the continent that the Cedrosan Saladoid inherited ZIC from the LH as part of their design elements. Chanlatte (1983) contested that the Cedrosan Saladoid followed the footsteps of the LH during their movement through the Antilles, which would explain the presence of materials from both components always in close spatial relation. Within his model, the ZIC ware that appears in Hacienda Grande contexts is the product of weak interactions in the form of trade or marriage alliances with the LH people (Chanlatte 1981).

Following the unearthing of La Hueca-Sorcé site, Rouse recognized the existence of something different, although at that point he was still not certain of what it represented.

Following initial comments by Louis Allaire (cited in Rouse1982), his first approach assigned the LH complex in the Antilles to a social unit [religious group] within the Cedrosan Saladoid. Around eight years later, Rouse (1990) proposed three alternatives for explaining the presence of this cultural manifestation. These were: that the LH and the Hacienda Grande manifestations represented the cultural manifestations of two different moieties; that the LH tradition represented the remains of an advance group "bringing its favorite part of the ceramic repertory, and that this party was followed by other immigrants bringing the rest of the range of the Saladoid's population pottery;" or that the producers of the LH tradition were religious specialists within the Cedrosan Saladoid.

After a process of revision Rouse, in collaboration with Alegría (Rouse and Alegría 1990), then placed LH and Hacienda Grande manifestations as two different styles that emerged concomitantly in Puerto Rico and the US Virgins Islands (plural styles). They argued that:

> As the invaders advanced from island to island, they developed new styles of pottery, including Prosperity in the Virgin Islands, La Hueca-Sorce in Vieques and the east coast of Puerto Rico proper, and Hacienda Grande in the rest of the main island and on the eastern tip of Hispaniola.

This debate remained in a vacuum since only one site was not enough to address the issue fully. This changed in 1986 when Rodríguez López (1987) reported the results of his work on the site of Punta Candelero. As previously mentioned, this site was important not only due to its corroboration of segregated contexts of the LH manifestation, but also because it added the dimension of containing such materials without any association to Hacienda Grande deposits as was the case in La Hueca-Sorcé. Rodríguez López and Rivera (1991) labeled this manifestation the Pre-Saladoid Zone Incised Crosshatch Connection but, at that moment, they basically agreed with Rouse that it represented a local divergence of Cedrosan Saladoid populations.

Partly as a result of this discovery, Rouse (1992) escalated the LH manifestation into the subseries level. His most recent model emphasizes that the Huecan Saladoid and the Rio Guapo cultures represent the two ends of the northward (in the Antilles) and westward (in the continent) radiation respectively of the Cedrosan Saladoid subseries. In those two areas, due to what he calls the founder's effect, they almost simultaneously dropped the use of WOR wares applying only ZIC designs. Based on a new set of ^{14}C assays from Puerto Rico and the Lesser Antilles, Rouse (1992) also updated the approximated dates of the incoming of the Cedrosan Saladoid to the Antilles, moving it around 400 years previous than he originally thought. He also acknowledged that this expansion process occurred at a much quicker pace and in larger scales than the stepping stone mode that he previously postulated. In his last pronouncement on the subject Rouse (1999:13-14) explains:

> The Hacienda Grande and La Hueca-Sorce cultures diverged from a common ancestor. Chanlatte has assumed that the divergence took place in South America. Alternatively, it may have happened in the Lesser Antilles, possibly as far north as Guadeloupe or St. Martin... The La Hueca-Sorce people have been assigned to a Huecan Saladoid subseries. It has been traced back only to the Hope Estate site on the island of St. Martin and possibly also to the Morel site in Guadeloupe. The earliest radiocarbon dates for these sites are ca. 300 and 1 BC respectively, appreciably later than the earlier dates of the Cedrosan Saladoid site on Monserrat Island. These facts suggest that the Huecan Saladoid subseries may have diverged from Cedrosan Saladoid in the vicinity of St. Martin or Guadeloupe during the first centuries BC.

But Rouse and Chanlatte are not the only ones who have contributed to this debate. Some other scholars have proposed alternative explanations based on their respective excavations of other early ceramic sites. One of these has been Haviser (1991a, 1997), who describes a different scenario to the one presented by both Chanlatte and Rouse. Based on his excavations at the Hope Estate site in St. Martin, he argues that there was an initial migration from somewhere in the Guianas, labeled by him the "Early Ceramic", which was distinct from both the LH and the Hacienda Grande manifestations. He denominates this manifestation simply the Early Ceramic

since he understands that still no suitable type-site has been identified for labeling this new complex. For Haviser, those Early Ceramic groups were the first to have contact with the Pre-Arawak peoples in the Antilles, from which they inherited eared axes and bone points. Then, after a strong process of interaction with the Cedrosan Saladoid immigrants from South America in the Northern Lesser Antilles, the Early Ceramic was absorbed by this new site-unit intrusion. Haviser (1991a:653) understands that the ceramic type design of the Early Ceramics was dominated by simple zone punctuation and "type C griddle rims." After the Early Ceramic/Cedrosan Saladoid contact, the manufacture of eared axes as well as the employment of zone punctuation and curvilinear incisions completely ceased. For him the more elaborated zone incised crosshatch (ZIC) designs present in LH wares were brought to the Antilles by the Cedrosan Saladoid and became an isolated decorative element after contact between both groups had occurred, therefore explaining the segregated ZIC contexts in Punta Candelero and La Hueca-Sorcé site.

Other investigators have also contributed to this debate. For instance Siegel (1991) offered a synoptic view of this argument as it was constructed until the late 1980s (which has not changed much since then). He basically argued that it exemplifies the classic lumpers versus splitters dichotomy in which there is an obvious ambiguity as to where one should draw the line for placing new cultural manifestations in Rouse's time-space schema. He uses for comparative purposes the Binford's and Bordes' "simpatric/allopatric" issue to debate the presence of a new migration to the West Indies. He states that the LH manifestation is the result of functional variability within the Saladoid rather than of cultural differentiation, thus coinciding with Rouse that there is only one initial series for all early agro-ceramic populations of the Antilles.

Others like Roe et al. (1990; Roe 1999b) have proposed that the LH manifestation represents an ethnic group intrusion or an outpost group that was followed by the large scale Saladoid expansion from South America. They based this hypothesis on the notion that "While La Hueca-Sorcé substyle ceramics might be found spatially segregated in Vieques, it is not yet documented already apart from Hacienda Grande phase occupations in Puerto Rico" (Roe et al. 1990:348). Obviously Roe et al. still had no knowledge of the lack of association of LH materials to a Hacienda Grande component documented in Punta Candelero.

Oliver (1999) has analyzed the theoretical standpoints of the different investigators involved in this debate. He has also intended to contextualize the excavations at La Hueca-Sorcé with regards to site formation processes, excavation methodologies, chronological sequence, and the classificatory lexicons used for defining the different early ceramic cultural manifestations of the Antilles. With this work he has made us aware of the importance of incorporating a taphonomic perspective to the interpretation of the "patterns in the ground" before jumping to further conclusions. He also made a case for demanding the use of quantitative analyses for delineating patterns in taxonomic data in order to make sounder interpretations on this issue.

Ceramics

Ceramics will be the first item of material culture addressed since, as previously noted, its examination has constituted the singular most important unit of analysis for the development of the culture-historical framework of the region. In general terms, there are two main early ceramic repertoires in Puerto Rico and Vieques during this initial ceramic period. The first of these, as reflected in the Hacienda Grande style, has been defined primarily on the presence of white on red painting (WOR), with zone incised crosshatched designs (ZIC) as a minority ware (Rodríguez López 1989). Other traits include the use of fine and light colored ceramic paste, fine-grained temper, inverted bell shapes, thin vessel walls, annular bases, D-shaped strap

handles attached to plain or flanged rims and zoomorphic modeled designs on heads, lugs and handles. The Hacienda Grande ceramic repertoire also includes topias (ceramic pot rests), cassava clay griddles, and troumassé (incense burners).

On the other hand, the LH wares have been defined as presenting both engraved and pre-fired ZIC designs as the most ubiquitous design element. The most common form of plastic decoration consists on geometrical zoned incised lines, incised parallel punctuations, and non-crossed zoned incisions. In some cases, these incisions are filled with white or pink paint. This ceramic repertoire presents a total lack of white on red or polychrome painted designs, which has been used as the major criteria for differentiating it from the Cedrosan Saladoid wares. Vessel shapes are dominated by hemispherical bowls, double spouted globular vessels (whether for use in cohoba rituals or for smoking tobacco is still in debate), effigy bowls with zoomorphic modeled motifs, and long necked adornos. Also many clay griddles evidence negative impressions of fibers on their exterior surfaces.

The general trend has been that Hacienda Grande deposits contain ceramics defined as LH style as a minority ware, while in the LH middens no WOR painted wares have been found. In fact, prior to the discovery of La Hueca-Sorcé ZIC ware was basically considered as indicative of the earlier phases of the Cedrosan Saladoid subseries or of a specialized ceremonial ceramic type (López Sotomayor 1975). Also, it has been always the case that wherever LH ceramics are found, in the same geographic locations are encountered other Cedrosan Saladoid components either Hacienda Grande or Cuevas styles. At present, vertically or horizontally segregated ZIC deposits have been geographically restricted to Puerto Rico (Rodríguez López 1989; Siegel 1992), Vieques (Chanlatte 1983), St. Martin (Haviser 1991a, 1999; Hoogland 1999), and Guadeloupe (Bèrard 2007).

Roe (1989) has argued that the differences observed in ceramic attributes between the Hacienda Grande and the LH wares are the result of social rather than cultural differences. He indicates that even though there are dissimilarities between the ceremonial vessels in both components, the utilitarian materials shared the same attributes. For instance, he argues that the common hemispherical LH bowls are simply beer drinking vessels and that the same attributes in undecorated pottery are shared between the LH and the Cedrosan complexes. Therefore, he labels the LH manifestation as the "La Hueca style or phase within the Cedrosan Saladoid subseries." (Roe 1989:267).

From where did these early agro-ceramic populations inherited the use of ZIC is also debated. For instance, Rouse understands that it proceeded from groups in the upper Amazon like the Early Tutischcainyo and that it mixed later with the Saladoid painted tradition (the when, were, and how of this process has not been fully explained). On the other hand, Chanlatte (1983) and Rodríguez López (1991) argue that the use of zone incised crosshatching is a result of the influence of northwestern early ceramic groups such as those reported on the shell mounds of Puerto Hormiga on the Caribbean coast of Colombia. This is another matter that is yet to be resolved.

Unfortunately, quantitative comparative analysis of between both wares, either modal or typological, are indeed scarce. Although several works have been published on the subject, most of them stay at the qualitative level, have been conducted with small samples, or are have been done on assemblages unearthed from sites where both wares are mixed (Chanlatte 1983; Petersen and Watters 1995; Rodríguez López 1989). Also, these comparative studies have been remitted to stylistic attributes and have not addressed the differences in manufacturing technologies. This sort of analysis in the ceramic production techniques should be viewed as a viable frame for

comparison as it may provide some new evidence that can add another perspective on this issue, as we have documented in Pre-Arawak contexts (Rodríguez Ramos et al. 2008a; see also Carini 1991; Espenshade 2000; Hofman 1999; Hofman and Jacobs 2001; Krause 1990; Lundberg and Wild 2006).

Absolute and Relative Chronologies

Another area of disagreement has been the temporal sequence of these two manifestations. The chronological placement of the LH complex has been problematic since the absolute dates that have been gathered from the LH contexts of Punta Candelero and La Hueca-Sorcé have been very ambiguous to say the least. In the excavations of La Hueca-Sorcé, carbon samples were extracted from different units placed on isolated LH contexts while others were collected from units that presented solely Hacienda Grande style ceramics. In the first round of dates, the LH locus dates went back as far back to between cal. 160 B.C. and cal. A.D. 240 thus placing it as one of the earliest ceramic contexts in Puerto Rico. However, in the later rounds of dates of the LH samples, these where much more recent spanning from cal. A.D. 1000 up to cal. 1440 A.D., leading Chanlatte to suggest a long period of occupation of the LH locus of the site (Chanlatte and Narganes 1990; Narganes 1991).

In Punta Candelero a similar case occurred with regards to the radiometric dates. When Rodríguez López dated his first samples, these went as far back as cal. 350 B.C. and cal. 210 A.D. This obviously placed this site as one of the oldest in the region, even older than La Hueca-Sorcé. However, during the second round of dates in the LH context, these ranged between cal. A.D. 560 and cal. A.D. 1340 (Rodríguez López 1989). Rodríguez López attributed such disparity to the process of cleaning with heavy machinery that the area was submitted to, which may have caused anomalies in the dates of the materials.

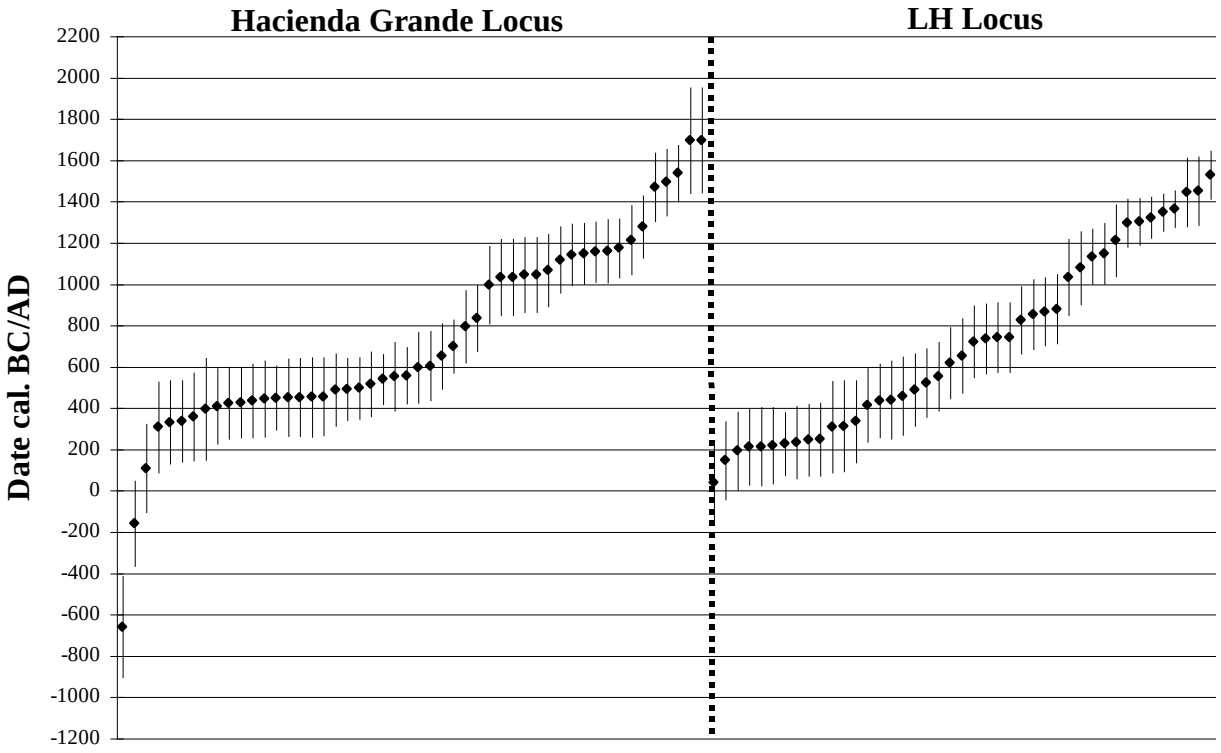

Figure 5-1. Calibrated 2σ ranges of radiocarbon dates from the LH and the Hacienda Grande components of La Hueca-Sorcé.

Although there are some considerable problems regarding the absolute temporality of this cultural complex observed in both sites, the available evidence seems to indicate that in both cases the sequence of occupation overlaps between components. This may evidence that, at least for some time, these distinct manifestations were being enacted by people that occupied overpenetrating territories, as is particularly evident in La Hueca-Sorcé (Figure 5-1). Therefore, future studies should also focus more attention on the type of interaction that these people had to sustain to cohabit in these plural contexts for an extended period of time, as was suggested by Oliver (1999) and Curet (2005).

With regards to relative chronologies, La Hueca-Sorcé site has not provided much information as in no section of the site have stratified contexts of LH and Hacienda Grande deposits been uncovered. Unfortunately, the area that may have provided such evidence,

corresponding to the ZTB and the P midden areas, was impacted by modern disturbances. A process of landscape reconstruction of post-alluvial sedimentation in other areas of confluence of both components at the site may add data to address this issue further. On the other hand, Punta Candelero has provided clear stratified contexts of LH and Cuevas style deposits. However, this does not add much to the initial agro-ceramic migration issue since Cuevas is considered by Rouse (1992) to be a terminal style within the Cedrosan Saladoid subseries. However, it clearly shows that at least in some parts of this site, LH materials pre-date deposits containing the Cuevas style of pottery.

However, this situation is different in other sites of Puerto Rico. For instance, Siegel (1992) reported a deposit of isolated LH wares underlying Hacienda Grande materials in his excavations of the Maisabel site, located on the north coast of Puerto Rico. More important though, is that he found those LH materials below a sterile layer of sand of around 20 cm that underlaid the stratum that contained Hacienda Grande materials. Due to overlapping thermoluminescence dates between the ceramics from the upper level that contained Hacienda Grande ceramics with the ones from the lower LH layer, he concluded that "This suggests that La Hueca is contemporaneous with Hacienda Grande, supporting Rouse's conclusion on the issue" (Siegel 1992:529).

Intriguingly and paradoxically enough, the dates from the lower LH context that underlaid the Hacienda Grande deposit *below a 20 cm layer of sterile sand* dated to a later date than the ceramic sherd from the overlaying strata. This seems to show a problem with the TL dating rather than a lack of cultural stratification as argued by Siegel. In fact, this was reported to him by the people who conducted the dating procedures. They cautioned him "The results of the TL survey dates indicated that none of the specimens would be suitable for high accuracy dating"

(Siegel 1992:518). Overlooking this caution, Siegel used these dates to make such a definite conclusion obviating the sounder chronological information offered by the vertical superposition of the cultural layers. This information needs to be reevaluated as this has been the only context that has presented a clear vertical segregation of Hacienda Grande and LH materials in Puerto Rico and is one of the westernmost areas were the LH component has been uncovered.

This chronological dilemma of early ceramic migrations is not only viewed in Puerto Rico and the Northern Lesser Antilles but also in Trinidad and South America as well. For instance, the Rio Guapo site dates to a later period than La Hueca-Sorcé and other early ceramic contexts in Puerto Rico and the Lesser Antilles therefore making it a problematic candidate as a type site for the "LH" manifestation in the continent as argued by Chanlatte. The same occurs with the Cedros site in Trinidad, which defines the Cedrosan Saladoid subseries in the Caribbean. The dates from this site, the oldest being cal. 190 B.C., are also about 300 years later than the earlier dates from other Cedrosan Saladoid sites in the Northern Lesser Antilles and Puerto Rico (Fitzpatrick 2006; Haviser 1997; Keegan 2004; Rodríguez Ramos et al. 2008b). Therefore, all of this information provided by the new dates that are being gathered from all the Antilles needs to be reevaluated as it are vital for reconstructing the temporal sequence of the migration of the peoples that enacted these traditions and the directionality of their movements to the islands.

The Superstructural Element

A topic of great importance that has been largely overlooked in this controversy has been the superstructural traditions as these are produced and reproduced in material culture. This issue is quite important as the cosmovision of these groups have been described as a rather conservative element of their societies. As Siegel (1991:85) explains:

> As I know, cosmology and worldview, to which the rich iconographic elements of Saladoid pottery are undoubtedly linked, are rather conservative. Therefore, while there

may be shifts in resource procurement and settlement strategies, it is likely that the myths, with the associated actors, do not change so readily.

Within this scope, it has been generally agreed that along with the advent of the producers of Cedrosan Saladoid pottery varieties to the West Indies also came the inception of *Cemiísmo* as their major superstructural practice (Rouse 1992; Wilson 1997). *Cemiísmo* is considered to be represented in the archaeological record by the presence of trigonoliths that, in the later periods of the precolonial history of the Caribbean, became highly sophisticated in their elaboration and representativeness. *Cemiísmo* is supposedly also reflected in ceramics by way of a variety of zoomorphic and anthropomorphic representations in modeled designs (Allaire 1997).

Trigonoliths have been found in many sites associated primarily with Hacienda Grande pottery, with lower representation in deposits with Cuevas style ceramics. Interestingly enough, none of these *cemíes* have been unearthed from the LH contexts of La Hueca-Sorcé or Punta Candelero. Even though Rouse and Alegría (1990) and Righter (1997) state that LH contexts evidence the use of stone trigonoliths, this has not been the case. In fact, the same was reported by Haviser (1991a) for the Hope Estate I context where no three-pointers were unearthed. This is an important line of evidence that needs to be further evaluated as it may indeed show a differential system of ideological representation that developed, by whichever reason, between these two early cultural manifestations.

Other factor that has been sparsely addressed is the treatment of the dead. This is another important point as in Cedrosan Saladoid complexes "mortuary practices are patterned within each cultural context" (Curet and Oliver 1998:228; see also Oliver 1999). The pattern of interment observed in sites associated to the Cedrosan Saladoid subseries has been described as relatively homogeneous in the different islands. The burials are deposited in the central spaces

of the sites, leading some to suggest the presence of cemeteries (Siegel 1992). The most common interment position is the fetal posture or squatting position (Rodríguez López 1997).

Interestingly enough, no burials have been found in the LH contexts from Punta Candelero or La Hueca-Sorcé. Even though 106 burials have been associated to the Cuevas component of Punta Candelero, none has been found in the LH locus. A similar case occurs in La Hueca-Sorcé were an undetermined number of burials has been associated to the Hacienda Grande component and none to the LH deposits. Even though in the latter site the central area of the LH locus has not been excavated therefore limiting the probability of finding any burials (Oliver 1999), in Punta Candelero the entire site was sampled and no burial associated to the LH component was found. This may suggest either some sort of differential pattern of interments between components or a deficient sampling strategy in these sites that definitely needs to be readdressed with more detail in future studies.

Infrastructural Organization

The society of the producers of Cedrosan Saladoid pottery has generally been typified as belonging to the tribal stage in Service's terms (Allaire 1997; López Sotomayor 1975; Moscoso 1999; Siegel 1992). Their organizational strategy has been depicted as presenting village-based self-sufficient subsistence economy where the control of resources was dominated by clan or kin structures (Curet and Oliver 1998; Siegel 1989). This symmetrical character society has been supposedly evidenced in the archaeological record by the homogeneous distribution of artifactual remains in the different middens and by the lack of differential attribution of grave goods to certain individuals (Curet and Oliver 1998).

The community plan observed in sites attributed to the Cedrosan Saladoid subseries has been generally described to follow the concentric ring model which is characterized by a horse shoe-like arrangement of structures (middens) surrounding a cleared central space defined as the

plaza/cemetery (Siegel 1989). The houses seem to be rather large, arguably to accommodate extended family groups (Curet and Oliver 1998). Siegel (1992) understands that his settlement configuration responds to the Arawakan ethos of these groups by representing their "physical model of the universe," as has also been argued by Heckenberger (2002).

With regards to settlement locations, sites with Cedrosan Saladoid pottery have been situated on both the coast and in somewhat inland settings (Haviser 1997). This flexible and opportunistic pattern has been correlated with island size, since in larger islands early Cedrosan settlements tend to be found in inland locations while in smaller landmasses these groups seem to have been more inclined on occupying the coastal environments although exceptions to this rule do occur, as is the case of Maisabel. Wherever they settled, it has been invariantly the case that the sites are situated near fresh water sources, sandy or loamy soils, mangroves and beach strands, and embayed shorelines.

The intra-site settlement configuration of La Hueca-Sorcé and Punta Candelero sites has been only superficially addressed which difficults the comparisons with other early ceramic sites. The only mention on the subject has been provided by Rodríguez López (1990), who noted marked differences on the spatial distribution of structure remains and middens between the LH and Cuevas components. He has indicated that during the LH occupation of the site the organization of the structures and the distribution of the middens was lineal, possibly along the bed of the Candelero River (Figure 5-2). The areas contained within the postmold patterns also seemed of lesser size than in the Cuevas locus. In the LH locus of Punta Candelero, Rodríguez López did not identify any central cleared areas while he did identify an "extensive and carefully planned" plaza/cemetery in the Cuevas section of the site (Rodríguez López 1997:84). The Cuevas settlement is similar to some other sites associated to the Cedrosan Saladoid subseries

documented in Puerto Rico as for example in Hacienda Grande (Rouse and Alegría 1990) and Maisabel (Siegel 1992). This lack of a central cleared "sacred zone" in the LH component of

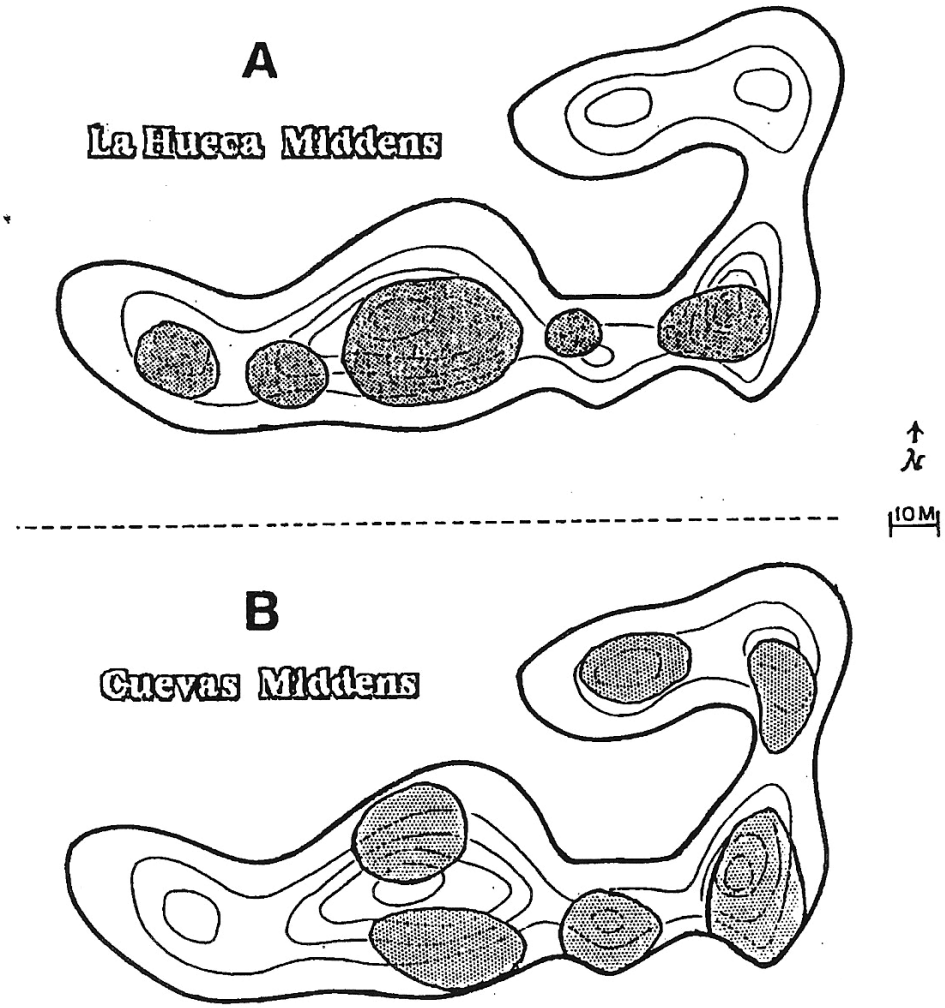

Figure 5-2. Map of Punta Candelero showing the distribution of LH and Cuevas middens. (After Rodriguez López 1991).

Punta Candelero seems to depart from the "physical model of the universe" manifested in the concentric ring model. Whether this represents a different articulation of their "axis mundi" or merely a different pattern of structure distribution due to some other logistic reason still awaits further evaluation.

In La Hueca-Sorcé, the settlement pattern was not much different from other Cedrosan Saladoid sites, as the configuration of the middens seems to follow the traditional horseshoe pattern (Figure 5-3). The only difference that has been observed when compared to other Cedrosan Saladoid sites is the presence of two middens, Z and ZTB that present a higher density of artifactual remains than the rest. This differential distribution of goods has been interpreted as

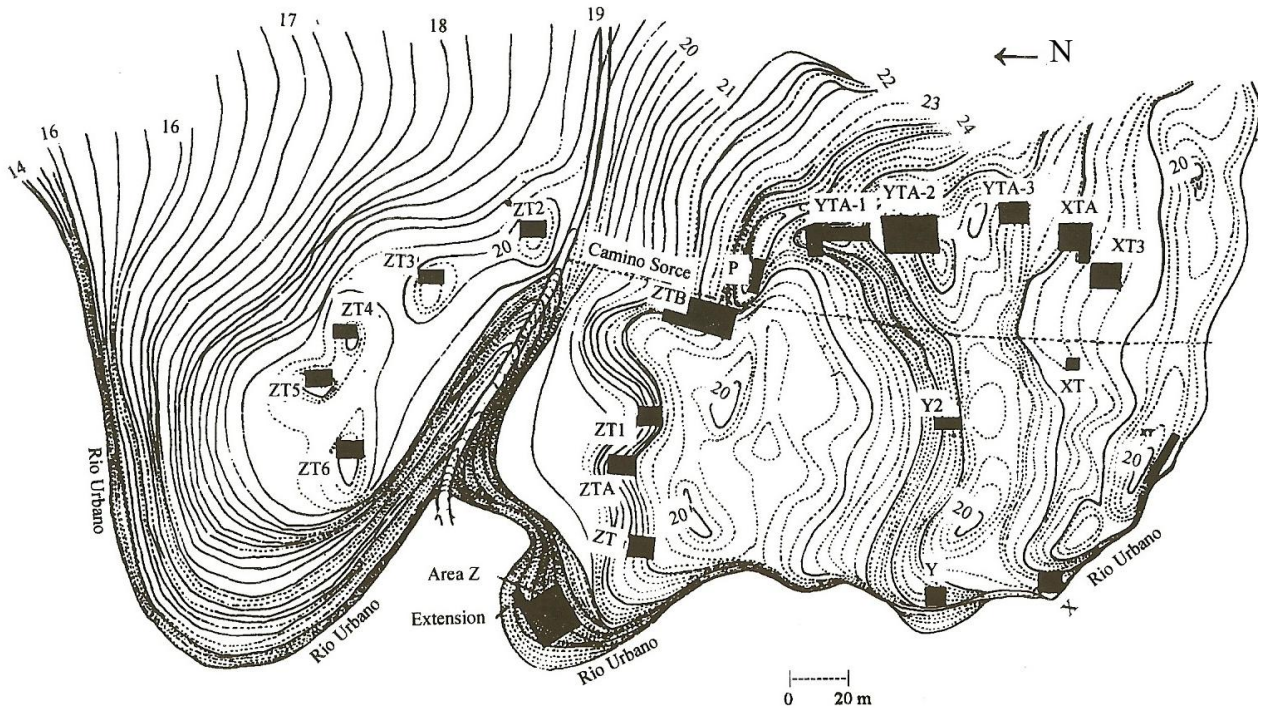

Figure 5-3. Map of La Hueca-Sorcé showing concentric plan of LH and Hacienda Grande middens. (After Chanlatte and Narganes 1990)

evidence that LH society was more stratified than that of the producers of Cedrosan Saladoid pottery, leading Chanlatte (1983) to suggest that these middens could be attributed to the refuse areas of the chieftain of the village.

With regards to subsistence practices, the producers of Cedrosan Saladoid pottery have been described as horticulturists that based their diet on the cultivation of root crops, especially bitter manioc (*Manihot esculenta*). They supposedly complemented these carbohydrates by

consuming proteins provenient from the exploitation of a wide range of terrestrial fauna such as agouti, rice rat, land crabs and iguana, among others (Wing 1990; de France 1989). In fact, this land oriented protein base in which crustaceans were an integral part was what promoted Rainey (1940) to label them the Crab culture in the first place.

In La Hueca-Sorcé, the protein component of the diet does seem to depart much from this land-based orientation. Both, the LH and the Hacienda Grande components evidence a vast amount of land crabs, which is the most ubiquitous dietary element in other Cedrosan sites. However, some differences with regards to the faunal resources exploited between the two loci have been noted by Narganes (1985). Among these is the presence of *Nesophontes* sp. and *Heteropsonys insularis* in the LH middens and their relative lack in the Hacienda Grande deposits. On the other hand, the Hacienda Grande deposits contain remains of *Isolodobon portorricencis* and iguanas (*Cyclura pinguis*) that are totally absent in the LH midden, as was also the case in Punta Candelero (Roe 1989). Narganes also noted a lack of evidence for the consumption of *carey* (sea turtle) in LH middens, a dietary element that was ubiquitous in the Hacienda Grande deposits. In fact, she suggests that the absence of this component of the diet in LH middens may be due to a superstructural practice as evidenced by the representation of batrachian forms in the LH lapidary materials. Also, the LH middens contained considerable amounts of land snails (*P. caracolla*) while the Hacienda Grande deposits did not evidence its consumption.

In Punta Candelero, similar patterns were evidenced with regards to faunal exploitation when compared to La Hueca-Sorcé site in both components. When Rodríguez López (1991) compared the subsistence activities of the LH component versus those evidenced in the Cuevas deposits, the major noted difference was that in the LH context the evidence indicated that the

exploitation of resources was mostly concentrated on the rocky coastal land resources while in the Cuevas deposits more concentration was directed towards exploiting the biotic resources of the Thalasia prairies. Asides from this, both groups seem to have been involved in similar subsistence activities at this site.

Lapidary

Another line of evidence that should be discussed is the highly sophisticated lapidary industry present in these early cultural manifestations as the unearthing of this array of materials has prompted many of the inferences made on the nature of the LH complex. For instance, Chanlatte (1983,1985) has postulated that the uniqueness of the iconographic representations evidenced in the lapidary materials of the LH signal, not only the area of provenience of this manifestation (the Andean section of South America), but also its character (a new migration). Others like Roe (1989, 1999a), Rouse (1990), and Siegel (1991) have used the same evidence for arguing that this manifestation simply represents a social unit within the Cedrosan Saladoid (a specialized gem-processing or religious group). These lapidary materials have also been used to provide information on the relations between the groups that inhabited the different islands and the mainland, due to the raw material transit present during that time period (Boomert 1987; Cody 1991; Haviser 1991b; Harrington 1924; Rodríguez López 1991, 1993; Vescelius and Robinson 1979; Watters 1997). Finally, these materials have also been used to suggest an incipient development of social stratification in “Saladoid society” as these ornaments "carried symbolic loads that supported elite ideologies" (Cody 1991:209).

Both La Hueca-Sorcé and Punta Candelero have been identified as "Saladoid centers" in the trade networks of exotic goods during this early ceramic period (Cody 1991; Roe 1999a). The presence of ports of trade in the precolonial history of the Caribbean was initially suggested by Harrington (1924) in his analysis of the S.W. Howes collection in Monserrat. This author

argued that some sites could have indeed served as gem centers, whose inhabitants were the recipients of exotic materials from other islands and from the continent by “intertribal trade." Later Boomert (1987) elaborated on this hypothesis by arguing that this exchange network was ceremonial in character and that it was maintained with Amazonian South American groups during time span of the Saladoid series. It has been within this regional context that the La Hueca-Sorcé has been defined as a “port of trade" and Punta Candelero as one of its "satellite villages" (Cody 1991; Rouse 1992). Furthermore, Siegel (1989:208) argues that La Hueca-Sorcé may represent a higher ranked site with political authority over the region while Punta Candelero would be a "checkpoint, through which visitors were required to pass on their way to Vieques." Other sites such as Vivé in Martinique, Morel in Guadeloupe, Pearls in Grenada, and Trants in Monserrat, among others, have been defined as the focal areas of this Pan Caribbean trade network of exotic goods (Oliver 1999). The semi-precious stones that were being circulated included serpentine, citrine, turquoise, calcite, amethyst, nephrite, aventurine, carnelian, and quartz crystal, among others. Some of these, as for example the nephrite, have been argued to proceed from South America (Cody 1991)

In all of these "gem centers" (sensu Harrington 1924) all the stages of manufacture of the micro-lapidary materials have been evidenced. However, it is interesting that the kinds of iconographic symbols produced in the different sites and the types of raw materials reduced in each location present a certain degree of variability, which might be indicative of community based levels of specialization. For instance, only Punta Candelero and La Hueca-Sorcé have evidenced a structured reductive strategy directed towards the production of the avian pendants that have been depicted as the distinctive icon of the LH (Chanlatte 1983) (Figure 5-4). Even though one of these specimens was found in its finished state in the Prosperity site (Rouse 1992)

and another was obtained from an unknown context in Trinidad (Fewkes 1907: Plate XVI), no other contemporaneous Cedrosan site has evidenced the local production of such an item or its import. In the case of La Hueca-Sorcé site, only one of these was found in the Hacienda Grande deposits. However, it seemed to have been obtained by a process of reclamation rather by exchange as reflected by its patinated surface and the numerous randomly located incisions inflicted upon the piece.

Figure 5-4. Avian pendants from the LH component of La Hueca-Sorcé (one on the left measures 5.2 cm).

In fact, these amulets are the ones that have received the most careful attention by Chanlatte and Narganes. For instance, Chanlatte (1983) has argued that this iconographic representation is related to the head trophy motif derived from Andean traditions. Therefore, this evidence has been used by Chanlatte to interpret that the LH represents a distinct ancestral tradition that originated in northwestern South America since it is unlikely that after years of insular adaptation, these people would come to "remember" the condor and to depict it in such a way in their material culture. The relation of early ceramic lapidary icons to that area has also been suggested by Sued Badillo (1979a) and McGinnis (1997).

What type of bird is represented in these avian pendants is also debated. For instance, Narganes (1985) has argued that it depicts both the male and female versions of the Andean condor (*Vultur gryphus*). In fact, this conclusion is an anchor piece in their interpretations as that type of bird is restricted to the Andean section of South America, the area of provenience of the LH as argued by them. Others contest that it represents a king vulture (*Sarcomphus papa*), a bird that in the insular Caribbean only ranges to Trinidad due to the continental character of the island (Boomert 1987; Houston 2001). This is another matter that is yet to be resolved.

Lithics in the Hacienda Grande Complex

As previously mentioned, utilitarian lithics have not been even mentioned within this debate. This does not depart from the traditional trend in the Antilles where the stone tools unearthed from Ceramic Age sites have always taken the back seat in archaeological studies. Fortunately, the number of publications on Caribbean lithics has been steadily increasing which has permitted to gather a more complete picture of Antillean assemblages. Even more fortunate has been the fact that most of these studies have been made on early Cedrosan assemblages and thus can be used here for comparative purposes. Since LH lithics have not been described in much detail, I will remit this discussion to other early Cedrosan Saladoid assemblages from Puerto Rico and the Lesser Antilles. This will serve as a frame of reference for the intended comparison between assemblages.

Core-flake technology

Procurement dynamics. During the early ceramic period, raw material procurement directed towards core-flake reduction presents a marked inter-island movement. This was not a novelty of ceramic-bearing societies since, as noted in the previous Chapter, Pre-Arawak groups were already transporting materials between the different islands (e.g., Bartone and Crock 1998; Knippenberg 1999b; Rodríguez Ramos 2002a). However, because of the lack of detailed

descriptions of the degree of reduction of these materials when they reached the sites, at this point it is difficult to address how the practices of raw material movement shifted from one period to the next. One aspect that seems to change though is the amplitude of the raw material spectrum of exploited sources by ceramic groups as a great array of materials provenient from different areas was being sought after. There were three major maritime oriented transit webs of raw material that have been suggested during this early ceramic period. These are: the large scale movement of exotic "gemstones" for the production of lapidary materials between the islands and from South America; the inter-island transit of fine-grained raw materials for the production of "expedient" flaked implements; and the inter-island movement of unreduced or preformed raw material for core tool production (i.e., celts and adzes). Because of this raw material transit some have postulated the presence of "extensive trade networks" (Bartone and Crock 1998), a Northern Antillean "interaction sphere" (Haviser 1991b), or a Pan-Caribbean trade network (Oliver 1999).

A major source of raw material for core-flake reduction was Antigua, as flint from that island has been found in Puerto Rico (Walker 1985; Rodríguez Ramos 2002a), Monserrat (Bartone and Crock 1998), St. Martin (Knippenberg 1995; Haviser 1993, 1999), Anguilla (Crock 1995), St. Martin (Haviser 1991b, 1999; Knippenberg 1995), and St. Kitts (Walker 1980), among others. Antiguan flint and other fine-grained raw materials were transported to some sites in nodular form for further local reduction while in others these were also imported in an already partially reduced state. Knippenberg (2006) has identified culturally bounded interaction zones where the movement of certain raw materials is observed.

During the early ceramic period procurement practices were mostly remitted to the collection of raw materials from nodular or secondary sources. Tertiary procurement also played

a role in raw material acquisition. In isolated cases, materials were reclamated from Pre-Arawak deposits to be further employed in the sites (Lundberg 1991; Pantel 1984). This mode of procurement, however, has been limited to sites near the areas of occupation and under no circumstances have these implements been demonstrated to be the acquired through exchange as finished items with Pre-Arawak populations or to have been imported from other islands.

Production dynamics. The reduction technology and the dynamics of use and discard of the flaked implements associated with Cedrosan Saladoid contexts have been described as "expedient" (Crock 1998 and Bartone; de Mille 1996; Futato 1995). Flakes and cores have been depicted as presenting too much morphological variation to be produced by any standardized manufacturing protocol. Retouch has been restricted in most instances to a unifacial use retouch which promotes the formation of a concave working edge usually associated with spoke shaving and other simple unidirectional retouches (Bartone and Crock 1998). Other flakes with pointed projections have been defined as drills (Knippenberg 1999a; Walker 1980) but no specific retouch type has been associated with the manufacture of this type of implement.

The flaking reduction sequences have been depicted as presenting two main protocols which co-occur in many cases: one unstandardized reduction method directed towards the extraction of generalized hand-held flakes with suitable edge angles by multidirectional freehand percussion and other comprising mostly a continuum from such freehand format to further reduction by the bipolar technique directed towards the production of microflakes. The latter reductive technique has been evidenced only in a small number of sites probably due to both, the lack of recognition of the bipolar products and inappropriate recovery techniques. This free-hand/ bipolar continuum has been labeled by Bartone and Crock (1998) the "cassava grater hypothesis." As originally proposed by Walker (1980), it states that during the ceramic period,

along with the inception of bitter manioc as a staple in the diet, also came the advent of a flaked lithic strategy directed in most cases towards the production of microflakes and chips as the desired ends of the reduction sequence. These where manufactured in order to produce morphologically specific grater teeth for their further insertion in cassava grater boards as has been reported in ethnographically documented tropical forest populations (Lathrap 1970). Walker (1980:107) even suggested that this freehand-bipolar continuum might represent a cultural marker between Pre-Arawak and the ceramic-related assemblages. Ever since Walker's study, grater teeth have been found in various sites in the Lesser and Greater Antilles (Allaire 1985; Knippenberg 1999c; Versteeg and Schindel 1992; Walker 1980,1985a,1998)

Crock and Bartone (1998) debate this hypothesis because they did not find any utilized microflakes in their collection from Trants and because the flakes from that site were basically larger free hand flakes. They use flake metric and technological data to debate whether the production of grater teeth was always present among Cedrosan Saladoid sites. They understand that the absence the manioc grater microflakes at Trans could have been due to the fact that these boards where imported as finished items from other sites as has been registered in the ethnographic record. The low incidence of bipolar cores (only seven in total) supposedly added another support to their alternative explanation.

The cores produced for flake extraction have also been described to show this marked process of opportunistic flaking. Most of these have been defined as multidirectional with random morphologies (i.e., polyhedral). Other core types like core on flakes and bi-directional cores, among others, have been documented but in no case have these been determined to be the objective pieces for any sort of morphologically specific flakes. One general trait that seems to

be common among many Early Saladoid sites is the high degree of exhaustion of flint cores, many of which were maximized by the employment of the bipolar technique.

Pecked-ground materials

The raw material employed in celt production was acquired both from local sources and by importing it from other localities. The island of St. Martin seems a likely candidate as the source area of some of the raw material transported to other islands to be employed in the manufacture of certain core tools such as celts and adzes (Knippenberg 1999a, 1999b; Chauviere 1998; Crock 2000). Haviser (1999) has argued that radiolarian limestone, a raw material that as previously noted was geographically restricted to this island, was moved to other locations for celt production. Core tools manufactured on this material have been found in other Antilles such as St. Eustatius (Versteeg and Schindel 1992) and Anguilla (Crock 2000; Haviser 1991b). Since heavy-duty woodworking tools such as adzes and celts were most ubiquitously used in tropical forest cultures, it is commonly assumed that pecking, grinding, and polishing techniques supposedly continued a marked betterment with the arrival of ceramic age groups into the Antilles as horticultural and canoe-making practices intensified. These technologies have been mostly related to the production of adzes and celts as well as to the confection of three-pointed cemíes and other formal implements.

Adzes and celts have gone through a considerable process of description since they have been employed to corroborate the cultural affinities defined by ceramic modal analysis. In fact, the only lithic implement that has been defined as a fossil marker of the Cedrosan Saladoid populations in Puerto Rico and the US Virgin Islands has been the plano-convex adze (Figure 5-5). This type of tool, initially identified by Rainey (1940) as characteristic of the Crab culture, is ubiquitous in sites associated with both Hacienda Grande and Cuevas style ceramics in Puerto Rico (Herrera Fritot 1964; Rainey 1940; Rouse 1952; Rouse and Alegría 1990; Siegel 1992;

Walker 1985a). The plano-convex adze seems to have played an important role in Cedrosan society as it is the only type of lithic tool that has been associated to superstructural activities such as burials in Puerto Rico (Roe 1985; Rodríguez López 1997; Siegel 1992).

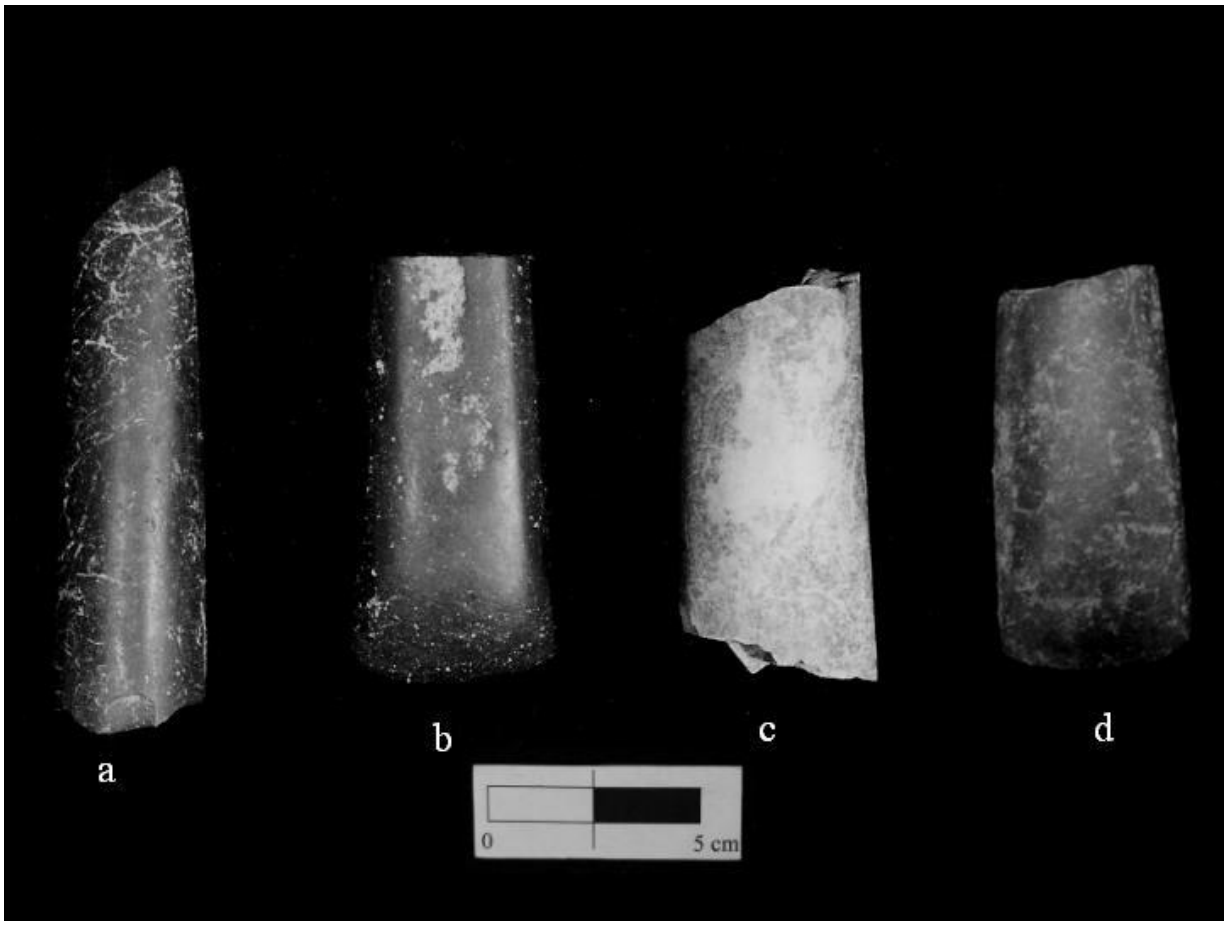

Figure 5-5. Plano-convex adzes from Cedrosan contexts. (a-b) La Hueca-Sorcé; (c) Punta Candelero; (d) Maisabel.

Early ceramic celts have been described to be of rather variant morphologies. The most common is biconvex or petaloid in shape. However, a problem has been in most cases the mere description of these as "petaloid celts" has left aside many other attributes that may indeed reflect the amount of variability that could be present in such materials. This has lead some even to suggest that "celts are indistinguishable between the Saladoid and the Ostionoid series." (Siegel 1992:108). Further insights on this matter will be provided in the next Chapter.

Use-modified materials

The repertoire of artifacts modified simply by the use to which these were submitted has received limited description in the islands, in contrast to those provided for the flaked and pecked-ground materials. Of these, the tool type that has been most widely discussed is the edge-ground cobble. As noted in the previous Chapter, this tool has been used as a cultural marker of Pre-Arawak occupations in Puerto Rico. However, evidence from Puerto Rico indicates also its presence early ceramic contexts associated to Hacienda Grande style ceramics (Pantel 1986; Rouse and Alegría 1990; Walker 1985). The finding of edge ground cobbles in early Ceramic Age sites of Puerto Rico led Pantel (1986:49) to argue that "the pebble grinder can be regarded now as a preceramic and early Hacienda Grande ceramic phase tool." Furthermore, Pantel (1986) and Rouse and Alegría (1990) indicate that the finding of these implements in early ceramic contexts serves as evidence for the acculturation of "Archaic" peoples by the Saladoid immigrants, or of "trait borrowing" from the former by the latter. However, as will be noted in the next Chapter, edge-ground cobbles continue to form an integral part of the culinary repertoire of later societies in the island.

Tradition of Doing Stone Things in the LH Complex

I now provide a description of the lithic production dynamics observed in the LH components of La Hueca-Sorcé and Punta Candelero sites. These are based on the analysis of 1871 artifacts from La Hueca-Sorcé and 1343 lithic items from Punta Candelero (Table 5-1). I will start the discussion by providing a description of the main protocols observed in core-flake reduction in the LH contexts. Then, I will discuss the patterns noted in the production of pecked-ground stone tools and will finish the discussion with a description of the artifacts modified simply by the uses to which these were submitted.

Table 5-1. Distribution of artifacts by general category in La Hueca-Sorcé and Punta Candelero.

La Hueca-Sorcé			**Punta Candelero**	
General Category	*N*	*%*	*N*	*%*
Flakes/shatter	1184	63.3	845	62.9
Cores	338	18.1	196	14.6
Celts/adzes	83	4.4	20	1.5
Other Ground	22	1.2	41	3.1
Use-Modified	244	13.0	241	17.9
Total	1871	100	1343	100

Core-Flake Reduction

As is common in the majority of sites of the West Indies and elsewhere, the vast majority of the artifacts recovered from both sites are related to core-flake reduction. The collection of flaked materials from La Hueca-Sorce is composed of 1522 artifacts (including cores, flakes, and shatter), while the one from Punta Candelero includes a total of 1041 pieces.

Procurement dynamics

In the production of flakes, both of these LH contexts present a marked emphasis in the import of a wide array of extralocal isotropic materials. In Punta Candelero as well as in La Hueca-Sorce, the vast majority of the materials was imported to the sites from distant locations of Puerto Rico as well as from extra-island sources. However, irrespective of whether the particular materials were locally procured or imported from extralocal areas, the emphasis in the LH loci of both sites seemed to be the obtainment of nodules that were brought to the sites for their local reduction. This is evidenced by the presence of discarded nodules, tested cores, primary flakes, and cortical shatter of local and extraneous materials.

The types of raw materials employed in core-flake reduction at these LH loci reflect three major general types of contexts from which these were obtained. The first of these is composed of the obtainment of locally available materials. Due to the fact that both La Hueca-Sorce and Punta Candelero are situated over the San Lorenzo Batolith, an intrusive volcanic formation that

extends between both islands, there is a similar suite of raw materials that could be procured from sources in the vicinity of the sites for core-flake reduction. These mostly include the milky quartz and meta-volcanic materials. Milky quartz was available in both Vieques and eastern Puerto Rico in the form of angular nodules of material that are that are widely scattered around the two locations as well as in the form of river-rolled pieces that were available in the Río Urbano and Río Candelero respectively. The metavolcanic materials could have also been obtained from those two high-energy sources and, in the case of La Hueca-Sorcé, from the beach deposits in La Esperanza. Interestingly, although both of these materials are available nearest to the sites, they comprise the minor portion of the raw materials used in core-flake reduction at both LH contexts (Table 5-2).

Table 5-2. Distribution of general raw material categories used for core-flake in La Hueca-Sorcé and Punta Candelero.

Raw Material	**La Hueca-Sorcé**				**Punta Candelero**			
	Cores		**Flakes/Shatter**		**Cores**		**Flakes/Shatter**	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Chert	133	39.3	468	39.5	121	61.7	389	46.0
Silicified Tuff	166	49.1	530	44.8	51	26.0	211	25.0
Milky Quartz	38	11.2	169	14.3	21	10.7	34	4.0
Meta-volcanics	-	-	10	.8	2	1.0	36	4.3
Other Materials	1	.3	7	.6	1	.5	219	25.9
Total	**338**		**1184**		**196**		**845**	

The second major type of material employed in the site was the silicified tuff. This type of raw material comprised 44.8 percent of the flakes and 49.1 percent of the cores in La Hueca-Sorcé, while in Punta Candelero it was less represented, comprising 25 percent of the flakes and 26 percent of the cores. The primary source of this material, originally identified by Jeff Walker, is associated with the Fajardo Formation. According to the geologic quadrangle of that area, this material is defined as a bedded tuff with a high silica content that presents a cherty appeal to it, occurring over a layer of pillow lava that is located between the Municipalities of Fajardo and

Ceiba; that is, approximately 15 km north-northeast from Punta Candelero and 35 km northwest from La Hueca-Sorcé (crossing the Vieques sound). The siliceous tuffs found in this formation are very homogeneous and present a high silica context, therefore providing this raw material with a chert-like flaking quality. Most of the nodules observed at both sites have an angular morphology, thus indicating their procurement from nearby their primary source, perhaps in the form of colluvium collected from a piedmont.

The third major category of raw material found at both of these sites is composed of cherts. In La Hueca-Sorce, chert is represented in 39.3 percent of the cores and 39.5 percent of the flakes, while in Punta Candelero it is much more frequent, comprising 61.7 percent of the cores and 46.0 percent of the flakes. Although chert is by far the most commonly used type of raw material in Punta Candelero and is also widely employed in La Hueca-Sorcé (second only to the silicified tuff by a slim margin), it is the rock whose geological occurrences are farthest from these two locations. The nearest documented occurrences of chert are located in southwestern Puerto Rico around 150 km west of Punta Candelero and 170 km west of La Hueca-Sorcé, while to the east the closest sources are located in St. Kitts that is at least 300 km away. As was the case in Pre-Arawak contexts, this again exposes the long-distance networks within which these materials were moved between locations.

On the basis of the macroscopic features of the different types of chert recovered from La Hueca-Sorcé, Knippenberg (1999c) defined several general categories. I then expanded this classification to include other types of material not included by Knippenberg in his original classification, some of which were only found in the LH context of the La Hueca-Sorcé site and others in Punta Candelero. Unfortunately, the exact sources of most of these materials could not be determined with a high degree of precision due to the marked intra-source variation that is

observed in them, most notably in Puerto Rico (Knippenberg 2006; Rodríguez Ramos et al. 2007). For the case of Puerto Rico, Knippenberg (2006:51) indicates that such variability might have been the result of their "secondary nature in which weathering must have had a significant effect." In our survey of chert sources in the island, we did not locate a single chert outcrop indicative of a primary formation, thus leading credence to Knippenberg's appreciation (Walker et al. 2001; Rodríguez Ramos et al. 2007).

Of these cherts, the only one that could be most clearly attributed to a specific source based on macroscopic attributes was that obtained from the Long Island source in Antigua. This type of chert is characterized by its gradation in color, spanning in some cases from an inner black (10yr 2/1) or very dark brown color (10yr 2/2) to an exterior pale brown (10yr 6/3). In most cases, Long Island flints contain white round bioclasts dispersed through their matrix. This identification was corroborated by Knippenberg's (2006) neutron activation analysis. The La Hueca-Sorcé site presented a more marked concentration of this type of Antiguan chert, comprising 18.2 percent of the chert flakes (including shatter) and 19.5 percent of the chert cores recovered. Punta Candelero presents a markedly inferior concentration of Long Island cherts, comprising 5.5 percent of the flakes and 6.6 of the cores. In both sites, the presence of discarded cores and primary flakes indicates its import in nodular form for its local reduction.

The particular source of the rest of the cherts is difficult to ascertain at the moment. Although I have noted marked similarities in the macroscopic features of some of the cherts found in La Hueca-Sorcé and Punta Candelero with those from the cherts found in the northwestern and southwestern portions of the island, Knippenberg's (2006:159) analysis of some of the chert varieties that he identified from La Hueca-Sorcé seem to pinpoint an Antiguan or a St. Kitts source for most of them, only one being attributed to a possible source from Puerto

Rico. However, irrespective of the particular sources from which these cherts were obtained, the most salient aspect is that these are located between 170 and 350 km from these two sites, making evident the importance that was placed in obtaining these nodular materials as valued commodities. Furthermore, the similarities observed in the types of raw materials (i.e., cherts, silicified tuff, milky quartz, and metavolcanic stones) that were imported to both LH contexts for core-flake reduction seems to indicate their involvement in similar trade partnerships and/or a direct exchange relationships between the two locations. The dorsal cortex content percentages observed in the flakes from both sites also indicate similar distributions between local and imported materials (Table 5-3). Also interesting is the fact that in both LH contexts the local and extraneous materials were reduced employing similar technological protocols, as will be discussed below.

Table 5-3. Cortex content percentage in flakes and shatter in La Hueca-Sorcé and Punta Candelero.

Raw Material	**La Hueca-Sorcé**						**Punta Candelero**					
	1	*2*	*3*	*4*	*5*	*6*	*1*	*2*	*3*	*4*	*5*	*6*
Chert	.9	4.1	3.6	8.5	12.8	70.1	3.3	4.4	5.6	9.3	14.1	63.0
Silicified Tuff	7.2	7.9	4.3	8.7	15.3	56.6	2.4	6.1	5.7	7.1	9.0	69.8
Local Materials	5.9	4.7	7.7	9.5	7.1	65.1	2.9	5.9	2.9	11.8	20.6	55.9

Production dynamics

In both LH contexts, similar core-flake formats were observed. After the raw materials were brought to the sites either by direct or indirect procurement, the first operation consisted on their testing to determine their suitability for the intended protocol of reduction. This is noted by the presence of primary flakes and discarded tested pieces objective pieces at both sites (Table 5-4). The testing procedure seems to have been carried out primarily by the use of the freehand technique. This is to be expected since this flaking technique is less invasive than bipolar flaking that usually, in "addition to crushing the striking platform, it also creates numerous internal

fractures which result in premature breakage" (Shafer 1973:65-66). However, there is also indirect evidence of primary reduction using the bipolar technique in the form of cores that bear cortex on both faces as well as by the presence of primary bipolar flakes. It is interesting to note that in both of these contexts, some flint varieties did not present direct evidence of their localized testing either in the form of primary flakes or tested nodules. This might be an indication of the import of certain raw materials in different states of reduction, probably as a result of contrasting forms of procurement mechanisms. For instance, items obtained by indirect exchange processes such as down the line trade would tend to present lower degrees of cortex than those obtained by embedded procurement (Lewenstein 1980).

Table 5-4. Core types in La Hueca-Sorcé and Punta Candelero.

La Hueca-Sorcé			**Punta Candelero**	
Type	*N*	*%*	*N*	*%*
FREEHAND	120	35.5	94	48.0
Tested core	23	6.8	14	7.1
Single Platform	27	8.0	14	7.1
Multiple Platforms	39	11.5	51	26.0
Inverted Platforms	2	.6	-	-
Bidirectional Platforms	3	.9	1	.5
Core on flake	12	3.6	2	5.6
Centripetal	14	4.1	12	6.1
BIPOLAR	213	63.0	93	47.4
MIXED TECHNIQUES	5	1.8	9	4.6
Total	338		196	

After testing, three major approaches to flake extraction by the freehand technique were observed: multidirectional flaking (Figure 5-6a-g), parallel flaking (Figure 5-6h-o), and centripetal flaking (Figure 5-6p-v). Of these, the most common one observed in both La Hueca-Sorcé and Punta Candelero was the application of multidirectional flaking. In this format, flaking operations are applied randomly over the cores, being mostly adjusted to take advantage of opportunistic reduction contingencies created during unplanned knapping situations. This results in the production of polyhedral cores, which sport more two or more surface platforms

occurring in different axial planes (Figure 56a-b). The flakes produced by this reduction protocol present two or more dorsal scar orientations, curved crossections, a higher variety of platform configurations (in many cases reflected previous flake detachments in the form of facets), a relatively high incidence of hinge and step terminations, as well as rather heterogeneous morphologies (Figure 5-6c-g).

The second most common form of flaking observed in these sites is the parallel format. This form of flaking was more commonly observed in Punta Candelero than in La Hueca-Sorcé. As was noted in the previous chapter, this flaking format involves the scaled application of force to a core along a single axis. This includes flake extraction from a single platform or in two opposed platforms, but still along a single core axis (Figure 5-6h-i). Within this class are included single and inverted platform cores, as well as the core on flake. The flakes produced through this knapping procedure had flat platforms with either a single facet or a cortical surface, a slightly curved profile, and dorsal scars running parallel to their longitudinal axis (Figure 5-6j-o).

The third most common core-flake reduction strategy in both of the LH contexts was the centripetal flaking format. It was present in 4.1 percent of the freehand cores from La Hueca-Sorcé and in 6.1 percent of the ones from Punta Candelero. The cores classed under this category presented a peripheral flake extraction that resulted in the formation of bifacial discoid cores in which their edges served as the striking platforms (Figure 5-6p-r). These cores tend to present bifacial symmetry, a round morphology when seen in planview, and a convex to pyramidal crossection in each of their faces. As was discussed in the previous chapter, this core reduction template produced flakes that presented convergent ridges at the center of their dorsal sides, and bifacial platforms (Figure 5-6s-v). Some of the cores produced by this technique in

both La Hueca-Sorcé and Punta Candelero were split, probably for their continued reduction using the bipolar technique (Figure 5-6x-z).

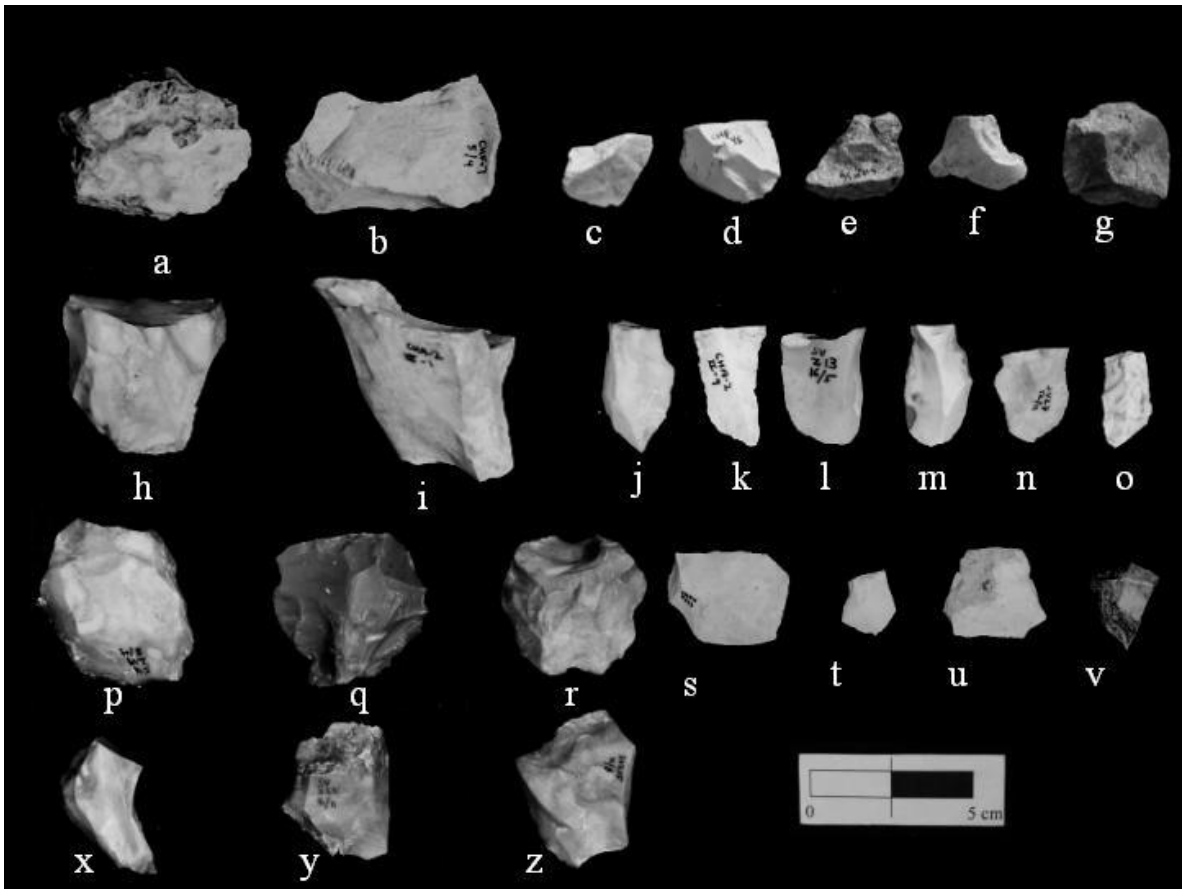

Figure 5-6. LH core-flake freehand reduction formats in La Hueca and Punta Candelero. (a-g) multidirectional cores and flakes; (h-o) parallel cores and flakes; (p-v) centripetal cores and flakes; (x-z) split discoidal cores.

The other form of flaking applied was the bipolar technique (Figure 5-7). In both of these LH contexts, the application of the bipolar technique commenced in different parts of the reduction continuum depending on the desired end product. As previously noted, in some cases the primary reduction of nodules was accomplished by the bipolar technique irrespective of the size, shape, or interior traits of the parent mass. In fact, some nodules with maximum sizes of up to 65 mm were initially reduced by the bipolar technique producing massive bipolar cores (Figure 5-7a).

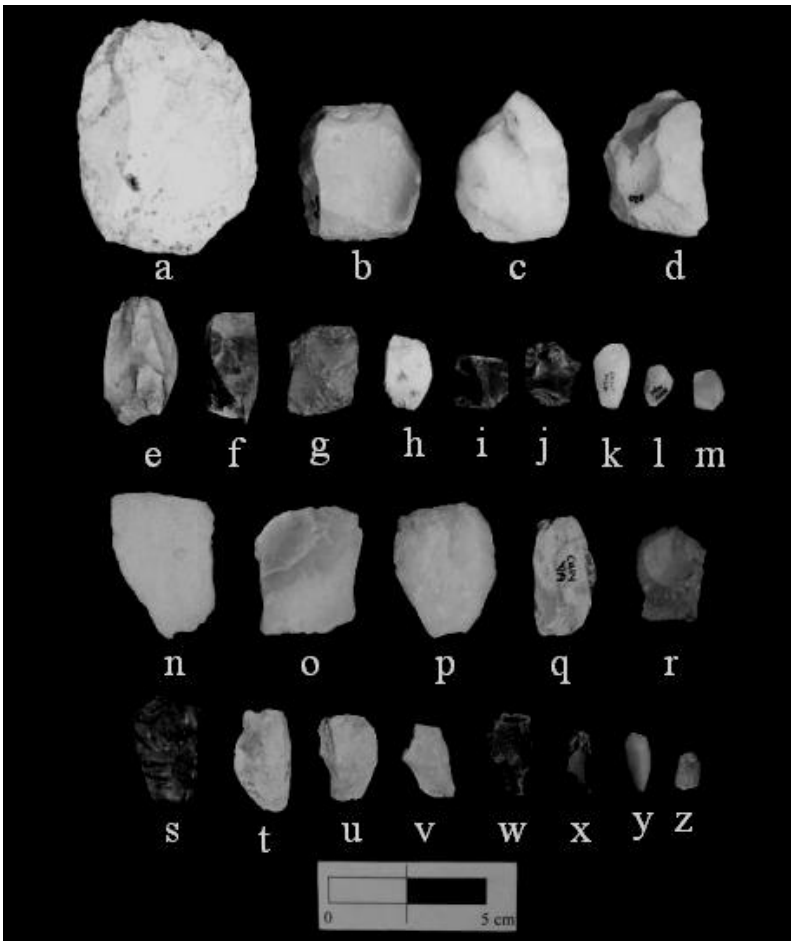

Figure 5-7. LH bipolar cores and flakes from La Hueca and Punta Candelero. (a-m) bipolar cores; (n-z) bipolar flakes.

The application of bipolar flaking to large nodules seems to have been aimed at producing large, lamellar or biconvex shaped flakes with straight profiles to be employed in a different array of activities (Figure 5-7n-q). However, in other cases the use of the bipolar technique was the most feasible choice for reducing small nodular materials or for exhausting other small cores. In fact, I observed some cores in both of these LH contexts that had dimensions of less than 1 cm in maximum length (Figure 5-7l-m). As has been argued previously for Cedrosan contexts, the purpose of exhausting these bipolar cores was to detach small and thin flakes, perhaps for their use as grater teeth as argued by Walker (1980) or for making other types of composite tools. Associated with these exhausted bipolar cores, I also identified some micro-flakes produced by

the bipolar technique that measured only 6 mm in maximum length (Figure 5-7z). Unfortunately, due to the employment of ¼-inch meshes at these sites, it is quite possible that most of such materials were not recovered as these micro-products are mostly recoverable using finer screen sizes (Rodríguez Ramos 2006).

In both of these collections, a minority of the cores (1.8 percent in La Hueca-Sorce and 4.6 percent in Punta Candelero) bore technical traits indicative of both freehand and bipolar flaking, thus representing a transition between these two reduction techniques. In these sites, clear evidence for this transition was only distinctively observed from freehand to bipolar flaking. However, as previously indicated, there is a possibility that a changeover from bipolar to freehand flaking could have been registered in the early stages of core preparation as would occur if the unmodified parent mass was bipolarly split to create suitable flat platforms for freehand flaking using a parallel format. In these sites, this freehand-bipolar transition was registered primarily on two types of cores: multidirectional and centripetal cores. The most evident case was that of the aforementioned discoidal cores that were rested over an anvil and where then radially split to create two core halves that could have been easily reduced further by bipolar flaking (Figure 5-6x-z).

A total of 55 flakes and shattered pieces from Punta Candelero (6.5 percent of the flakes and shatter) and 38 from La Hueca-Sorcé (3.2 percent) presented evidence of intentional flake retouch. In both sites, I identified the same forms of intentional flake modification that included fine, abrupt, and denticulate retouch (Figure 5-8). The abrupt retouch consisted of the removal of a small notching flake form one of the margins in order to produce a concave working surface (Figure 5-8e-h). Crock and Bartone (1998) have argued that in their collection these incurvate edges were the result of use and thus that were not intentionally produced. However, in most of

the notched flakes present in these sites it is evident that such a flake was produced either by confined flaking or by pressure, to create the necessary conditions for their use over convex surfaces (e.g., spokeshaving).

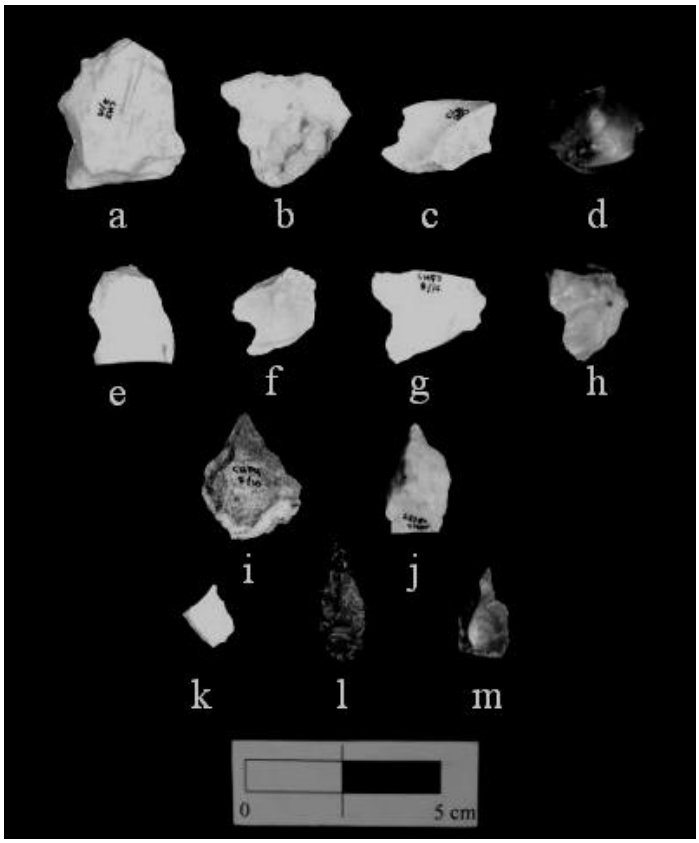

Figure 5-8. Types of flake retouch. (a-d) denticulate; (e-h) incurvate; (i-m) fine.

Fine retouch was performed in order to isolate pointed projections (Figure 5-8i-m). This was accomplished by means of the application of pressure retouch obliquely from the distal ends of the flakes and from any other portion that presented an obtuse bulge. In most of these specimens, I observed rounding in their bit portions signaling their use in incision activities. This type of retouch was most evident in bipolar flakes than in freehand flakes, perhaps as a result of the common pointed and thin distal portions observed in this type of flake that could be finely pressured thus easily obtaining a pointed edge without much effort.

The final form of post-detachment manipulation consisted on the creation of serrated edges by unifacial retouch, producing what is usually termed a denticulate (Figure 5-8a-d). It was performed by the creation of two or more notches along a single edge of the piece. In most cases, this form of retouch seems to have been applied by pressure while in bigger pieces it was applied by freehand flaking. The fact that most of these forms of post-detachment manipulation were not directed to alter the overall morphology of the pieces but only at producing the necessary working conditions of their edges, indicates that the major effort of the core-flaked technology was aimed at producing suitable working edges for their use as hand-held or composite tools.

Pecked and Ground Materials

As stated in Chapter 2, pecked and ground materials were divided into ground bifacial core tools (adzes and celts) and other ground artifacts (in this case, edge-ground bifaces, channeled stones and incurbate-edged tools). The sample of ground bifacial core tools from the LH contexts of these sites was further subdivided into six major types on the basis of a combination of attributes designed to model their overall morphology. This artifact typology included biconvex celts, flat-top celts, oval ended bifaces, LH adzes, plano-plano adzes, and other unique (i.e., enigmatic) bifaces (Figure 5-9; Table 5-5).

Celts and adzes

Most of these items were produced on locally available raw materials, mainly metavolcanic rocks such as andesite and basalts. However, the use of imported materials was also noted in their production, particularly the import of radiolarian limestone from St. Martin and peridotite obtained most likely from western Puerto Rico. It is interesting that despite the particular raw material that was employed, the morphology of some of these pieces in both sites was rather conservative thus demonstrating the adherence to particular manufacturing guidelines.

The import of radiolarian limestone and peridotite was most commonly observed in La Hueca-Sorcé, being those materials represented in Punta Candelero in only two pieces (both were radiolarian limestone).

Table 5-5. Metrical attributes for celts and adzes in La Hueca-Sorcé and Punta Candelero.

La Hueca							**Punta Candelero**					
Type	*N*	*%*	*Leng*	*Wd.*	*Th.*	*Wg.*	*N*	*%*	*Leng*	*Wd.*	*Th.*	*Wg.*
Biconvex	30	36.1	147.2	52.2	33.1	436.8	12	60.0	125.5	52.6	31.1	382.5
Flat Top	1	1.2	95.0	58.0	35.0	350.0	2	10.0	99.5	53.0	28.5	280.0
Oval-ended	28	33.7	-	61.7	19.0	188.8	-	-	-	-	-	-
LH Adzes	14	16.9	89.1	43.0	16.0	109.3	2	10.0	71.5	41.0	12.5	70.0
Plano-Plano	4	4.3	-	58.0	14.2	118.6	3	15.0	-	56.0	16.3	142.0
Other celts	6	7.2	147.0	84.0	31.0	585.0	1	5.0	-	-	-	88.2
Total	83						20					

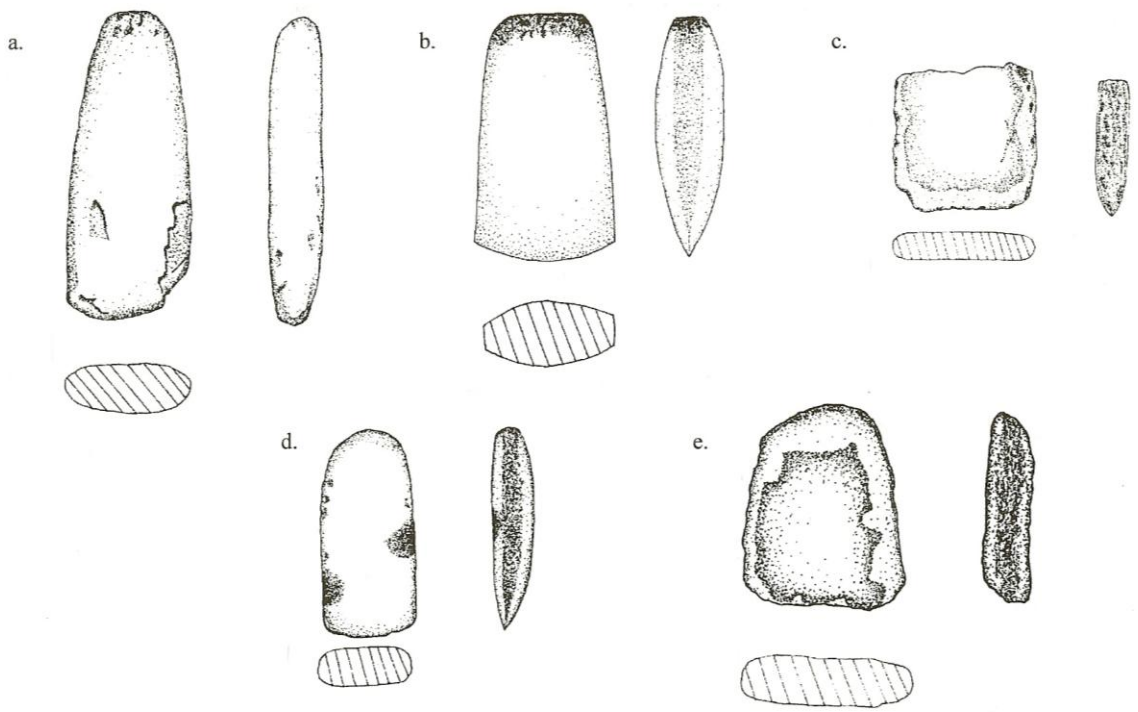

Figure 5-9. LH bifacial ground tools. (a) biconvex celt; (b) flat-top celt; (c) plano-plano adze; (d) LH adze; (e) oval-ended thin bifaces.

In the case of the use of radiolarian limestone, it should be noted that because only two flakes of this type of raw material were found in Punta Candelero and none in La Hueca-Sorcé, it is possible that it was imported either in a finished or a preformed state, as has already been

suggested by Knippenberg (1999c) in his analysis of the lithics from the Hacienda Grande component of the La Hueca-Sorcé site. However, this does not necessarily mean that there was a "celt manufacturing center" in St. Martin as suggested by Haviser (1991a), since this raw material could have also been brought to the periphery of the sites in its natural state and reduced in a specific locality not yet discovered. This last possibility is stated as I did not find any direct evidence of the reduction of locally obtained materials either for celt or adze production either so I cannot rule out that both, the imported and the local materials, were reduced in untested off-site locations. Another problem with stating that these pieces were imported in a preformed or finished state is the fact that some implements that are made over these raw materials, such as the plano-convex adze and the LH adzes (see below), have not been identified amongst the form tools produced in St. Martin. Therefore, I consider that more evidence needs to be gathered before we are in a position to ascertain the state and the mechanisms by which this material was moved to other islands.

Biconvex celts. Biconvex celts were the most common ground tool in both LH contexts. Based on the negative impressions of their reduction process, they seem to have been produced by lateral intrusive flaking, evened by pecking and then finished by grinding. In these specimens, usually designated under the generic 'petaloid celts,' surface smoothing was mostly confined to specific sections of the tools, being most evident along the center of both faces and near the bit, leaving most of their margins in a crude state (Figure 5-10a, b). Their lateral margins are characterized by being most commonly convex-divergent, tapering gradually towards a round or conical poll end (Figure 5-9a). Their crossections vary from an elliptical to a straight elliptical morphology while their bits when seen in planview are elliptical showing either a gradual or an abrupt boundary with their margins. Some of these pieces presented haft features

in two major forms. The rarest of these consisted of a pecked groove that encircled the proximal segment of the tool (Figure 5-10f). The second, and most common, type of hafting was comprised of confined indentations on the two margins of the tool (Figure 5-10e).

Flat-top celts. These were classified primarily on the basis of their poll morphology, which is straight (Figure 5-10c-d). The flat poll end does not present battering marks on its upper portion therefore indicating that its morphology was not a result of use but of manufacturing intent. Their lateral margins were straight-divergent with somewhat facetted surfaces. The tapering of this celt is much more gradual than the biconvex ones (Figure 5-9b). Two of these specimens, recovered from Punta Candelero, still bear some of the negative impressions of their initial production procedure that consisted of lateral intrusive flaking. Then, these were pecked and finished by grinding in most of their body area. In fact, these presented an overall higher degree of termination when compared to the biconvex celts, although none of these was polished. One of the specimens from Punta Candelero seems to have been reused as a bipolar hammerstone.

Plano-plano adzes. Plano-plano adzes were defined primarily on the basis of their lateral margin morphology and crosssection (Figure 5-11a-b). These are mostly thin, flat, and wide specimens almost rectangular in shape that present a slight tapering from the bit to their poll ends. Made exclusively out of basalt, these show negative impressions of their shaping by flaking, while their most intense finishing process is confined to their bit ends while most of their body was evened by grinding. Their lateral margins are almost parallel, tapering very gradually towards their proximal ends (Figure 5-10c). Their asymmetrically beveled bits are wide and flat. Due to the lack of complete pieces that sported their poll ends, I cannot ascertain their morphology in this section of the tool nor the ubiquity of a haft element.

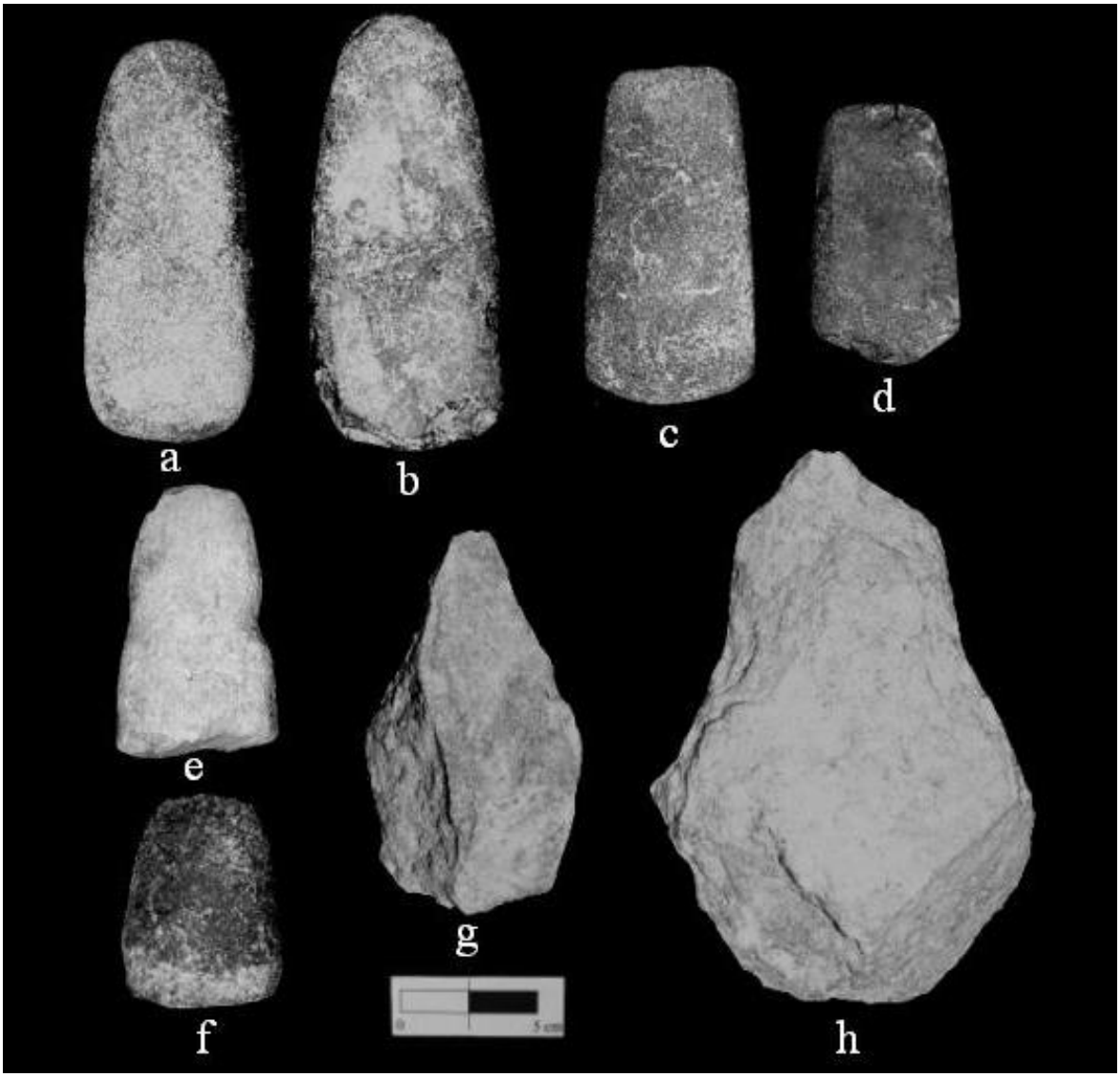

Figure 5-10. LH celts. (a-b) biconvex celts; (c-d) flat-top celts; (e-f) types of haft elements; (g-h) enigmatic celts.

LH adzes. An adze form that is characteristic exclusively of the LH contexts of these sites is the LH adze (Figure 5-11e-h). These items are classified as adzes due to their edge morphology since their bits are irregularly beveled, being offset towards either side of the tool's centerplane (Figure 5-10d). One of these tools bore the negative scars of its reduction procedure, which, again, consisted of lateral intrusive flaking smoothed by grinding. The lateral margins present common peck marks that were imparted to mold the tool to a specific morphology. In a single case of a LH adze manufactured over peridotite, some degree of luster was observed

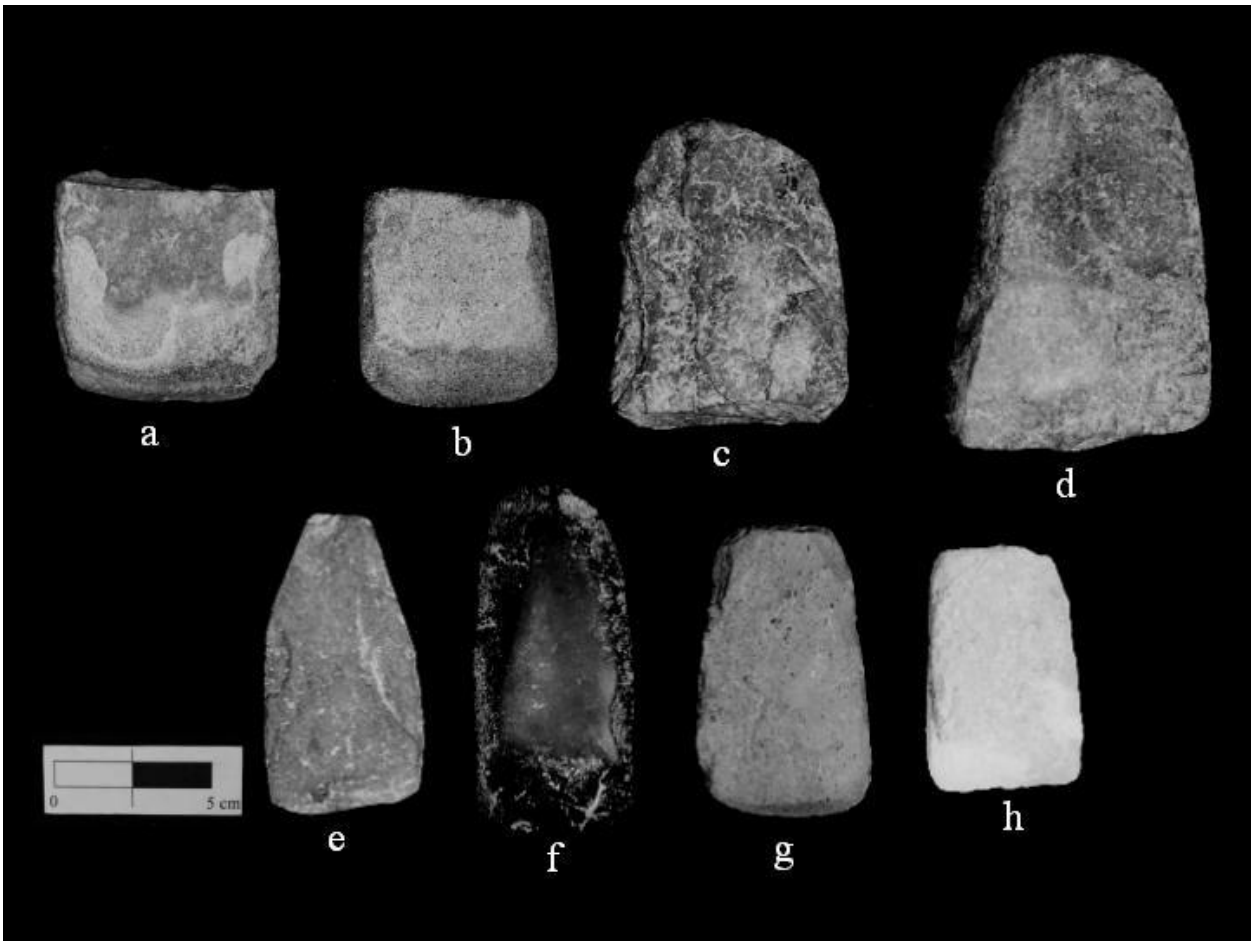

Figure 5-11. LH adze types. (a-b) plano-plano adzes; (c-d) oval-ended thin bifaces; (e-h) LH adzes.

signaling a more intense finishing than that registered in the rest of the bifaces (Figure 5-11f). However, this was not the characteristic polished termination of the items found in Cedrosan deposits, being confined to the center portions and to the bit sections of the tools. In some cases this grinding procedure was so intense, that it promoted a faceted ablation either on one or two of their faces. These implements were very homogeneous in size and general morphology, being made on a different array of materials both local (river rolled meta-volcanics) and imported (radiolarian limestone [Figure 5-11h], peridotite [Figure 5-11f], and coarse-grained silicified tuff). As seen in plan view, their bits tend to be straight with angular corners presenting a use angle of around 65 degrees, which is similar to that of plano-convex adzes. Their poll ends were

usually either straight or round. None of these implements show evidence of hafting or traces of heavy battering. The most common wear type is remitted to the presence of striations perpendicular to the working edge and parallel to the long axis of the tool, evidencing their use in a wood shaving action. These materials are rather similar in morphology and dimensional characteristics to others produced in shell (usually termed gouges) in both LH contexts as well as in Pre-Arawak sites in the Greater Antilles (e.g., Veloz Maggiolo 1980).

Oval ended thin bifaces (hoes?). I defined oval bifaces as rather long, thin, and wide core tools with an almost circular poll end (Figure 5-11c-d). These tend to be crudely shaped presenting lateral intrusive flakes all around their perimeter in conjunction with a generalized lack of grinding in most of their body surface. In fact, these are the crudest core tools in appearance due to their almost total lack of termination, when compared to the rest of the ground bifacial core tools analyzed in this collection. These form tools seemed massive, although this appreciation is hampered by the fact that I only had fragmented portions, corresponding exclusively to poll ends. In fact, due to the absence of bit fragments I was not able to assert their functional purpose. However, these are very similar to specimens labeled as 'hoes' by Evans and Meggers (1960). Also, these could be preforms of other form tools such as the plano-plano adzes due to their similarities in cross section morphology (Figure 5-10e). These were manufactured over both local (basalt) and imported (radiolarian limestone) materials. The presence of these tools was confined to the LH context of La Hueca-Sorcé, as none from Punta Candelero was included in this sample.

Other celts. There were other 'enigmatic' specimens that could not be ascribed to any particular celt or adze type, although due to their symmetrical bits were considered as celts. One of these enigmatic celt forms was represented by two specimens that were diamond shaped

(Figure 5-9g-h). Their lateral margins were angular convex. Both of these presented broad flakes bifacially removed. They had a bifacially beveled distal end with an angle of about 70 degrees. Both present hafting depressions on their sides, similar to the ones present in the other biconvex celts. These two tools were made over silicified shale. The largest one presented pitted depressions on the center of its body probably due to its reuse as an anvil.

The other enigmatic biface had sinuous lateral margins that gave it a morphology similar to the necked specimens found in Pre-Arawak sites of the Lesser Antilles. It presented a similar haft pattern than the rest, consisting of marginal depressions. Its bit was round, sporting extreme battering wear.

Other ground materials

The following discussion will be devoted to the rest of the ground materials that were not immersed in heavy-duty woodworking tasks. These are the edge ground biface, the incurvate-edged biface and the channeled stone (Figure 5-12). Attribute summaries each of these artifact classes are provided in Table 5-6.

Table 5-6. Metrical attributes for other ground materials from La Hueca-Sorcé and Punta Candelero.

La Hueca-Sorcé							**Punta Candelero**					
Type	*N*	*%*	*Leng.*	*Wd*	*Th.*	*Wg.*	*N*	*%*	*Leng.*	*Wd.*	*Th.*	*Wg.*
Edge-ground	7	31.8	88.4	47.4	12.6	110.7	39	95.1	68.3	46.4	15.0	67.4
Incurvate-edged	3	13.6	62.0	71.3	17.7	103.3	2	4.9	97.5	60.0	15.5	127.5
Channeled Stone	12	54.5	171.4	141.0	57.6	2187.9	-	-	-	-	-	-
Total	22						41					

Edge ground bifaces. I defined as an edge ground bifaces those flake tools that presented a bifacially ground edge and an overall D-shape when seen in planview (Figure 5-12c-f). Some of these specimens sported only one ground edge while others had two. These edges were mostly convex, although some pieces also presented straight edges. These form tools had faceted margins isolating a honed edge of around 40 degrees. The raw material employed in the

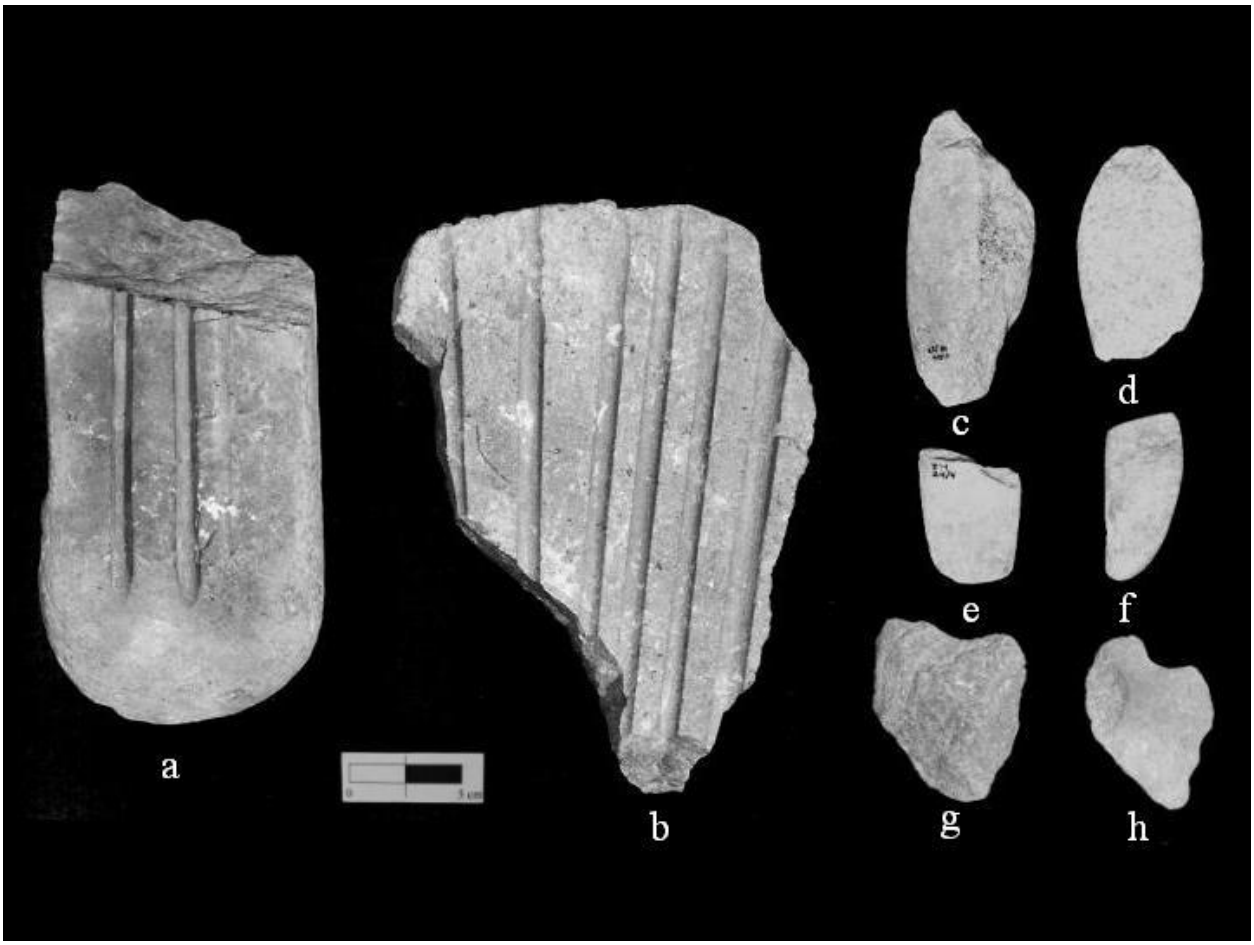

Figure 5-12. Other ground materials (a-b, channeled stones; c-f, edge-ground bifaces; g-h, incurvate-edge tools).

production of this artifact type was invariably silicified shale. These items do not bear any negative impressions of their attachment to other piece for their use, so they should have been hand held during their employment. Both sites presented the entire spectrum of reduction of these tools, including everything from blanks to flake byproducts and finished items. In most specimens, besides the grinding of the edges, they also ground the two faces of the tool.

Channeled stones. These implements are characterized by these presence unidirectional parallel incisions along one of the faces of large slabs of rock, which usually span the total length of the tool (Figure 5-12a-b). For the production of this type of stationary implement, a wide

variety of materials of massive size were chosen. These raw materials varied from coarse-grained types such as conglomerates and sandstones to other fine-grained ones such as silicified shale.

Their estimated process of reduction began with the collection of large, rather flat faced blanks. The primary manufacturing step consisted in flattening their face through abrasion. Then the trajectory width, length, and depth of the incisions were delineated by pecking with a pointed implement. These tools were then finished by grinding each of the grooves. Some items were also molded to specific overall morphologies by pecking and grinding around their entire perimeter. The incisions are always completely straight, remaining symmetrical in width and depth through their trajectory. The topography of the bottom of the incisions also remained plain all across their trajectory. In every case, these incisions present concave bottoms. Their width varied from 5 mm to 10 mm while their depth ranged between 3 and 5 mm. Within a single piece, the channels always remain parallel, never intersecting each other. The number of incisions within a single piece spanned from one to six.

Incurvate-edged pieces. Made exclusively of silicified shale, these hand held tools are characterized by the presence of a heavily battered section in one of their edges producing a concave working space (Figure 5-12g-h). The incurbate portion of these tools is created through flaking and is then smoothed by grinding. The opening of these worked areas varied from 2 to 3 cm. The overall morphology of these pieces tends to vary from triangular to irregular. All of the four items were also ground in their two faces.

Use-Modified Materials

The attention will now be turned to the artifacts that were modified simply by the uses to which these were submitted (Figure 5-13; Table 5-7).

Table 5-7. Metrical attributes for use-modified materials from La Hueca-Sorcé and Punta Candelero.

La Hueca-Sorcé							Punta Candelero					
Type	*N*	*%*	*Leng*	*Wd.*	*Th.*	*Wg.*	*N*	*%*	*Leng*	*Wd.*	*Th.*	*Wg.*
S. sided anvil	1	.4	-	-	-	285.0	2	.8	52.0	79.0	85.0	677.5
D. sided anvil	3	1.2	111.3	90.7	58.0	444.0	1	.4	75.0	64.0	23.0	190.0
Fine gr. Perc.	11	4.5	50.4	50.1	44.3	169.1	9	3.7	52.6	40.0	44.6	140.0
Other pec.	4	1.6	77.0	49.0	29.7	120.7	11	4.6	56.9	45.3	29.7	127.3
Pecking stone	4	1.6	-	-	-	118.8	13	5.4	72.7	47.7	18.7	143.1
Round-pitted	5	2.0	48.0	108.3	97.3	810.0	2	.8	-	-	-	540.0
Edge-ground	1	.4	-	-	-	365.0	6	2.5	70.0	143.0	41.0	312.5
Striated pebble	188	77.0	46.5	26.3	14.6	34.4	167	69.3	38.5	24.6	16.3	28.9
Pestle	2	.8	122.0	52.0	40.5	545.0	3	1.2	93.5	62.5	37.5	134.8
Grinding slab	23	9.4	80.3	57.5	18.3	220.9	27	11.2	63.2	48.0	39.4	134.8
Pitted Slab	2	.8	-	-	178.2	4112	-	-	-	-	-	-
Total	244						241					

artifact, the surface morphology and the thickness are important. Flat surfaces are preferred and thick bodies also. Most of these were massive, selected to withstand the impact of the activities performed over them as well as for minimizing the loss of their force (Kobayashi 1975). Most of the specimens presented bilateral pitted sections resulting from their repeated use in both faces, for which I considered them double sided anvils. In these sites, anvils were invariably of river rolled meta-volcanics.

Round fine-grained hammerstones

These implements were commonly found in the collections of both La Hueca-Sorcé and Punta Candelero sites (Figure 5-13c-h). These can be described as spherical shaped tools whose morphology is the result of severe battering on most or their entire surface. These are made exclusively over fine-grained materials such as chert, jasper, and milky quartz. As mentioned by de Waal (1993), these implements tend to mold to a round morphology due to the fact that their protrusions collapse when the material is submitted to use. However, I think that, at least in part, this round morphology may have been also the result of an intentional procedure by which the hammerstone was pecked and ground to a ball shape. This process may have had to do with strengthening their outside surface for extending their durability in response to the brittleness of

these fine grained materials. This grinding procedure also incremented the amount of area that could be covered during a hammering episode. Therefore, I think that perhaps these were produced in such a manner for their employment in the bipolar technique, as it requires for the hammerstone to present a convex head, which permits it to cover a broad impact zone (Flenniken

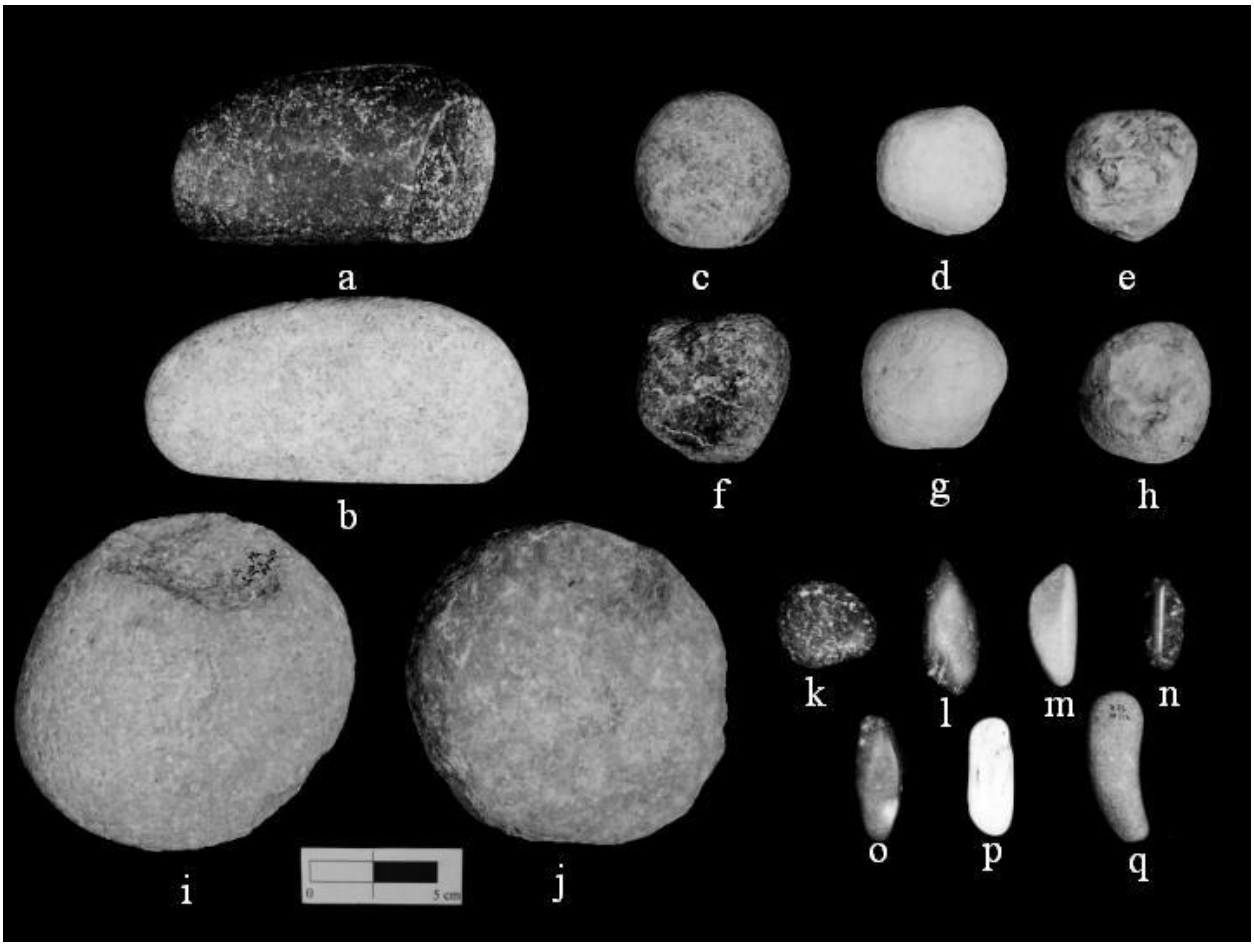

Figure 5-13. Use-modified materials. (a-b) edge-ground cobbles; (c-h) fine-grained round percussors; (i-j) round pitted stones; (k-p) striated pebbles.

1981; Kobayashi 1975). The smaller lightweight version of this tool type may have been used for the removal of bipolar micro-flakes from some of the small bipolar cores previously described, to be inserted in grater boards as postulated by Walker (1980). These pieces also presented flattened surfaces, which might have been the result of their use as grinding tools as well. I found that in some cases, when their uselife either as a hammerstone or as a grinding implement ended,

they were recycled into cores for further flake removal. This is to be expected as these were made over imported materials that should have been considered commodities within those contexts.

Other hammerstones

The pieces classed under this type consist of egg to oval shaped cobbles that presented confined battering marks. These were usually of metavolcanic materials. The utilized portion of the pieces are usually confined to their two opposite ends, although some specimens presented use traces all around their surface. An interesting variety within these hammerstones included two angular pieces that presented corner-battered sections. Both of these were made of jasper. Their striking similarity has been underlined because of the presence of one in La Hueca-Sorce and the other in Punta Candelero.

Pecking stones

Pecking stones were defined as elongated river worn pieces that presented a pointed termination with concentrated fracture cones. The direct impact battering of this apex may have been due to their use in ground stone production as other similar hammering pieces have been found to be used in that same fashion in other contexts (Shafer 1973). This confined working edge could have also been used for indenting in specific types of flake retouch such as the abrupt and the denticulate. All of the specimens found in La Hueca-Sorcé and Punta Candelero sites seem to have been collected from river rolled sources and were made exclusively of volcanic rocks.

Round pitted stones

Round pitted stones are defined on the basis of the presence of pecked depressions in the center of the tool accompanied by peripheral battering around their entire perimeter, normalizing the tool to a round morphology in planview (Figure 5-13i-j). These are commonly known as

nutcracking or nutting stones. The use of similar items for opening nuts has been ethnographically documented by Ranere (1975) who indicated their employment in Panama for opening *corozo* nuts. These tended to present a discoid morphology with at least two flattened opposing faces. The depressions were usually present in those two flat surfaces. These depressions had an average diameter of 25 to 33 mm and a maximum depth of around 4 mm. The peripheral battering was perhaps due to their use also as pounding implements.

Edge-ground cobbles

As described in the previous Chapter, these consist of half-moon shaped cobble tools that present a ground facet along their longest margin (Figure 5-13a-b). These items also displayed battering marks on one or more of their edged projections, probably due to their use also as pounding implements.

Striated pebbles

This type of implement, commonly described as ceramic polishing stones (Haviser 1999; Walker 1980), was very common in the collections from both sites (Figure 5-13k-p). These artifacts are defined by the presence of clear unidirectional striations that, judging by the homogeneity of their trajectory, is evident that they were not caused by natural agents (river rolling or sand blasting). Other striated materials included fine-grained marine rocks, milky quartz pebbles, and a white spotted variety of basalt. In both LH contexts, the elongated pieces seem to have been preferred. Some of these presented a fingertip appearance in their ends caused by their extended use. The other common morphology was the discoidal form. In the LH context of La Hueca-Sorcé site, there is evidence of a great emphasis being put to import pebbles of peridotite, perhaps corroborating Knippenberg's (1999b) and Walker's (1980) appreciation on their probable trade through the islands.

Pestles

Pestles are hand held implements that present a battered end caused by their use in mashing or pounding activities (Shafer 1973). The presence of peck marks and of Hertzian cones over ablated surfaces seems to have been produced by their constant use over a rather flat surface. The five analyzed pestles presented an ovate to conical morphology. All presented two faceted planes converging on the center of the used surface, indicating that these were slanted to either side of the tools longitudinal plane during their use motion. All of these were made over river rolled pieces that presented suitable convex surfaces for their use without further treatment.

Grinding slabs

These are tabular or beach collected sandstone items exhibiting one or more flat or concave surface ablation on a single face, with a depth of as much as 4 mm in their deepest portion. This normalized face is the only one that presents culturally induced alterations, as the rest of the pieces presented rounding most likely as a result of natural weathering processes. Their shapes are either discoidal or oval, although this appreciation is tentative due to the fragmentary characters of most of the analyzed artifacts. These grinding slabs were made over different grades of sandstones, with more emphasis being placed on the coarser varieties (coarse sandstone or composites). This could be a result of the use of these pieces for abrading hard materials such as wood, stone or shell.

Angular pitted stones

These items exhibit one or more confined concavities similar to those of the round-pitted stones. These depressions measured between 20 and 30 mm in diameter and were less than 5 mm deep. Different from the round-pitted stones, these do not present the peripheral battering that imparted them their round morphology. On the other hand, these were made over rather massive slabs of angular rocks (quartzite and silicified shale) that presented flat and wide surfaces. Only

two pits are evident in each of the analyzed samples. These items appear to have been submitted to the same technique or motion of use as the round-pitted stones, at least the use that these presented in their central sections.

LH Lithic Technological Styles: A Summary Perspective

The examination of the utilitarian stone artifacts related to the LH context of Punta Candelero and La Hueca-Sorcé sites has provided some valuable insights into the lithic technological organization of the producers of this cultural manifestation. It has shown that in both sites similar reduction strategies were followed in stone tool production, although a variable emphasis was placed in the procurement of certain raw materials as well as in the application of either freehand or bipolar reduction in each of those contexts.

Starting with the patterns of raw material procurement, in both sites a high degree of raw material selectivity was registered resulting from the import of fine-grained raw materials for flake production, which arrived from places such as Antigua, Ceiba, and probably from the western portion of Puerto Rico and the Dominican Republic. Interestingly enough, even though there were some inter-site disparities in the import of certain materials, I noted no differing patterns of raw material usage between local versus imported objective pieces, as they seem to have undergone similar processes of reduction irrespective of their origin. For instance, silicified tuffs, milky quartz, and Antiguan flint, were all reduced employing either expedient freehand reduction strategies or the bipolar technique, irrespective of the raw material. As previously indicated, the fact that most of these raw materials were present in both sites might be indicating their involvement in similar trade partnerships or in a direct exchange relationship between the two.

In both sites similar freehand flaking patterns were observed. These include the preponderance of multiple platforms, the generalized lack of platform preparation for flakes,

their usually hinged or stepped terminations, and similar metrical attributes. In both sites I also noted the presence of a systematic reduction format that resulted in the formation of discoidal cores and centripetal flakes. The reasons for the application of this core-flake reduction format is not clear, particularly when flakes with similar qualities could have been produced using other reduction protocols such as parallel and multidirectional flaking (Boëda 1993). This might be reflecting a technological style that was not induced by economic requirements but rather to other habitual behaviors that were part of the daily practices of these peoples.

Flake retouch was applied to a considerable number of flakes, at least in West Indian standards. In both sites, I identified several forms of intentional flake modification that included fine, abrupt, and denticulate. The fact that most of these forms of post-detachment manipulation were not directed to alter the overall morphology of the pieces but only at producing the necessary working conditions in their edges reiterates the postulate that the major effort of the flaked technology was aimed at producing suitable working edges.

The other form of flaking was done by the bipolar technique. In this case, I have argued that the purpose of the application of this flaking technique was not strictly to produce micro-flakes for their insertion of cassava grater boards, but also as an competent way of extracting usable flakes from raw materials with poor conchoidal qualities (i.e., milky quartz) or to extract lamellar or biconvex shaped flakes for their use in a similar suite of activities as those performed with freehand flakes. Thus, it is important to note that different from what has been argued in other contexts, the bipolar technique was not necessarily applied in response to raw material stress in the form of small nodular sizes or lithic resource scarcity, but rather as an effective, simple, and quick way of producing usable flakes. Also, the fact that in both of these sites there

is evidence of fabricators in the form of different types of percussors and anvil stones shows that flaked lithic production was being done at the intra-site level.

Other interesting trends were observed in the production of ground stone artifacts. In neither of these sites was there direct evidence of the local production of celts or adzes due to the generalized lack of either preforms or other by-products. However, I have argued that this does not necessarily imply that these items were brought to the sites in a preworked or finished form since direct evidence for the reduction of local materials is also lacking. This signals the possibility that both, imported and local materials, were reduced in an unsampled portion of these sites or in an nearby off-site location (e.g., in the periphery of the river).

A similar array of bifacial ground tools was found in both sites. The most popular was the biconvex celt, followed by the plano-plano adzes, LH adzes, and the flat-top celt. However, there were some ground implements that were not present in the collection from Punta Candelero, specifically the oval-ended biface and the other enigmatic types. Aside from the absence of these implements, both sites present similar patterns of bifacial ground tool production of which the most salient is the use of lateral intrusive flaking being partially smoothed by pecking and grinding. None of the bifaces from these LH contexts has been polished so the lack of this form of termination seems to be a common denominator between these two sites. The fact that the same form tools were being fashioned over a different variety of materials indicates that similar production templates were being followed in their manufacture in both LH contexts.

I also observed three other forms of ground tools that were produced exclusively in the LH contexts of these sites. These include the incurbate edged tools, the edge ground biface, and the channeled stone. The first two of these were made exclusively of silicified shale, and presented all of their production stages within these sites. The presence of preforms and finished items as

well as other manufacturing byproducts shows that these implements were being produced in these sites for their localized use and/or export. The local production of edge-ground bifaces, however, is most notably observed in the LH context of Punta Candelero than in the LH locus of La Hueca-Sorcé, while there is no evidence of channeled stones in the analyzed sample from Punta Candelero. Whether this represents the performance of different activities associated to these types of artifact between these two locations or a sampling bias is not clear at the moment.

Both LH contexts also presented a similar array of use modified materials which include the fine-grained round percussors, anvils, sandstone grinding slabs, striated pebbles, nutting stones, and edge-ground cobbles. The presence of the latter two artifacts is especially interesting in light of the fact that, as indicated in the previous Chapter, both of these have usually been associated with Pre-Arawak and other early Ceramic contexts both in Puerto Rico and the Lesser Antilles.

When taken as a whole, the similarities in the technological styles that have been observed in the production of lithic artifacts and in the overall technological organization in the LH contexts of these two sites definitely outweigh the variability between the two, specially when taking into consideration that they were made to articulate with two contrasting environments such as a beach strand setting composed mostly of aeolian sediments (Punta Candelero) and an inland terrace formed by alluvial sediments (La Hueca-Sorcé). Thus, I understand that both assemblages represent the remains of a single and markedly cohesive lithic tradition, which was enacted and negotiated in similar ways by the inhabitants of both of these locations. But, how different are the lithic production styles associated to this complex when compared to those of the Cedrosan counterparts? This is the question that will be addressed in the next section.

Comparison between LH and Cedrosan Related Assemblages

As stated in the introduction, the final objective of this Chapter is to compare the lithic manufacturing processes and the artifacts that resulted from them in the Cedrosan and LH contexts of La Hueca-Sorcé and Punta Candelero. My aim in doing this is to add another line of evidence to the long-lived debate regarding the so-called "La Hueca problem" (Oliver 1999). In order to do this, aside from the analysis of the stone artifacts related to the LH contexts of these sites, I also examined the lithic materials recovered from one excavation unit dug in the YTA-2 [Cedrosan Saladoid] deposit of La Hueca-Sorcé site, as well as those unearthed from the top layers of nine 2 x 2 m units from Punta Candelero. Due to the scarce representation of the Cedrosan materials from La Hueca-Sorcé, this comparison is supplemented with the results of the lithic analysis performed by Knippenberg (1999c) from 17 units also from the YTA-2 mounded midden.

Procurement Dynamics

When the materials retrieved from the Cedrosan and LH components of these sites are compared, some interesting trends begin to emerge. Starting with the patterns of raw material procurement, both the Cedrosan and the LH deposits of these two sites evidence the import of a truly remarkable quantity and variety of extraneous fine-grained raw materials for their intra-site reduction. The import of raw materials to both sites and to both complexes does not depart from the general trend during the early ceramic period when a widespread movement of fine-grained materials between the different islands has been amply documented. The fact that some of these raw materials were being imported to both contexts might indicate their immersion in similar economic interaction spheres. However, there are some materials represented in the LH middens that are not present in the Cedrosan ones, while the opposite case does not occur. This seems to

indicate that the LH knappers had a more ample spectrum of procurement sources or more extensive trade networks than those of their Cedrosan Saladoid counterparts.

I also noted a contrast with regards to the state of reduction of the imported flints when they reached the sites in each component. For instance, no tested and discarded nodules were found in the Cedrosan component in none of the 17 units analyzed by Knippenberg (1999c) from the Cedrosan component of La Hueca-Sorcé, in the unit that I analyzed from that same context or in the Cuevas context of Punta Candelero. The only proof of the import of unreduced nodules or partially reduced cores to the Cedrosan loci of these sites was in the form of cortical flakes while in the LH middens there was direct evidence of both tested nodules and cortex bearing cores only partially reduced.

Also, even though Knippenberg (1999c:4) indicates that in the Cedrosan context of La Hueca-Sorce "cores where generally exhausted indicating that flint was considered scarce by its inhabitants," in both LH contexts I found a high quantity of non-exhausted cores produced by both the freehand and the bipolar strategy. Many of the cores recovered from the LH contexts of these sites may have been further reduced either through the freehand or the bipolar technique. This is indicated by the mean maximum dimension and relative weight of the discarded cores. For instance, in the LH context of La Hueca-Sorcé site the mean maximum dimension for freehand cores was 46.1 mm, while the minimum size of an exhausted bipolar core was 8 mm. This indicates that many of these cores could have been further reduced by either of these strategies. This differential core exhaustion is also evident when comparing the mean core sizes between the LH and Cedrosan complexes. In La Hueca-Sorcé, the mean size for freehand cores was of 33.9 mm with a mean weight of 19.16 g (Knippenberg 1999c) while those of the LH context (not counting tested and discarded nodules) of that site present a mean maximum

dimension of 46.1 mm and more importantly, a mean weight of 39.9 g. This again shows the lower degree of core exhaustion, thus evidencing that both complexes were exhibiting different raw material conservation practices.

The densities of archaeological materials per excavated area also reflect these dissimilar protocols of raw material acquisition. For instance, in the Cedrosan component of La Hueca-Sorcé, Knippenberg (1999c) reports the recovery of 222 chert artifacts which represent 3.70 pieces per meter square while in the analyzed sample in this study from that same context the number was 2.25 pieces per meter square. When comparing that to the flint numbers obtained from the LH context of this site, this figure rises up to 10.1 pieces per meter square, thus indicating the much more intense process of flint obtainment in this component. This is also illustrated perhaps by other figure that might not be skewed by the condition of the materials, which is weight by square meter. In the LH context of this site, 86.64 grams of flint per square meter were recovered while this figure for the Cedrosan context of this site is of 27.86 grams per square meter. This figure is even more radical in Punta Candelero, as in the LH context of that site, these were 303.03 grams per meter square of flint, while in the Cedrosan context of that site that figure was only of 37.6 grams per meter square. This again shows the higher intensity of flint procurement in these LH contexts when compared to the Cedrosans, as well as reinforces the previously stated observation of the increased importance of flint acquisition in Punta Candelero's LH context when compared to that of La Hueca-Sorcé.

Additional evidence of this differential process of raw material acquisition between both components comes from the comparison of the manners of obtainment of the silicified tuffs evidenced in each of the different loci. As previously mentioned, the silicified tuff was brought to the LH middens from primary sources as evidenced by the angular character of the nodules

and the lack of smoothed cortex. On the other hand, this same type of raw material was obtained from river-rolled sources in the Cedrosan component of La Hueca-Sorcé site as they presented rounded exterior surfaces. This procurement of silicified tuff from secondary sources was also observed by Knippenberg (1999c) in his analysis of the Cedrosan materials. Aside from getting to each context from different proveniences, the quantity of this type of raw material that was imported to the LH context was markedly higher when compared to the Cedrosan one. For instance, Knippenberg reported a total of 34 pieces of this form of raw material in the flake tool technology, which would constitute a number of .5 pieces per meter square while I identified in the LH context of this site a total of 530 pieces in this same technological class, providing a ratio of 8.83 pieces per meter square. This is a point of great importance as it evidences the need to look for a feasible explanation for this difference in provenience of the same raw material as well as its differential emphasis between these two components, which might be related to control over sources by a group, the establishment of different trade partnerships between them, the result of down-the-line trade, or lack of knowledge of the primary source by the other.

Obviously, all of the previously presented figures aimed at contrasting procurement behaviors between components are limited in their significance due to the low temporal and spatial resolution of these samples. More substantial figures such as densities per cubic meter cannot be estimated at this point basically due to the lack of comparability between assemblages, which results from factors such as their deposition in different landscape contexts (e.g., mounded versus hillside middens) and problem with establishing the range of time represented in each specific deposit (the chronological dilemma; see Oliver 1999). I also lack detailed information about counts of other material remains (e.g., ceramics), making the establishment of ratios between different artifact classes impossible at this point. However, as will be evident in the

next section, the trends in the analyzed collections are so strong that figures on ubiquity definitely evidence the great range of variability between components with a much higher degree of resolution.

Production Dynamics

Core-flake reduction

In general terms the flaked tool production protocols evidenced in the LH context of these sites was otherwise not much different from that observed in the Cedrosan deposits and in other early ceramic sites. It was primarily directed towards the unpatterned manufacture of flakes with suitable edge angles for their use in a different array of activities, produced by the freehand and the bipolar techniques. In both complexes in the two sites, the most common type of freehand core was the multidirectional, produced by opportunistic flaking strategies. This resulted in a very similar array of flakes that presented comparable metrical and technological attributes.

However, aside from the production of randomly shaped cores and flakes, the LH context of these sites presented a patterned reduction format that consisted of centripetal faking. This produced a considerable number of discoidal cores and centripetal flakes whose traits reflect those mentioned for this type of core-flake reduction format observed in Pre-Arawak contexts (e.g., Figure 4-5e-h). In the lithic assemblages from the Cedrosan context of these two sites there is a total lack either of discoidal cores as well as flakes with converging dorsal scar patterns or other traits indicative of this reduction format. In fact, no standardized process of flake removal was evidenced in any of the two Cedrosan contexts. Therefore, the total absence of this reduction approach in the Cedrosan materials is indeed another significant difference between these two components, particularly when taking into consideration that it has not been observed in any Cedrosan component in the Lesser Antilles while it was documented in the only segregated LH component of those islands uncovered in Guadeloupe (Bèrard 2007).

It should also be noted that in contrast to the reduction sequence postulated by Walker (1980) for the Cedrosan Saladoid materials from the Sugar Factory Pier site in St. Kitts, the evidence from the LH middens does not seem to support a scenario where the flaked reduction processes were most frequently aimed at producing micro-flakes to be inserted in grater boards by the bipolar technique. I understand that grater teeth production was indeed observed in the LH deposits but that it accounts only for a portion of the flake production strategies evidenced at the site. I base this assumption on the high quantity of non-exhausted freehand and bipolar cores in proportion to the number of exhausted bipolar cores in the LH samples, which are the ones mostly associated with grater teeth production. Moreover, I identified only a small number of flakes that could have been used as grater teeth, even though I understand that this may be a sampling bias due to the applied recovery techniques at both sites as well as my lack of expertise for recognizing this artifact type. Therefore, the production of these microflakes can only be indirectly inferred in both LH loci by the presence of exhausted bipolar cores.

Pecked and ground materials

The production of celts and adzes provides perhaps the most diagnostic frame of comparison to address the issue at hand. In both, LH and the Cedrosan contexts, the most frequently occurring woodworking tool form is the biconvex celt. In fact, no major morphometrical differences were observed in this form tool between components, aside from the presence of a more pronounced conical poll in Cedrosan celts while being rounder in LH celts. The major noted difference in the patterns of celt production between these two components consisted in the lack of polishing in the LH tools (Figure 5-14a-b) and its common use as a termination technique in the Cedrosan materials (Figure 5-14c-d). In fact, all of the analyzed Cedrosan bifacial ground tools were finished by polishing. This is a rather important aspect as this finishing degree has been used as a formal indicator of technological style as it has not been

demonstrated to offer any particular functional advantage (Bullbrock and Rouse 1953; Shafer 1973). The coarse character of the LH pecked and ground technology differs from what has been observed in other early ceramic components from Puerto Rico and Vieques were an emphasis in polishing as an aesthetical standard has been informed.

Another important aspect is the total lack of plano-convex adzes in neither LH deposit and their presence in the Cedrosan deposits of the two sites. This is a rather important point as the plano-convex adze has been the only lithic tool that has been used as a formal indicator of Cedrosan occupations in Puerto Rico and Vieques. Moreover, as previously mentioned, this tool type has been related to ceremonial activities as, for instance, it has been found in a cave burial in Puerto Rico (Roe 1985). The fact that Cedrosan deposits in both sites contain plano-convex adzes in their lowest levels seems to indicate that these people arrived to these sites with such a tradition while their total absence in neither LH deposit indicates that it never became part of their tool kits.

The functional analogues to plano-convex adzes in the LH loci were the LH adzes and the plano-plano adzes. The first of these tool types is totally absent in both Cedrosan deposits, thus perhaps being a good candidate as a *fossile directeur* of LH lithic tradition. As was previously stated, this form tool was made of both imported (radiolarian limestone, peridotite, silicified tuffs) as well as of local materials (metavolcanics), therefore indicating that the emphasis on its overall morphology was underlined in both LH contexts irrespective of the raw material. The other adze form present in both LH contexts that was absent from either Cedrosan deposit was the plano-plano adze. Nonetheless, in contrast to the LH adze, this tool type has been previously documented amongst the ground tools uncovered from the early ceramic context of the Hacienda

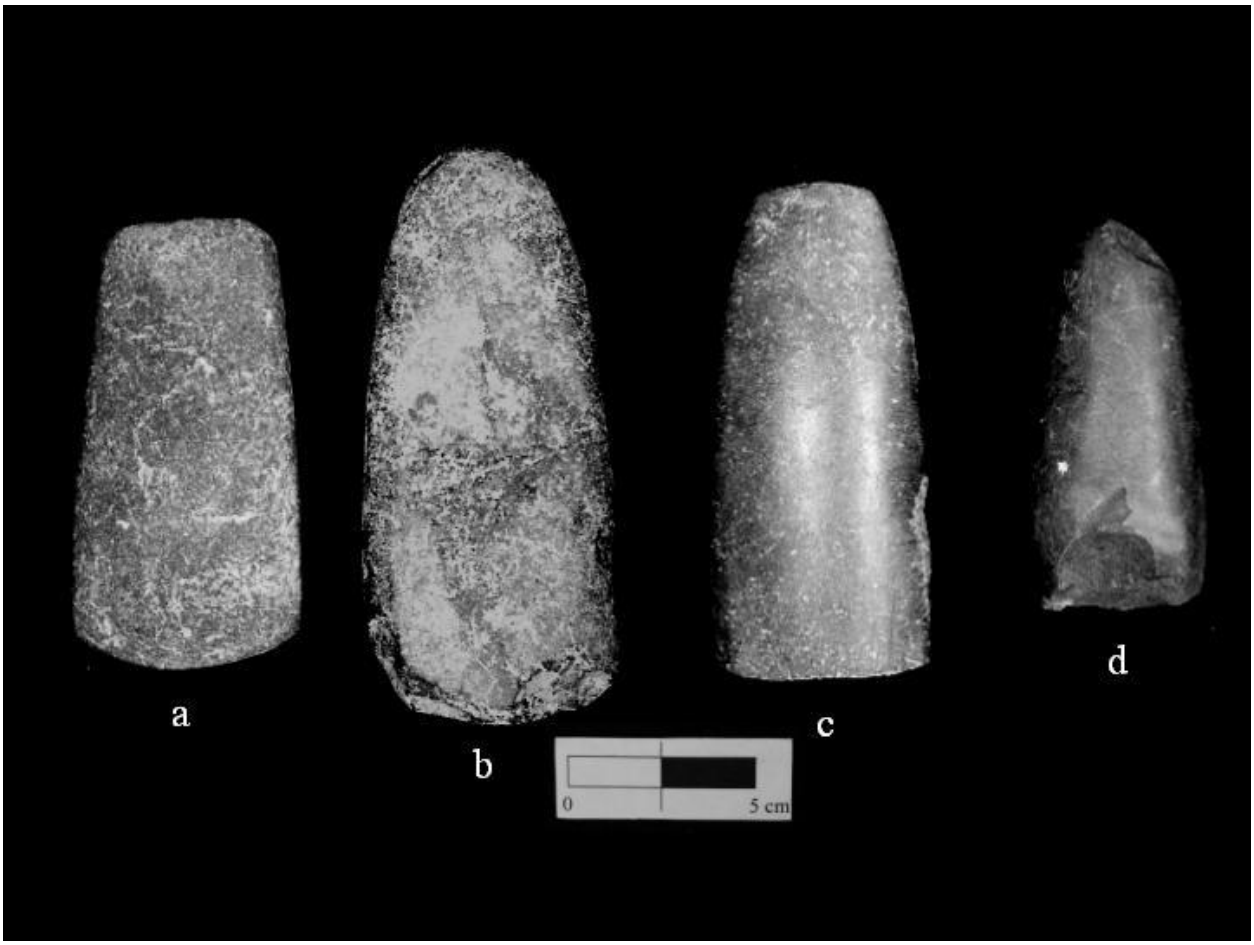

Figure 5-14. Comparison of termination techniques between LH and Cedrosan ground tools. (a-b) LH ground tools, Punta Candelero and La Hueca-Sorcé; (c-d) Hacienda Grande ground tools, La Hueca-Sorcé.

Grande site (Walker 1985). However, at least at the intra-site level, the fact that this tool type was commonly represented in the LH context of both sites indicates that it was an integral part of their tool kits, while its total absence in both Cedrosan loci evidences its exclusion from their lithic repertoire. A clear association of this tool form to either cultural component is even more problematic when one takes into consideration the fact that the only published context aside from these two sites that has documented its presence was remitted to the lower levels of the Hacienda Grande site, where Chanlatte (1995) has argued for the existence of a previously undetected LH context. Thus, until the cultural layering in Hacienda Grande is further deciphered, it will be

difficult to determine if this tool form is characteristic exclusively of the LH cultural complex or if it was a morphological archetype shared with the Cedrosan tradition.

Also, the LH middens presented at least three other formal tool types, besides the LH and the plano-plano adzes that were totally absent from either Cedrosan deposit. These are the edge-ground biface, the incurvate-edged tool, and the channeled stones. The first two of these presented all stages of reduction at both LH loci. The only other context that has produced such a specific tool form was the potential LH context identified by Chanlatte (1995) in the Hacienda Grande site. With regards to the channeled stone, even though some grooved pieces have been identified in Cedrosan contexts such as Maisabel (Siegel 1992), these are basically hand-held implements that present converging incisions, being very different from the stationary and rectilinear character of the ones produced by LH stone workers.

Use-modified materials

With regards to the use-modified materials, both components evidenced the presence of most of the same types of implements including the round fine grained percussors, volcanic hammerstones, pecking stones, pestles, single-sided and double-sided anvils, striated pebbles, grinding slabs, and pitted angular slabs. However, there were two types of use-modified implements that merit consideration as they have been commonly associated to Pre-Arawak and Hacienda Grande contexts, and have been used as indexes of the interaction between those groups. These are the edge-ground cobbles and the round-pitted stones. Even though both LH loci evidenced the presence of these two types of artifacts, none was uncovered in either of the two Cedrosan deposits. This may indicate that in these two sites, the initial interactions with the Pre-Arawak peoples were established by the producers of the LH tradition and not with those that manufactured Hacienda Grande pottery, in contrast to what has been documented in other contexts (Rouse and Alegría 1990; Walker 1985a). This type of evidence is important since it

can add an indirect line of data for establishing the sequentiality of these two manifestations, at least in these two sites.

A final observation is that, in all major aspects, the LH context of Punta Candelero seems more Pre-Arawak-like in its technological protocols than that from La Hueca-Sorcé site. The greater emphasis on freehand flaking and other overall immeasurable qualities in that artifactual repertoire seem to indicate that the LH occupation of Punta Candelero has more influences from the technological styles observed in Pre-Arawak contexts than that observed in La Hueca-Sorcé. This seems to reinforce Haviser's (1991a) argument that the LH materials of La Hueca-Sorcé present a higher degree of Cedrosan influence when compared to other "Early Ceramic" contexts such as that from Hope Estate, which present a higher emphasis on Pre-Arawak lithic traditions. Whether these differences reflect variable negotiations with the LH tradition in the different locations or a major degree of integration of Pre-Arawak technological styles in Punta Candelero as a result from the more intense interactions with the producers of the LH tradition in such site still awaits further scrutiny.

The La-Hueca Problem: A Lithics Perspective

As stated in the introduction, a major objective of this chapter is to use the analysis of the LH technological traditions in order to address what Oliver (1999) termed the "La Hueca Problem." In order to describe this lithic technological tradition, it was necessary to study both LH assemblages in isolation from the Cedrosan materials for determining which protocols of reduction were followed by LH knappers, as well as for establishing how did those contrast to the technological practices enacted by their Cedrosan counterparts.

Following the analysis of the lithic materials from the LH loci of Punta Candelero and La Hueca-Sorcé, I identified differences as well as similarities in some of the technological styles expressed in both cultural manifestations. For instance, the import of exotic materials for the

production of expedient items and for the manufacture of celts and adzes was common in both cultural complexes. Also, both lithic repertoires consisted of a similar array of materials such as adzes, celts, pestles, grinding slabs and pitted stones, among many others. The use of similar tool kits in both components is to be expected as the two shared similar physiographic constrains and a dietary basis dependent on a diversified subsistence structure.

However, the differences that were observed in the ways of manufacturing these items merit consideration. There are three major mechanisms that may account for the documented variability which include: 1) that they are the result of different functions performed by a single group of people (functional difference); 2) that there was a differential availability of the means of production, in this case stone resources (environmental difference); 3) or that they are the result of different ancestral traditions (cultural difference).

For analyzing the first option, which would be similar to Binford's (1977) activity differentiation model, it is necessary to define certain types of special activity artifacts that were created to perform the same function in both complexes. This is obviously a rather arduous task especially with the flaked materials, since establishing similar functions would be the subject of a major undertaking. For addressing the possibility that these artifactual variations resulted from the fact that different functions were being performed by the same group of people, the best bet would be to analyze materials whose use is most evident such as celts and adzes. Interestingly enough, celts and adzes present some dissimilar properties of which the most salient are the lack of polishing in the LH materials and the manufacture of different types of adzes in each cultural component. This then evidences that the same tasks were being performed with artifacts made following dissimilar production templates. Therefore, I would argue that the functional argument does not suffice for explaining the differences between these two complexes.

With regards to differential availability of raw materials, I have already stated that this can be outcasted as a source for artifactual variation as both groups were settled in the same geographic locations and thus had the same access to locally obtainable raw materials. If the case were that the imported materials were acquired by different mechanisms, then it would not be due to geographical but to either social or cultural processes. I also stated that different products were being manufactured with the same raw materials in both cultural components, as for instance both plano-convex as well as LH adzes were made over radiolarian limestone as well as peridotite. Therefore, Pantel's (1988) cautionary tale on the effects of raw material on lithic variability does not seem to hold for explaining the differences observed between these cultural components as manufacturing intent superceded the conditions imposed by the use of different raw materials.

The fact that neither the sympatric nor the environmental variables account for the technological variability observed between these two complexes seems to indicate that these purported differences correspond to distinct cultural traditions of stone tool production. Therefore I conclude that, based on lithic evidence, the LH and the Cedrosan loci indeed represent the remains of two culturally distinct entities. With regards to the debate on whether these two cultural complexes are the result of two separate migrations or of a cultural branching from Cedrosan society, I obviously can only assert with a high degree of certainty that when these two groups reached Puerto Rico and Vieques they represented two distinct cultural entities. However, based on the notion that, as expressed by Walker (1997:1) "Stone artifacts are generally a conservative element of any cultural tradition, which changes much more slowly than ceramics, for example." and considering that "the Saladoid expansion from South America was rapid and large scale providing little time for drastic cultural changes" (Walker 1980), then I

would have to state that these changes must have preceded the arrival of these groups to the Northern Lesser Antilles, which contrasts with Rouse's (1999) most recent argument. This is more evident when taking into consideration that other conservative elements in cultural traditions such as burial practices and the development of systems of representation were also drastically different between both components.

If, as Rouse (1999) states, the Huecan Saladoid branched from the Cedrosan Saladoid in the Northern Lesser Antilles, then his model should try to address how and why all of a sudden those people decided to drop the manufacture of cemíes, began to inter their peoples following different practices than those employed in Cedrosan contexts, began to sculpt birds that are only present in Central America, South America or in Trinidad, and completely dropped the use of white on red painting in pottery production, traditions that were present within their cultural repertoires for about 800 years, all of this within a period of 200 years and moreover within the frame of an egalitarian society. At the present state of this debate, Rouse's model fails to answer those questions.

Perhaps the problems that this issue has raised have demonstrated the difficulties in applying a univariate approach for explaining culture dispersal and interaction in the West Indies. Therefore, in line with Oliver's argument, until other forms of data are analyzed following rigorous methodological standards, one will only be able to guess about the nature of this cultural manifestation. Furthermore, as will be noted in the next section, this debate also serves as a cautionary tale with regards to the almost fetishist fixation with northeastern South America for explaining cultural patterns in the Antilles. As will be demonstrated, Antilleanist archaeologists need to amplify the scale to other areas beyond northeastern South America for

understanding these processes because if not we will only have a partial view of the myriad of inter-societal that led to the complex configuration of the Antillean precolonial landscape.

Things that Glow: The Macro-Regional Movement of Shiny Wearable Art in the Greater Caribbean

As is the case in the Antilles, around 500 years B.C. the Isthmo-Colombian area witnessed the articulation of long-distance interaction networks associated to the circulation of "shiny" personal adornments (Saunders 2003) and greenstone celts (Snarskis 1984). These networks extended between Costa Rica and Colombia to the south and probably up to Belize to the north (Creamer 1984; Fernández Esquivel 1999, 2006; Guerrero Miranda 1986; Saenz Samper and Lleras Pérez 1999). These transactional circuits not only emphasized the movement of raw materials such as greenstones (e.g., jadeite, nephrite, serpentinite) and other semi-precious stones (e.g., amethyst, agate) as well as *Pincatada*, *Strombus* and *Spondylus* shells, but also involved the reproduction of certain themes in the iconography represented in the wearable art produced over these raw materials. In this area, the assortment of themes has been argued to embody, not only local representations, but also Mesoamerican (primarily Olmec) and South American influences. These raw materials and ideographic expressions were not only being circulated on a north-south axis but also between the Pacific and Atlantic coasts, a process that perhaps started in much earlier times (Cooke 2005:147; Cooke and Sánchez 2001:19-20; Griggs 2005:326).

As was previously discussed, the evidence from the Antilles also indicates that around that date, along with the configuration of the LH and Cedrosan societies to the islands, there is an emphasis in a pattern of long-distance interactions that emphasized the movement of brilliant wearable art and greenstone celts. Some of the lapidary art, particularly that produced in the LH manifestation, has no parallel either in the Lesser Antilles nor in northeastern South America during this time. Because of this, the specific area of provenience for the LH remains uncertain.

However, if we open the scope of possible Antillean relationships, it becomes evident that the strongest signals for most, if not all, of the iconographic themes and technological styles of production noted in the lapidary and shellwork of the LH tradition are also observed in contemporaneous contexts of the Isthmo-Colombian area. As previously indicated, in the LH the most noteworthy emblem has been the beak-bird motif (Figure 5-15a), which shows marked similarities to pieces recovered from contemporaneous contexts of the Isthmo-Colombian area (Figure 5-15b), particularly in the Línea Vieja portion of the Caribbean Watershed of Costa Rica (e.g., Balser 1961:216), an area that has been characterized as an important indigenous trading center (Bray 1977). Whether the depicted avian figure is a condor (Chanlatte and Narganes 1983; Narganes Storde 1995) or a king vulture (Boomert 2000:415), does not seem to be as important as the fact that none of these birds are endemic in Puerto Rico or the Lesser Antilles. The most important thing is that the local lapidary production of pendants depicting the *theme* of the raptorial bird (both in male and female forms) carrying a head clasped in its claws is recurrent in Puerto Rico and the Isthmo-Colombian area, while the available evidence indicates that its reproduction was not represented in northeastern South America and the Lesser Antilles during this time.

Other similarities between Costa Rican and LH specimens include the location of the incisions and the configuration of the negative spaces within the pieces. The similar location of the incisions indicates that these were worn in a similar fashion in both contexts, also denoting similarities in their use for comparable forms of bodily display. An interesting contrast in this type of representation between both areas is that while in Costa Rica most of these birds seem to be in the act of feeding or pecking the head of the prey (being depicted by the beak connected to the head), in the LH the beak of the bird is separated from the clasped head, perhaps representing

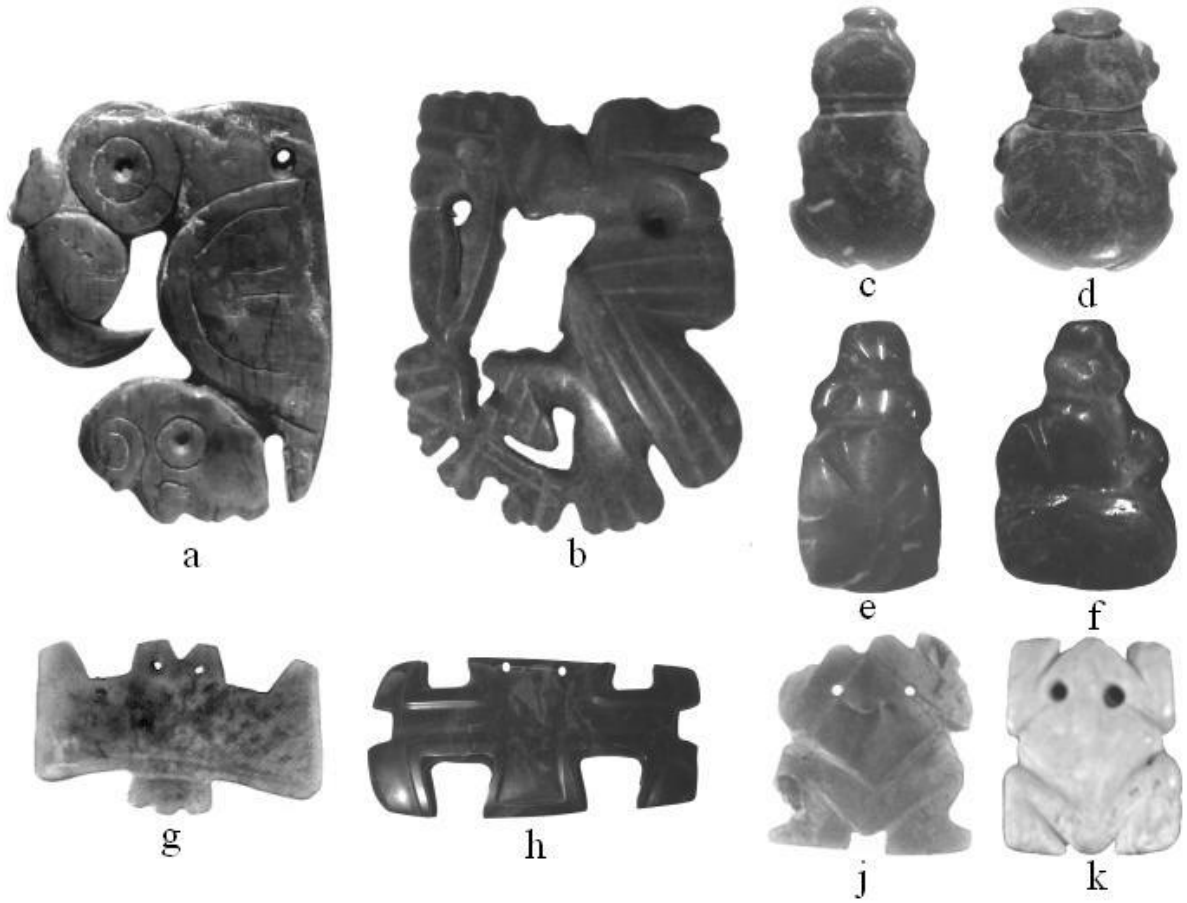

Figure 5-15. Comparison of motifs between the LH component of La Hueca-Sorcé and Punta Candelero and those noted in the Isthmo-Colombian area. (Not to scale). (a) beak-bird pendant from La Hueca-Sorcé; (b) beak-bird pendant from Costa Rica on display at the Museo del Jade; (c-d) *batraciforme* pendants from La Hueca-Sorcé; (e-f) *batraciforme* pendants under curation at the Museo del Jade, composite piece #1420; (j) frog-shaped pendant, La Hueca-Sorcé; (k) frog-shaped pendant, Cerro Juan Diaz, courtesy of Richard Cooke.

the act of catching it. This might be suggesting either local reinterpretations in both areas of the same motif or different but related events within a single mythical narrative.

In the Antilles, the only evidence for the local production of this type of icon has been recovered from Punta Candelero and La Hueca-Sorcé sites of Puerto Rico. As is the case in Costa Rica, macroscopic observations seem to indicate that both "social jade" (Lange 1993) in the form of the serpentinite locally available in Puerto Rico and "true" jade (i.e., jadeite) obtained from an extra-Antillean source were employed in the manufacture of this type of motif

(Narganes Storde 1995). Interestingly, the production of these lapidary items involved the use of string sawing, a technique whose application was limited at this time to Costa Rica and Mesoamerica (Chenault 1986, 1988; Fernández Esquivel 2006), while being absent in northeastern South America and the Lesser Antilles in contexts predating those of Puerto Rico. This type of lapidary technique continued to be of importance in the insular Caribbean and other parts of the Isthmo-Colombian area until the contact period, as was mentioned by Fernando Colón who, when visiting the Veragua Region of Panama, wrote: "Their food is fish, which they take with nets and hooks made of tortoise shell, which they cut with a thread as if they were sawing; the same they use in the [West Indian] islands." (cited in Lothrop 1955:48).

Another of the main iconographic themes shared between the Isthmo-Colombian area and the Antilles at this time is the winged pendant, which is commonly thought to depict bats (e.g., Lothrop 1955:47; Stone 1993:146). The earliest contexts in which this theme has been uncovered have been dated to around 150 B.C. between Colombia and Costa Rica (Figure 5-15h), being found in the Andean portion of Venezuela around A.D. 400 (Perera 1979; Wagner and Schubert 1972). In the LH, these winged pendants were produced over nacreous shells such as *Pinctada* and *Pteria* (Chanlatte and Narganes 2005) (Figure 5-15g). Interestingly, the production of mother of pearls personal adornments is most commonly observed at this time in Panama, in sites such as Cerro Juan Diaz, which is also contemporaneous with the LH occupation of La Hueca-Sorcé and Punta Candelero (Cooke 1998). In addition to this type of motif, other geometric icons made over nacreous shells are also shared between the LH and those recovered from Cerro Juan Diaz (Cooke 1998). The techniques of extraction of the mother of pearls as well as the technological styles involved in their transformation into wearable art also seem to be similar between Panama and Puerto Rico (Mayo Torné 2004). A review of the

evidence of shellwork in northern Venezuela indicates that, although utilitarian materials such as celts and gouges were produced by early societies, there is no evidence for the manufacture artifacts made of mother of pearls predating those of Puerto Rico or the Isthmo-Colombian area (Linville 2005).

The "frog-shaped" theme represented in pendants produced primarly over greenstones and shell, commonly related to South American mythology (e.g., Boomert 1987, 2000), is also an important element in both Isthmo-Colombian (Stone 1993:146) and LH lapidary and shellwork during this period. There are two main types of frog motifs represented at this time in Puerto Rico: one is the three-dimensional *batraciforme* pendant that is most commonly associated to the LH (Figure 5-15c-d), while the other consists of a bi-dimensional frog-shaped representation (Figure 5-15j), variations of which are also found in Hacienda Grande artwork (Narganes 1995:142). Interestingly, in a recent visit to the collections housed at the Museo del Jade in Costa Rica, I was able to record the presence of pendants indistinguishable from the LH *batraciformes* collected from the Caribbean watershed of Costa Rica (Figure 5-15e-f). Stirling and Stirling (1997; Figure 12) also report the presence of one of such pieces from the Mercocha site, also located also in the Caribbean Watershed of Costa Rica, dated between cal. A.D. 100 and cal. A.D. 600. Variations of the bi-dimensional frog-shaped motif have been observed both in LH and Cedrosan Saladoid deposits, being made on greenstones (e.g., nephrite, jadeite, and serpentinite) as well as on *Pinctada* and *Strombus* shells. Quite similar pieces to those documented in the LH contexts of Puerto Rico were recovered by Cooke (1998) from Cerro Juan Diaz (Figure 5-15k). The presence of these bi-dimensional frog pendants recovered from the Caribbean Watershed of Costa Rica, which are tantalizingly similar to those of both LH and Hacienda Grande contexts, was also observed in the collections of the Museo del Jade.

In the LH, there is also evidence for the production of beads (mostly discoidal) and other types of representations over *Spondylus* and *Strombus* shells. The manufacture of personal adornments over these hard-cone shells, especially in *Spondylus* (commonly known as *mullu*), has been associated with long-distance interactions during this period, most notably in Ecuador, Panama, and Costa Rica (Cooke and Sánchez 2001:37; Stahl 2003:478). The symbolic importance of the production of *mullu* artifacts has been deemed to be "central to Andean cosmology and religion" (Staller 2001:210; see also Bauer 2007; Paulsen 1974). The circulation of these shell commodities was of such importance that there were long-distance traders of this type of product in the Andean region as well as specialized workshops for its processing (Murra 1982). Interestingly enough, I have identified a type of artifact whose production has been documented exclusively in LH deposits, the aforementioned edge-ground biface, which is indistinguishable from some of the sawing instruments documented in the *mullu* workshops of Ecuador (Hocquenghem and Peña 1994). Masucci (1995) also reports the finding of grooved abraders in mullu workshops from southwestern Ecuador that present lineal incisions with concave bottoms that are similar to the ones observed in the channeled stones recovered from La Hueca-Sorcé. Therefore, this again indicates similarities in the finished artifacts and their derived meanings as well as marked parallels in their technological styles of production.

As is the case in the Isthmo-Colombian area during this time (Cooke et al. 1998; Guerrero 1993), in the LH there is also evidence for the import of jaguar and peccary (also found in the Cedrosan Saladoid contexts) teeth for their use as pendants (Narganes Storde 2005). The fact that neither jaguars nor peccaries are part of the endemic fauna of the Antilles definitely indicates that these were imported to the islands from somewhere in the surrounding continental areas, including northeastern South America. Another major component of the Isthmo-

Colombian sumptuary paraphernalia observed during this time, particularly in Costa Rica, are the mace heads (Stirling and Stirling 1997). One of such prestige emblems, made over locally available quartzite, was recovered from the LH component of Punta Candelero (Figure 5-16). Unfortunately, this piece is fragmented thus rendering difficult determining the particular type of representation that it had, if any.

Figure 5-16. Mace-head from the LH context of Punta Candelero.

The evidence for contacts with the Isthmo-Colombian area has also been noted on the basis of the import of vegetative products from such region, as reflected in Pagán Jiménez's (2005) starch grain analysis from materials recovered from La Hueca-Sorcé and Punta Candelero. Pagán Jiménez (2005) has noted that, although most of the cultivated plants consumed by the LH had already been introduced during Pre-Arawak times, two of the missing pieces of the Isthmo-Colombian plant assemblage, leren (*Calathea* cf. *veitchiana*) and arrowroot (*Maranta* cf. *arundinacea*), were found in the LH materials. This led him to the argue that the "botanical culture" reflected in the LH had an Isthmo-Colombian base and that it served not only for

subsistence functions but also to reproduce to an extent the phytocultural landscape from that area. Pagán Jiménez's study also indicates that the subsistence practices of the people that moved into the Antilles during this time did not necessarily represent a "transference to insular settings of a tropical forest economy from South America" (Petersen 1997:124), but a combination of the botanical assemblage that had already been introduced in Pre-Arawak times, the use of local products, and other crops that continued to be imported from the Isthmo-Colombian area and perhaps South America as well.

Another feature that characterizes the LH that is also found in the Isthmo-Colombian area is the decoration of pottery with engraved zonal incisions filled with white paint and appliqués. In Costa Rica, these have been associated to the Rosales Zoned Engraved and Guinea Incised styles of the Zoned Bichrome period, dating between 300 B.C. and A.D. 500 (Guerrero 1993; Desrayand 2001). The use of these forms of plastic decoration has been documented in both the Pacific and Caribbean Watersheds of Costa Rica during this time (Baudez and Coe 1966). However, it should be noted that despite the similarities in some of the engraved and appliqué designs, this type of Costa Rican pottery is commonly characterized by the presence of effigy legs, a trait that is not observed in LH wares. The use of engraving filled with white paint has also been documented in Colombia, particularly in the Hornoide pottery (Ardila 1996:177), which is also contemporaneous with LH and Cedrosan Saladoid occupations of the Antilles. However, this form of decoration is secondary in Hornoide assemblages, as its main emphasis is in the application of bichrome and policrome painting.

Chanlatte and Narganes (1983) also report the finding of black polished wood pendants at the LH locus of the La Hueca-Sorcé. These pendants present anthropomorphic and zoomorphic representations. Although limited, the finding of these pendants might indicate that the

production and circulation of black polished wood pieces started at least since this period, thus predating the timeframe for the movement of wooden implements between the Isthmo-Colombian area and the Antilles suggested by Helms (1987).

These Isthmo-Antillean relationships during this time were not limited to circulation of technological styles and ideographic expressions but also seem to have included the movement of raw materials as well. The x-ray diffraction analysis conducted by George Harlow (2007) indicated the presence of a celt fragment made of Guatemalan jadeite amongst the analyzed material from the LH component of Punta Candelero. It consists of the bit fragment of a coarsely made biconvex celt, which presents a haft snap and clear evidence of battering wear in its distal portion (Figure 5-17a). Although limited, the presence in the LH component of Punta Candelero of this celt made of jadeite whose from the Motagua fault zone in Guatemala coupled with the identification of jadeite pendants in both Punta Candelero and La Hueca provide clear evidence for the tight Isthmo-Antillean relationships of the producers of the LH tradition during this time.

The import of this raw material, however, is not only evidenced in LH contexts but in Cedrosan ones as well. Harlow's (2007) study also identified the presence of two ground tools made of Guatemalan jadeite from Tecla 1, the site that contains the earliest evidence for Hacienda Grande occupations in Puerto Rico. These consist of a coarsely made biconvex celt (Figure 5-17a) and a medial fragment of a plano-convex adze (Figure 5-17b). As was the case with the import of radiolarian limestone, silicified tuff, peridodite, as well as the locally available metavolcanic materials, there is no evidence of the local production of these jadeite implements. The presence of imported jadeite in these contexts corroborates the results of the previous petrographic study conducted by Harlow et al. (2006) on several celts recovered from a Cedrosan

context in Antigua, which also indicated that their most likely provenience was the Motagua fault zone in Guatemala. This is the same source of some of the jades imported to Costa Rica during this time (Cooke 2005; Harlow 1993).

Figure 5-17. Jade ground tools analyzed by George Harlow (a, biconvex celt, Punta Candelero; b, biconvex celt, Tecla 1; c, plano-convex adze, Tecla 1).

A salient element of this celt production and distribution process during this time is the manufacture of the plano-convex adze that, as previously noted, is associated exclusively with Hacienda Grande and some Cuevas contexts of Puerto Rico. The evidence available thus far indicates that the production of this type of tool is absent in contemporaneous contexts of the Lesser Antilles, Venezuela, and the Orinoco. Interestingly enough, the production of plano-convex adzes is commonly observed between Costa Rica and Guatemala during this period. Particularly in Costa Rica, these are found without decorations, as pendants, or depicting the axe-god motif (Guerrero 1986). Therefore, the presence of this type of artifact in the Hacienda

Grande components of Puerto Rico could be indicating the local use of an object that had an important ideological value in the Isthmo-Colombian area as well, which again shows the tight relationships and the significance of these Isthmo-Colombian connections in Hacienda Grande contexts.

The available evidence indicates that Cedrosan were also involved in the interaction networks that promoted the movement of shiny personal adornments and themes between the Isthmo-Colombian area and the Antilles. Interestingly, there are two main motifs found in both the Isthmo-Colombian area and Hacienda Grande deposits in Puerto Rico that have not been observed thus far in the LH. The first of these is the curly-tailed emblem, which has been recorded at this time between Costa Rica and Panama (Balser 1961; Cooke 1998; Mayo Torné 2002). In Puerto Rico, curly-tailed adornments that are almost indistinguishable to those from the Isthmo-Colombian area have been recovered from the Hacienda Grande deposits of Tecla I and La Hueca-Sorcé (Chanlatte and Narganes 2005). Corinne Hofman (2007 personal communication) has also informed me that a curly tailed pendant made of wood was recovered from Morel in Guadeloupe. The second type of motif is what has been termed by Lange (1993:284) the two-sided avian pendant. A piece made over nephrite strikingly similar to those documented in the Caribbean Watershed of Costa Rica, particularly in the Mercocha site (Stirling and Stirling 1997), was recovered from the Hacienda Grande component of La Hueca-Sorcé (Chanlatte and Narganes 2005).

Another indicator of these isthmo-Antillean relationships during this time is a fragment of a gold-copper alloy or *tumbaga* artifact dated to cal. A.D. 100 from the Hacienda Grande context of the Maisabel site, which is located in north-central Puerto Rico (Siegel and Severin 1993). The available evidence indicates that the production of *tumbaga* during this time was restricted

to Colombia (Cooke 2005). In fact, this date from Maisabel coincides with the earliest evidence for the export of gold-copper alloys from Colombia to Panama, being then found in Costa Rica around century later (Cooke 2005:153; Fernández Esquivel 2005:31). The technique of manufacture (sheet hammering) noted in the fragment reported by Siegel and Severin (1993) could be assigned to what Cooke and Bray (1985) called the Initial Group. Thus far, no evidence for early *tumbaga* artifacts has been recorded in northeastern Venezuela or the Lesser Antilles during this time (Oliver 2000).

Another type of feature identified in the Isthmo-Colombian area and the Antilles during this period is the presence of dog burials, a tradition that has antecedents in both Mesoamerica (Valadez Azúa 1995) and the Andean region (Schwartz 1997). The earliest Antillean evidence for dog burials has been obtained from the La Hueca-Sorcé and Hacienda Grande sites in Puerto Rico, being found in later contexts all the way down to Barbados (Newsom and Wing 2004:204). Although there is scant evidence for the presence of dog bones within middens in northeastern Venezuela since at least A.D. 400 (Linares 1987:39; Vargas 1979:202), currently no primary dog burials have been found either in Orinoquia or anywhere in northeastern Venezuela in contexts predating those of the Puerto Rico. Therefore, the available evidence makes problematic the previous claims made by Roe (1995) about the origins of this practice in northeastern South America. Interestingly, Newsom and Wing (2004:204) report that in a considerable number of dog specimens, there is a form of mutilation in the lower fourth premolar that might be associated to the use of a “muzzle-like restraint” similar the those reported in the archaeological record of Ecuador. Also, the production of dog figurines observed in both LH and Hacienda Grande contexts has not been documented thus far amongst the ceramic repertoire of contemporaneous sites in northeastern Venezuela (Mela Pons 1983:123), while representations

of this type of animal are commonly observed from Ecuador to the Isthmo-Colombian area and Mesoamerica during this period (Schwartz 1997:130-134; Stone 1993:146).

These data show that both the producers of the LH and Hacienda Grande traditions were immersed in the macro-regional networks within which these shiny personal adornments, iconographic representations, mythical themes, technological styles, raw materials, cultigens, and faunal domesticates, among other elements, were being circulated. This indicates that the interaction networks that were articulated in the Antilles extended into the Isthmo-Colombian area and vice versa, thus showing the need to reexamine the geographic range of such transactional spaces in both areas. It is important to note that the sharing of these elements, particularly the themes expressed in the lapidary and shellwork in the Antilles and the Isthmo-Colombian area during this time, not only indicate the articulation of economic interactions such as exchange but also a process in which a mythical grammar was being reproduced in both areas with their own local interpretations, most likely in tandem with other kinds of information. Furthermore, this evidence clearly shows that even though the emphasis on producing some of these personal adornments on greenstones has usually been traced to the Guianas and the Lower Orinoco (e.g., Boomert 1987, 2000), the use of green colored rocks is also one of the most salient elements of Isthmo-Colombian lapidary and celt production during this period (Stone 1993), perhaps representing another element of the ritual complex shared between these two areas.

For those of us working in the insular Caribbean, this evidence underlines the need to open our eyes to areas beyond northeastern South America for understanding the cultural relationships of the peoples that migrated to the area during this period and their reasons for doing so. Perhaps the population movements of LH and early Cedrosan societies to the Antilles at least in part responded to their search for suitable venues in which to position themselves within these pan-

Caribbean interaction networks. This could explain why some of the earliest sites are located in proximity to sources of materials with ritual and/or economic value in these transactional circuits, which may also point to community-levels of specialization in the manufacture of certain goods that were important in such networks. This is the case, for instance, of the "social jade" obtained from the serpentinite belt located nearby Tecla, the radiolarian limestone used in green-stone celt production observed in Hope Estate, the amethyst used in lapidary production in Pearls, and the nacreous (e.g., *Pinctada* sp. and *Pteria* sp.) and hard-cone shells (e.g., *Spondylus* sp. and *Strombus gigas*) used in Punta Candelero and La Hueca-Sorcé, just to mention a few examples of sites located nearby important raw material sources. This indicates that the articulation and maintenance of these long-distance trade networks was not epiphenomenal for these societies as commonly assumed, but was rather an important aspect for the incoming of these peoples to the islands and their selection for settlement locations.

CHAPTER 6
HORIZONTAL DIVERSIFICATION IN PUERTO RICO: THE FORGING OF NEW IDENTITIES

In Rouse's (1992) model, the most pivotal event in the development of what is commonly known as the "Taíno" is marked by the rise of the Ostionoid series in Puerto Rico around A.D. 600. The beginning of this series is represented by the divergence of the Cuevas style of the Cedrosan Saladoid subseries into the Monserrate style of the Elenan Ostionoid subseries in the eastern part of the island and the Pure Ostiones style of the Ostionan Ostionoid subseries in the west. As previously indicated, Rouse's scheme is predicated upon the fact that the configuration of this cultural series took place after the Cedrosans eliminated or pushed west the foraging Pre-Arawak peoples soon after their arrival to the island around 400 B.C., and after they also eliminated or drove east the peoples that Rouse grouped within the Huecan Saladoid subseries around A.D. 250. Therefore, the *in situ* development of the descendants of the Cedrosans in ethnic isolation eventually gave way to the later genesis of the "Taino ethnic group" (Rouse 1992:185).

However, the evidence presented in the previous Chapters indicates a much more complex scenario than that narrated in Rouse's model. In Chapter 3, I established that the Pre-Arawak groups that inhabited Puerto Rico were not traditional "Archaic" societies as assumed by Rouse (1992) as an antecedent condition for their interactions with the later migrants, but were people that were humanizing their botanical and zoological landscapes, had already introduced agriculture (including the botanical trinity of maize, manioc, and sweet potatoes, among other domesticates) and ceramic production to the island (although not necessarily in tandem), and were overall much more complex than previously thought. In Chapter 4, I evaluated Rouse's single migration hypothesis and argued that the LH and the Hacienda Grande manifestations of Puerto Rico reflected two distinct cultural traditions. The differences noted in their systems of

representation, superstructural practices, lithic technological protocols, and pottery decoration styles, as well as other elements, were so marked that they indicate different cultural ancestries for the group that enacted those traditions. These ancestries can be traced back to different continental areas (the Isthmo-Colombian area for the LH and somewhere in northern South America for the Hacienda Grande) that, in combination of their spatial segregation in the islands, is indicative of at least two distinct migrations to the Antilles as was originally argued by Chanlatte and Narganes Storde (1980).

On the basis of such evidence and on the recently generated data from Puerto Rico, I consider that the most critical period in the articulation of the late cultural landscape of the island, instead of resulting from the unilineal evolution of an Ostionoid series derived from a Cedrosan stock that operated in ethnic isolation in Puerto Rico as argued by Rouse (1992), was registered around A.D. 500 when new identities began to be forged within the island while others continued to be reproduced and reformulated in a context thus characterized by cultural and social plurality rather than homogeneity. These changes were associated with a period of horizontal diversification when what were previously highly welded villages began to fission and new communities were formed (Rodríguez López 1990; Torres 2005), a process that denotes marked social changes during this time. Also, this period witnesses other significant changes in the traditions of lithic making and ceramic production, resulting in the articulation of new technological styles. At this time there were also marked shifts in the configuration of the regional interaction spheres observed in previous times, from ones that promoted the production and trade of shiny raw materials (both semi-precious stones and nacreous shells) and finished personal adornments to the circulation of other emblems of social hierarchy and/or ethnic identity within the island and in surrounding regions. These changes signal marked alterations in

the ideological and economic structures upon which those interactions were articulated previously in Puerto Rico, the Antilles, and the Greater Caribbean.

This chapter will address this critical period in the pre-Columbian history of the island and its effects in the configuration of its late precolonial cultural landscapes. It will start by reviewing the previous discussions regarding what has come to be known as the crab/shell dichotomy, an issue around which the different perspectives regarding the reasons for the shifts registered in the island at the onset of the Ostionoid series have traditionally revolved. Then, the temporal data upon which the antecedent conditions assumed in Rouse's model were built (i.e., the early disappearance of Pre-Arawak societies, the displacement of the LH around A.D. 250, and the sequentiality of the Late Saladoid/Early "Ostionoid" pottery styles) will be revised on the basis of the radiocarbon inventory developed in this study. This will provide chronological evidence for the aforementioned culturally plural scenario observed in the island around ca. A.D. 450-500. Then, the variable lithic-making traditions that are observed in several locations of the island and the different levels of interaction that are reflected through them will be described. The lithic data will show that the late cultural landscape of Puerto Rico was configured by a myriad of developments and interactions of, not only the producers of Hacienda Grande pottery, but also the Pre-Arawak and the LH and perhaps others as well, which is indicated by the continued enactment and negotiation of those multiple technological traditions. This evidence will also underline the fact that there was a high degree of variability in the operational sequences observed between sites even in cases in which the same pottery type was produced. This variability resulted by the distinct degrees of integration of those traditions that resulted from the multiple negotiations that were taking place within and between those locations. The shifts that are observed in the material culture during this period are also reflected by the forging

of other public displays of social and/or ethnic identity, such as the practice of fronto-occipital cranial deformation and the installation of rock enclosures.

These social changes that were taking place in the island, particularly in its north-central portion, seem to have been further accelerated by drastic climactic perturbations that were registered between ca. A.D. 1000 and 1100, as we were able to document particularly in the Paso del Indio site (Clark et al. 2003; García Goyco and Maurás Casillas 1993; Rodríguez Ramos 2003a; Walker 2005). At this time, an intensification of regional integration began to be reflected by the incorporation in the ceramic assemblages of two pottery styles, the Capá and the Esperanza, and by the institutionalization of social asymmetry legitimized primarily by what Oyuela-Caycedo (1998, 2002) has called religious routinization. This Chapter closes by expanding again the scale of analysis to the macro-regional level in order to demonstrate how these social and cultural processes are embedded within much more encompassing interaction networks, which continued to extend to the Isthmo-Colombian area.

The Crab/Shell Dichotomy: A Synopsis

One of the most contested issues in Antillean archaeology has been the reason for the marked shifts registered in association with the rise of the Ostionoid series in Puerto Rico around A.D. 600. The first to bring this problem to bear was Froelich Rainey, who in the 1930s was sponsored to pursue excavations in Puerto Rico as part of the Caribbean Archaeology Program of the Peabody Museum of Yale University. As a result of this work, Rainey (1940) indicated that there was a generalized disruption in the cultural sequence of Puerto Rico. He observed a persistent shift at different locations from the presence of a layer dominated by crab claws, thus named the Crab Culture, to a cultural stratum that evidenced the intensive exploitation of shells and other marine dietary elements, which he termed the Shell Culture. In addition, he noted that the ceramics belonging to the Crab Culture were fine-pasted, well fired, and their surfaces were

painted. In contrast, pottery from the Shell Culture was coarse-tempered and lacked paint. On the basis of these and other notable differences that he observed, Rainey (1940) concluded that these two cultures reflected two different migrations from South America. Furthermore, even though by that date there had not yet been any formal discovery of a Pre-Arawak component in Puerto Rico, he made the important observation that "The recent excavations have had no bearing on this Ciboney culture except to show that some of the traits by which it is characterized according to Harrington are found in the late, Shell Culture, deposits in Porto Rico" (Rainey 1940:180). The existence of these two cultures that, among many other things, presented contrasting protein bases gave rise to the highly discussed crab/shell dichotomy.

After conducting his doctoral research in Haiti, Rouse arrived in Puerto Rico to continue the work initiated by Rainey as part of the Scientific Survey of Puerto Rico and the Virgin Islands. As previously indicated, on the basis of his pottery analyses, Rouse concluded that there was a continuum of ceramic modes between the Crab (i.e., Cedrosan Saladoid) and Shell (i.e., Ostionoid) cultures, suggesting that there was only one migration of agro-potters to the Antilles whose eventual development resulted in the rise of the Taíno "ethnic group" (Rouse 1989:391). Rouse (1992) has repeatedly argued that Rainey saw dramatic changes in the ceramic repertoire because he focused on decorated sherds thus not contemplating the gradual nature of the shifts that led to the technological degeneration of the fine Cedrosan Saladoid ceramics to the coarsely made Ostionoid wares, which were separated by a period when plain pottery was dominant. Furthermore, he contended that the changes in diet observed by Rainey that comprised a shift from a terrestrial protein base consisting mainly on crabs to a marine diet primarily based on shells, were simply the result of the seasonal runs of crabs that tended to skew the composition of the dietary remains in midden deposits.

Since the development of Rouse's model, there has been an almost universal acceptance that around A.D. 600 there were marked changes in the cultural and social landscape of Puerto Rico in association to the rise of the so-called Ostionoid series. During the last three decades with the upsurge of processual concerns concomitant with the generalized decrease in emphasis on chronology building, studies dealing with the Ceramic Age in Puerto Rico such as those on settlement patterns (Rodríguez López 1992; Torres 2001, 2005), socio-political organization (Curet 1992; López Sotomayor 1975; Siegel 1992), religious development (Curet and Oliver 1998; Rouse 1982; Walker 1993), and dietary shifts (de France 1989; Keegan 1989b; Stokes 1998), among others, have almost invariably rested on Rouse's assumption of the presence of a single cultural series operating on the island at any point in time. Following this argument, it has been proposed that intra-societal dynamics of Cedrosan populations led to increasing social complexity and shifts in material culture resulting in the Ostionoid series and eventually culminating in the development of the people that encountered Columbus upon his arrival to the islands.

Understanding the particular intra-societal dynamics that resulted in the marked changes observed between these two series in the island has promoted a great deal of investigations drawn from different perspectives. For instance, Carbone (1980) indicated that the transformations observed in "Ostionoid" contexts were the result of drastic climactic changes. However, this notion has been disfavored because of the temporally disparate rate of cultural change observed across the Antilles (e.g., Curet 2003). Others such as Keegan (1989b), based primarily on optimal foraging theory, suggested that the changes that were observed in diet reflected to what he termed a "diet breadth expansion," in which the increasing scarcity of terrestrial protein sources concomitant with an increasingly high protein demand made necessary

the exploitation of other biotic sources thus explaining these dietary shifts. Relying on bone isotope data, Stokes (1998:196) presented contrasting results with those from Keegan, as she indicated that "It appears that both Saladoid and Ostionoid populations in Puerto Rico were relying heavily on terrestrial resources." Another explanation provided from the zooarchaeologial perspective (de France 1989) was that the observed dietary changes responded to the gradual decimation of the crab communities of the island, which demanded the exploitation of other food sources for sustaining the necessary protein provision for a growing human population. Others have looked at these changes from a socio-political standpoint, indicating that the observed changes were partly the result of "institutionalized stratification" of late Cedrosan societies that influenced the overall "Ostionoid" scenario (Curet 2003:13, see also Siegel 1992 and Torres 2001, 2005 for alternative approaches to this issue).

Regardless of the different approaches for explaining the reasons for the changes resulting in what Rouse called the Ostionoid series, there is general consensus that the major cultural manifestation configured after the end of the Cedrosan Saladoid subseries in Puerto Rico resulted eventually in the development of the Taíno. Thus, with a few notable exceptions (Alegría 1965; Chanlatte and Narganes 1983, 1990; Oliver 1999), most of the studies that have explored different aspects of the crab-shell dichotomy have focused on explaining the social causes for the reported changes that resulted in the transformation from the Saladoid to the Ostionoid series, assuming Rouse's contention about the existence of mono-cultural landscape on the island represented by the sole presence of Cedrosan Saladoid peoples. In the limited cases where the existence of strong interactions between competing cultures during Period II in Rouse's scheme has been mentioned as a secondary cause for these changes (e.g., Rouse 1992; Siegel 1992), the antagonistic groups (e.g., LH complex, Pre-Arawak groups) that have ignited such changes have

been limited to a marginal function prior to their riddance (i.e., colonization or displacement), therefore not contributing important elements of their culture to the post-Saladoid cultural scenario of the island. Interestingly enough, besides Chanlatte and Narganes (1990), no other major work that has dealt with different aspects of the crab/shell dichotomy or with the reasons for the development of the Ostionoid series in Puerto Rico has considered the possibility of Pre-Arawak societies or any other social grouping operating in the island as an important agent in that process (but see Curet 2003; Keegan 2006; Keegan and Rodríguez Ramos 2007; Rodríguez Ramos 2003b, 2005a). As was stated earlier, one of the main reasons for the lack of exploration of this possibility has been the scarcity of systematically analyzed data sets to deal with this issue and the almost religious acceptance of Rouse's model in most studies on this regard. However, as will be demonstrated in the following sections, the available evidence indicates a much more complex and dynamic scenario to that proposed by Rouse that demands a reconsideration of the main assumptions upon which most of the aforementioned studies have been based.

Multiple Developments, Multiple Interactions: From Cultural Isolation to a Landscape of Plurality

This section will evaluate critically three of Rouse's main temporal assumptions for the development of the late cultural landscape of the island: 1) the early and quick elimination of the Pre-Arawak groups that inhabited the island at the hands of the producers of the Hacienda Grande style; 2) the sole presence of the Cuevas style between A.D. 400 and 600 in Puerto Rico; and, 3) the temporal sequentiality of the Cuevas/Early Ostionoid pottery styles in the island that, for Rouse, evidenced their phylogenetic relationship. This revision will be primarily accomplished by the analysis of the radiocarbon database from the island that I developed as well as with other available sources of data on settlement patterns and ceramic analyses.

The Pre-Arawak/LH-Hacienda Grande Interface

A common sense approach has dominated most discussions regarding the outcome of the contact situation between the Pre-Arawak peoples of the island and the Hacienda Grande/LH newcomers that arrived around 500 B.C. Due to the fact that the Pre-Arawak groups were supposedly hunters-gatherers organized in acephalous bands and the later LH and Hacienda Grande immigrants were tribal groups that practiced horticulture, it has commonly been assumed that they quickly displaced, eliminated, or acculturated the former, giving substance to the horizontal boundary that separates them in Rouse's (1992) scheme. This is best exemplified by Rouse and Alegría's (1990:80) statement that "Since the Corosans were a relatively small population, they may have been absorbed by the Hacienda Grande who replaced them in Puerto Rico. Alternately, they may have been pushed into Hispaniola and assimilated into its El Caimito population. In either event, they would have contributed little to the subsequent peoples and cultures of the Greater Antilles." In fact, as noted by Mártir de Anglería (1944:541), some of these displaced non-Tainian people were supposedly pushed to the Guacayarima peninsula in Haiti, which in Arawak meant the "anus of the world."

However, the short time span and the character of such relationships is put into question when considering the temporal extent of the interactions of Pre-Arawak groups with the later immigrants. According to Rouse's (1992) most recent scheme, the earliest Pre-Arawak groups were colonized or displaced from Puerto Rico upon the arrival of the producers of Hacienda Grande pottery, around 400 B.C. However, as indicated in Chapter 4, the available radiocarbon assays from Pre-Arawak sites of the island extend to cal. A.D. 200 (Yanuel 9 site, Tronolone et al. 1984) (Figure 6-1). This shows that Pre-Arawak groups continued inhabiting the island for at least half a millennium after the arrival of its later immigrants. As such, this does not support their quick elimination or displacement as proposed by Rouse (1992). If an antagonistic

relationship is assumed between these two groups (for which no evidence exists at the moment), then these data indicate a situation of resistance rather than a context of unidirectional relations in which the "Saladoid replaced the previous Ortoiroid populations" in quick fashion (Rouse 1992:73).

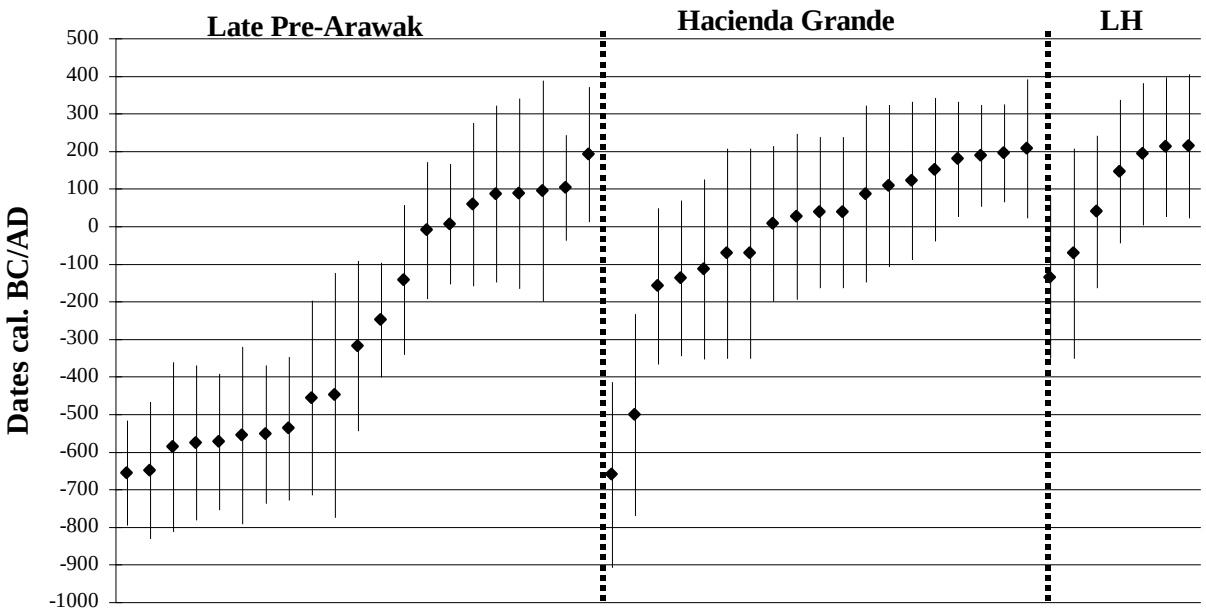

Figure 6-1. Calibrated 2σ ranges of radiocarbon dates from late Pre-Arawak and early LH and Hacienda Grande contexts of Puerto Rico.

These different types of intersocietal interactions are particularly illustrated at a micro-scale in the neighboring Cueva María de la Cruz and Hacienda Grande sites. Cueva María de la Cruz is a rockshelter located in eastern Puerto Rico, around 500 m west of the Hacienda Grande site. Two burials were unearthed in this rockshelter. They were interred in the extended position, which coupled with the finding of associated Pre-Arawak lithics, led Alegría et al. (1955) and Rouse and Alegría (1990) to identify them as belonging to the Coroso culture. Interestingly, these two burials dated between cal. 50 B.C. and A.D. 40. This is at least 200 years later than the earliest occupation of the Hacienda Grande site (Roe 1985) and at least four centuries after the earliest evidence for Hacienda Grande pottery is registered on the island. On

the basis of the finding of edge-ground cobbles in the Hacienda Grande site, Rouse and Alegría (1990) had argued that the Pre-Arawak had been absorbed (i.e., acculturated) into Hacienda Grande society. However, the persistence of this burial practice in these late Pre-Arawak interments and their location in this rockshelter, a type of context used by many Pre-Arawak peoples from the Greater Antilles for the disposition of the dead, shows that at least some of these different social aggregates were engaged in a type of social relation that allowed each of them to reify their own identities and to enact their sense of place for an extended period of time even in situations in which they were living in what were very likely overpenetrating territories.

These relationships between Pre-Arawak and the later migrants to the island are further illustrated when considering the data from Maisabel and Paso del Indio. Evidence from a coring project conducted by Siegel et al. (2005) at Maisabel showed the presence of Pre-Arawak groups since at least 2200 B.C. Although there is no direct evidence for the presence of late Pre-Arawak groups at that particular location when the producers of the Hacienda Grande style of pottery arrived (ca. 200 B.C.), Siegel et al. (2005:114) contend that "As Saladoid people occupied the Maisabel location during the Hacienda Grande period, Archaic groups were alternatively displaced, exterminated, or absorbed into the ceramic-age group." Interestingly, there is evidence from Paso del Indio, located upriver from Maisabel, of a Pre-Arawak component dating to cal. A.D. 90 sealed under more than 2 m of sediments (Clark et al. 2003; Walker 2005). This evidence indicates the continued existence of Pre-Arawak groups in close proximity to the inhabitants of Maisabel in an inland context at least three centuries after the producers of Hacienda Grande style of pottery occupied this coastal location. Thus, some Pre-Arawak groups continued to live for an extended period of time in close proximity to Cedrosan and LH peoples. In fact, it is interesting that materials such as calcite where commonly imported to the coastal

Maisabel site (Siegel 1992) downriver from the interior karst haystack hills, such as the ones that surround the Paso del Indio site. On the other hand, the aforementioned context of Paso del Indio showed the import of a radiolarian limestone celt, a raw material that is limited to St. Martin, which was probably introduced to such site upriver from the coast. This indicates the possibility that some sort of exchange relationship may have existed between these groups. The evidence demands that we reconsider the unidirectional types of interactions between these peoples and the quickness of their adverse effects over Pre-Arawak groups.

The relationships between Pre-Arawak groups and the later newcomers to the island are further illustrated when looking at the types of lithic raw materials that were later employed by the producers of the LH and Hacienda Grande complexes. The available evidence indicates that most of the raw materials that were used in LH and Hacienda Grande contexts already were being procured and circulated by at least some Pre-Arawak groups for the production of utilitarian and sumptuary items. For instance, this is the case of the exploitation of serpentine, diorite, calcite, and quartz crystal for bead production, which are the four locally available materials most commonly employed in the production of personal adornments in LH and Hacienda Grande groups throughout the island. The exploitation and circulation of all of those raw materials had already commenced in Pre-Arawak contexts, as indicated in Chapter 4. Also, the procurement and movement of cherts from the western portion of the island (from its northwestern and/or the southwestern sections) had already been documented in Pre-Arawak contexts. Later LH and Hacienda Grande components from sites such as La Hueca-Sorcé and Punta Candelero had evidence for the import of silicified tuff, a raw material that is also represented in the Pre-Arawak context of Puerto Ferro. Even the use of nacreous shells for personal adornments, most notably observed in the LH components, was previously found in the

Pre-Arawak context of Maruca. These similarities in the raw material base are also indicated by the import of similar extra-island materials such as the radiolarian limestone used in celt production and the Antiguan chert used in core-flake reduction in both Pre-Arawak and later LH and Hacienda Grande contexts. Interestingly, the Pre-Arawak context of Paso del Indio where the radiolarian celt was uncovered is contemporaneous with the Early Ceramic context from the Hope Estate site in St. Martin, where the local production of this type of item has been documented, and with the Hacienda Grande component from Maisabel. This could indicate a type of product that was exchanged for the calcite pieces between the Pre-Arawak and the Cedrosan peoples of such locations. The import of amber from Hispaniola has also been documented at Punta Candelero (Rodríguez López 1993) and Hacienda Grande (Walker 1985a) in contexts that predate the entrance of the producers of Cedrosan or LH traditions to such island. In the LH context of La Hueca-Sorcé I also identified two macro-blade fragments that very likely had a Hispaniolan origin (Figure 6-2). Therefore, the lithic evidence indicates the articulation of inter-island exchange relationships that involved the producers of Pre-Arawak, LH, and Cedrosan manifestations.

It is possible that the Isthmo-Colombian vectors of interaction were also delineated by Pre-Arawak groups. The finding of an obsidian blade in Maruca is evidence for the movement of materials from that area. These Isthmo-Antillean interactions are later noted in LH and Hacienda Grande components by the aforementioned import of Guatemalan jade and the reproduction of shared themes between the Antilles and the Isthmo-Colombian region. The fact that these Pre-Arawak groups might have planted the seeds for the later Isthmo-Colombian relations is also indicated when comparing the botanical repertoire that was consumed in these different complexes. Pagán Jiménez's (2005; Pagán Jiménez et al. 2005) starch grains study from Pre-

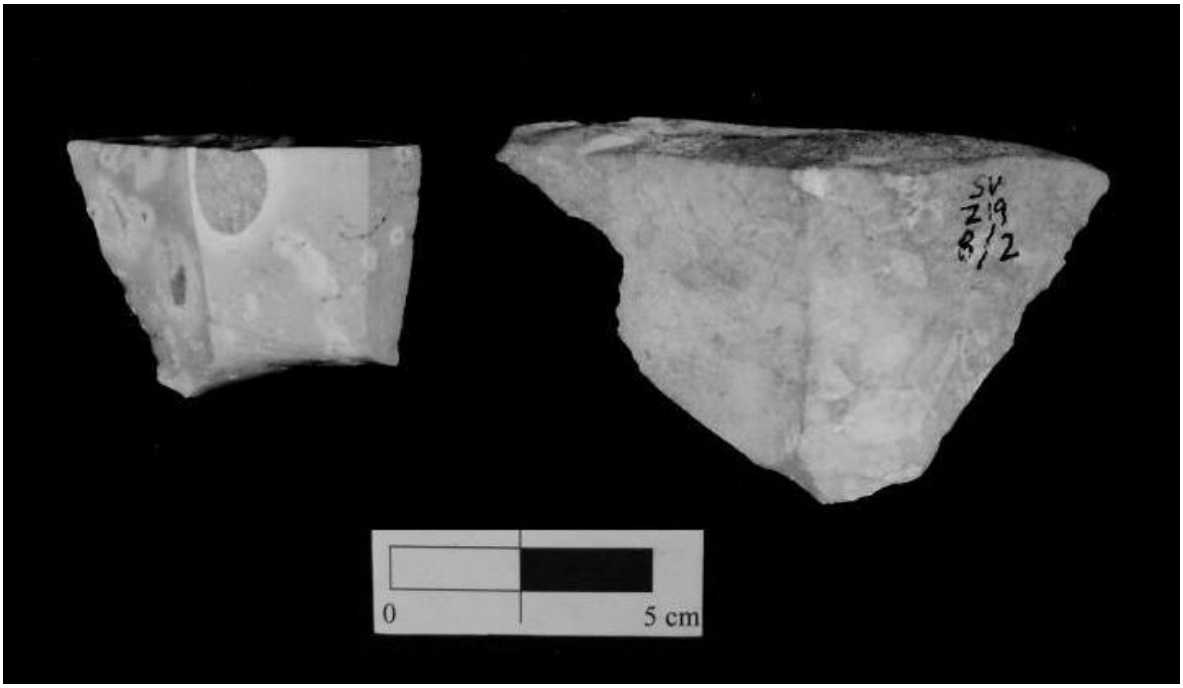

Figure 6-2. Imported blade fragments from the LH component of La Hueca-Sorcé.

Arawak and LH materials indicates that more than 80 percent of the identifiable species of imported tubers, grains, and other vegetative products that were consumed in the LH contexts were introduced by Pre-Arawak groups, very likely from the Isthmo-Colombian area. This is also the case for the consumption of local vegetative products. This shows that the biological template within which the later immigrants sustained themselves was already contoured by the Pre-Arawak groups, which serves as evidence for the intimateness of the interactions between them. This is most clearly indicated by the presence of the highly poisonous zamia, an endemic product consumed in both Pre-Arawak and LH contexts, whose detoxification requires a systematic set of practices to make it consumable that very likely were transmitted between groups through their long-term interactions. All of this points to the fact that the later vectors of interaction registered in the island, the Antilles, and the Greater Caribbean were established over the trajectories delineated by Pre-Arawak groups, which signals a process of collaboration rather than conflict in their inter-societal engagements.

Also noteworthy in this regard is the fact that some of the latest Pre-Arawak dates come from interior contexts of the island, which might suggest a late inland focus of these groups rather than the westward displacement suggested by Rouse (1992). If one takes into consideration that Pre-Arawak groups were the first to settle the interior of Puerto Rico, especially its north-central portion (Ayes Suárez and Dávila Dávila 1993; Dávila Dávila 1981; García and Maurás 1993; Martínez 1994; Walker 2005), then there is no reason to explain why those groups needed to abandon the island particularly when considering that the earliest Hacienda Grande and LH settlements are restricted to the coastal plains. Unfortunately, the scarcity of radiocarbon dates for interior Pre-Arawak sites does not yet offer a particular solution to this issue. But if one takes into consideration that one of the latest dates for a Pre-Arawak context in Puerto Rico comes from the Paso del Indio site (cal. AD 90), which is located in an inland river valley, one might argue for the possibility of an interior incursion of at least some Pre-Arawak groups, as was originally suggested by Dávila Dávila (1981) and Martínez (1994).

Interestingly, it is in the interior portion of the north-central section of the island where most of the early pottery uncovered in association with Pre-Arawak assemblages has been documented, some of which presents traits characteristic of what has been classified as Chican pottery and other Ostionoid styles (Rodríguez Ramos 2005a, 2008; Rodríguez Ramos et al. 2008b). Thus, it could be possible that some of those Pre-Arawak groups that moved inland continued to develop, eventually producing some of the pottery styles that have been lumped into the Ostionoid series (Rodríguez Ramos 2005a). In fact, Figure 6-3 shows that based on the 2σ spread of the available dates and on the continuity of lithic and shell artifact production protocols and dietary practices that have been observed between the Pre-Arawak and the "Ostionoid" series, we can not falsify Chanlatte's (1990) original hypothesis of the development of the Pre-

Arawak into some of the “Ostionoid” manifestations as a result of their interaction with both the LH and the Cedrosan peoples.

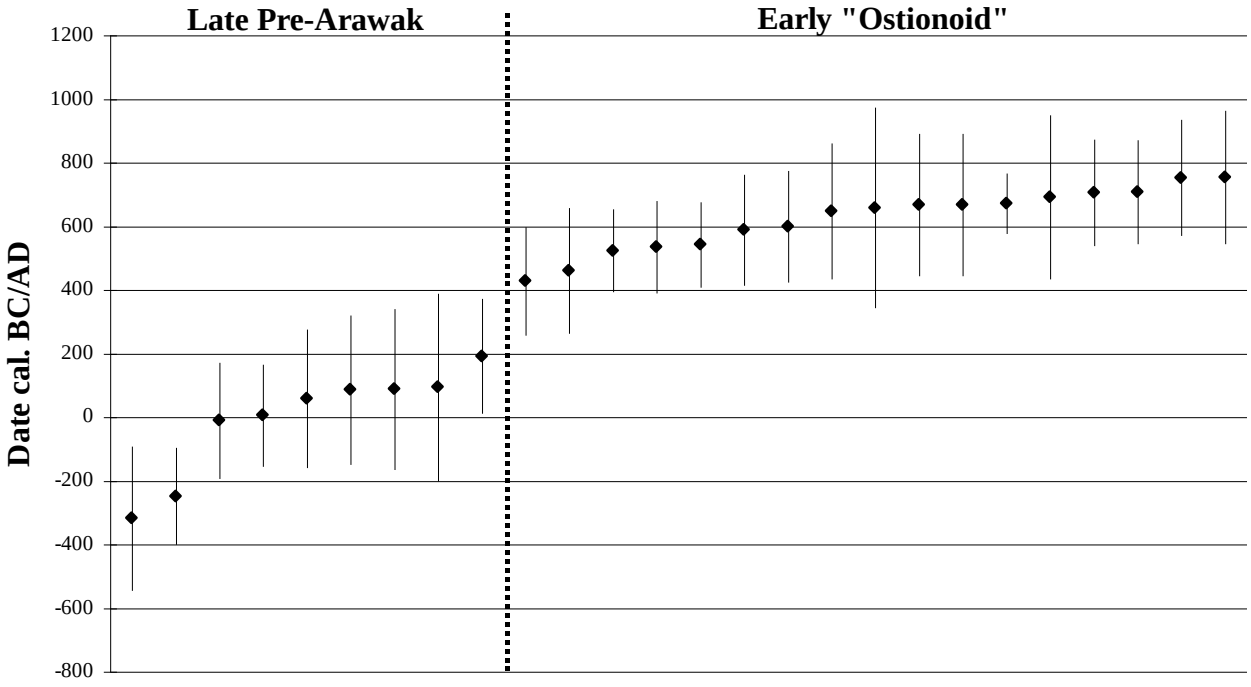

Figure 6-3. Calibrated 2σ ranges of radiocarbon dates from late Pre-Arawak and early “Ostionoid” contexts of Puerto Rico.

If we accept the fact that at least some Pre-Arawak groups had already introduced agriculture, developed the ability to produce ceramics, had complex methods of woodworking that included the manufacture of canoes, produced basketry and textiles, and were involved in extensive exchange networks, among other elements, then following Woodburn (1988), it could be hypothesized that the political pressures imposed by the arrival of Saladoid and LH populations, instead of leading to their disappearance, promoted them to intensify their productivity thus transforming into societies of higher levels of complexity. The possibility that some of these Pre-Arawak societies developed even further after their contact with Cedrosan and LH populations could explain why some of the pottery styles and culinary traditions that have been observed in later “Ostionoid” contexts show the survival of many elements traditionally

considered Pre-Arawak, as has been postulated by Chanlatte and Narganes (1990). As previously noted, this persistence of Pre-Arawak elements in these contexts was observed first by Rainey (1933:32), who noted that "A comparison of both "Ciboney" and "Tainian" artifacts with Shell Culture artifacts from Puerto Rico indicates a common pattern of traits with many duplicating specific and detailed types." These parallels in material culture raise the possibility that the development of some of those Pre-Arawak groups led to the configuration of some of the cultural manifestations in the island that resulted in the aforementioned contexts of social and cultural plurality that was registered later in time.

Of Fissioned Villages, New Communities, and Other Selves

The cultural landscape of the island becomes more complex around A.D. 450 - 500, a critical period when some of the larger settlements began to fission, new communities emerged in the island interior, and other pottery styles were produced. As indicated previously, according to Rouse's (1992) scheme this period is supposed to be characterized by the exclusive production of Cuevas style of pottery, which lasted between A.D. 400 and 600. At around A.D. 600, the development of the Ostionoid series is registered by the production of the Pure Ostiones style in the west while in the east a new pottery style, named the Monserrate, also began to be produced.

However, the evidence indicates that some of the previous pottery styles documented in the island, the Hacienda Grande and the LH, continued to be produced until later times, while others began to be manufactured much earlier than previously thought. This is the case for the Hacienda Grande style whose manufacture supposedly ceased around A.D. 400. Yet, the available evidence indicates that Hacienda Grande style pottery was produced until at least cal. A.D. 650, 250 years later than previously estimated. Evidence for the late production of white on red pottery comes from La Hueca-Sorcé (Narganes Storde 1991, 2007) and Diego Hernández (Maíz López 2002). Siegel (1992:226) also reports the finding of a pot of the Hacienda Grande

style in direct association to a burial whose earliest date was cal. A.D. 650 but, after some deliberation, he understood that "it is best to consider this a bad date." It should be noted though that there is a marked decrease in the number of sites that present white on red painted pottery starting around A.D. 500, which suggests a decline in importance of the use of such decorative mode in the systems of representation in the island. This, however, is not the case in the Lesser Antilles where this form of decoration is observed until much later times (Hofman 1993; Hofman and Hoogland 2004; Petersen et al. 2004). Therefore, this decline in emphasis in the use of white paint in pottery decoration in Puerto Rico might be reflective of the alterations that are observed in the extra-island spheres of interaction between the inhabitants of the island with those from the Lesser Antilles at this time, which may have provided the social glue that promoted the reproduction of this decorative mode in earlier contexts (see Keegan's 2004 notion of the "Saladoid veneer").

The temporal incongruities with Rouse's model are also observed in the LH pottery. According to Rouse, the LH manifestation was supposed to be in existence between 400 B.C. and A.D. 250. However, the evidence seems to indicate that the production of this style of pottery lasted in Punta Candelero and La Hueca-Sorcé until at least A.D. 850, 600 years later than its supposed date of elimination or eastward displacement. That is, if we do not consider the later dates from La Hueca-Sorcé that extend all the way up to the contact period (Narganes Storde 2007). As Oliver (1999; see also Rodríguez Ramos et al. 2008b) has indicated, the late occurrence of this pottery style needs to be addressed in more detail because there is no clear evidence for a later cultural intrusion on the LH component of La Hueca-Sorcé to which such late dates might correspond.

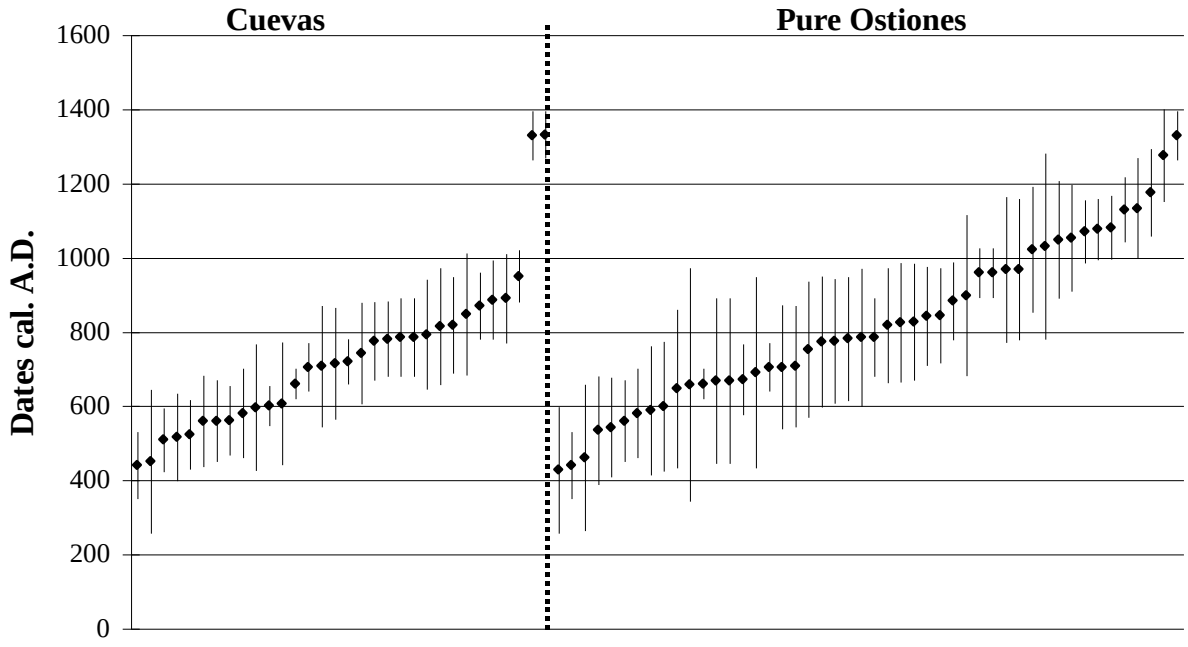

Figure 6-4. Calibrated 2σ ranges of radiocarbon dates associated to pottery of the Cuevas and Pure Ostiones styles.

In addition to the production of these two pottery styles, the period around A.D. 450-500 also witnesses the start of the manufacture of the Cuevas style of pottery. As previously noted, this style was supposed to be produced between A.D. 400 and 600. However, the dates suggest that this style of Cedrosan pottery lasted between A.D. 450 and 950, 350 years later than the previous estimation for its terminal date (Figure 6-4). Interestingly, the dates for Cuevas pottery not only coincide for at least four centuries with those of the LH complex, but also indicate that this type of pottery was produced in the island coincident with the Hacienda Grande style for more than two centuries. Late evidence for the production of Cuevas style of pottery comes from Rio Tanamá, Paso del Indio, Punta Guayanés, Maisabel, Lower Camp, Punta Candelero, and the type site of this style, Cuevas, which dated to cal. A.D. 850. However, the available dates for the end of the Cuevas in the island are not homogeneous, as its production seems to

have ceased earlier on the central portion (A.D. 850) than on the eastern side and the interior (A.D. 950 or even later).

The case of the production of Cuevas pottery is particularly noteworthy because some of its earliest assays come from sites located in interior valleys that seem to represent offshoot communities that separated from larger nearby coastal settlements. This is the case of Paso del Indio where this type of pottery was registered around cal. A.D. 450. The Cuevas context of Paso del Indio was very likely related to Maisabel, where Hacienda Grande pottery was produced until at least cal. A.D. 550 (Siegel 1992). Cuevas pottery has also been found in an inland context at the Rio Tanamá site, with dates that go back to cal. AD 440 (Carlson 2007). This early presence of Cuevas pottery in these inland sites shows that some of these interior communities were producing different styles of pottery from those observed in larger neighboring coastal settlements. This is also the case of Punta Guayanés where Cuevas pottery was produced as early as cal. A.D. 500 while in the neighboring site, Punta Candelero, that style of pottery started to be produced around cal. A.D. 700. This temporal evidence indicates that the Cuevas pottery from Punta Guayanés was produced in tandem with that of the LH style from Punta Candelero for at least two centuries in contexts in close proximity to each other. The production of Cuevas pottery exclusively in some of those newly formed inland communities could be showcasing a situation in which its inhabitants began reifying their particular identities by the production of different pottery styles to those manufactured in the areas from which they originally descended or in other neighboring settlements were other styles of pottery were still being produced, most notably in coastal areas. The fact that the production of Cuevas pottery was eventually registered in Maisabel and Punta Candelero also indicates the continued relations between the inhabitants these inland and coastal communities through time.

A quite significant fact is that the dates for the start of the production of the Cuevas style pottery coincide temporally with that of the Pure Ostiones style (Figure 6-4), which supposedly marks the beginning of the Ostionoid series in the island in Rouse's (1992) scheme. Pure Ostiones pottery has been dated as early as A.D. 450 in sites such as PO-23 (Krause 1990), Tecla 1 (Narganes 2007), and Punta Ostiones (Narganes 2007). Pure Ostiones pottery was also found mixed with Cuevas style pottery in contexts dating back to cal. A.D. 440 at the Rio Tanamá site (Carlson 2007), which again indicates the early temporal concomitance of these two pottery styles in some sites.

These early dates for the Pure Ostiones style clearly indicate that its use as the distinctive element for the marked transitions that led to the rise of the "Ostionoid series" needs to be reconsidered, as it was originally developed contemporaneously with Cuevas style pottery, and in tandem with LH as well as Hacienda Grande types of pottery for at least two centuries. The finding of these early dates for pottery associated with the Ostionoid series thus challenges the notion that it actually developed from the Cuevas, at least in western Puerto Rico. When considered regionally, the finding of early Pure Ostiones ceramics in the occidental portion of the island should not be surprising, based primarily on the recovery of similar pottery in the southeastern part of the Dominican Republic in sites such as La Iglesia, dating to ca. A.D. 400 (Ortega et al. 2004) and even earlier in the Barrio site in Punta Cana (Veloz Maggiolo 2001; Veloz Maggiolo and Ortega 1996). Therefore, the development of the Pure Ostiones style does not reflect a strictly intra-island evolution in western Puerto Rico of the Cuevas as was suggested by Rouse (1992) but was probably the result of the inter-societal engagements registered between societies in the Mona passage area, a geocultural space of interaction established since

Pre-Arawak times. Pure Ostiones pottery is found on the island until at least cal. A.D. 1350 (Oliver et al 2001); this is 450 years later than its previous estimation.

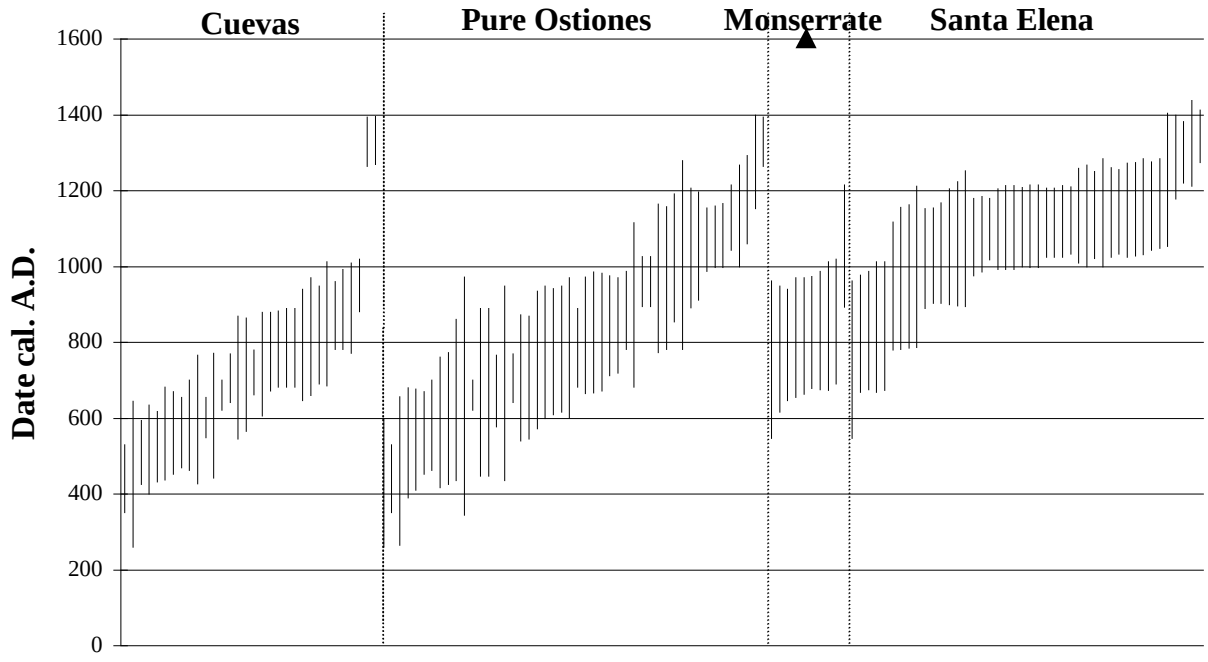

Figure 6-5. Calibrated 2σ ranges of radiocarbon dates associated to pottery of the Cuevas, Pure Ostiones, Monserrate, and Santa Elena styles.

This scenario becomes even more complex with the development of two additional pottery styles, the Monserrate and the Santa Elena. As previously noted, the Monserrate style was supposed to have developed from the Cuevas in eastern Puerto Rico around A.D. 600, while the Santa Elena style was purportedly derived from the Monserrate around A.D. 900. However, the available dates indicate that the start of both styles is contemporaneous, beginning somewhere around A.D. 750 (Figure 6-5). It is also interesting that the earliest dates for the Santa Elena pottery, which was supposed to be a style that arose in eastern Puerto Rico, actually come from sites in the south-central portion of the island thus also casting doubts about the geographic origin of this pottery manifestation (Lundberg 1985b).

The geographical distribution of the earliest dates for these pottery styles provides a rather interesting perspective because it again shows that these seem to have most commonly developed in inland communities, which is where some of the earliest dates for such ceramic complexes are found. For instance, the earliest assays for the Monserrate style come from the Florida 2 site in the Municipality of San Lorenzo located on the island interior (cal. A.D. 780). This style of pottery is earlier than in its type site, Monserrate, which is located downriver on the coast (cal. A.D. 820, Rouse and Allaire 1978). Early evidence for these two styles was also obtained from El Bronce, where these were found also as early as cal. A.D. 750 (Lundberg 1985b). Although more evidence is needed, this may indicate that the cultural cores of pottery production were not registered in large sites located at the eastern and western ends of the island as argued by Rouse, but perhaps in settlements that located in its center. Interestingly, the central portion of Puerto Rico is the area where most pottery styles are represented, some of which occur earlier and mixed together rather than by themselves. If we make an analogy with the axiom that the regions of highest genetic variability are the ancestral areas of the different genomes, then it could be argued that some of the pottery-making traditions observed in Puerto Rico developed in a central core area and then spread to its margins. As will be noted later in this chapter, other important cultural developments such as the installation of stone enclosures and the manufacture of stone belts also started and were continually concentrated in the central part of the island, thus underlining the importance of this area as a core of cultural production.

In tandem with the articulation and negotiation of new systems of representation through the production of these pottery styles, some of these inland communities were also articulated on the basis of a much different community plan to that observed in earlier sites. For instance, while in Maisabel the plan is dominated by the traditional horseshoe configuration formed by the

mounded middens, the deposits in other contemporaneous sites such as Paso del Indio are contained in a scattered sheet midden while the Cuevas context of Rio Tanamá presents a trash pit, a negative space which is contrary positive space created by the erection of the mounded middens observed in previous sites. The construction of a trash pit in an inland site at this time was also documented in the Cuevas site located in Trujillo Alto, the type-site of the Cuevas style in Puerto Rico (Rouse 1952). These differences are also noted when comparing the semi-circular form of the mounded middens of Punta Candelero with the scattered hillside midden documented in Punta Guayanés. This indicates that although some previously occupied sites retained the traditional concentric village plan (e.g., Maisabel, Tecla, La Gallera, Punta Candelero), at least some of the new communities being forged inland at this time also reified their difference by articulating distinct social landscapes which were emancipated from the "physical model of the universe" (Siegel 1992:388) observed in the coastal concentric settlements. This rupture could have been promoted by emerging elite agents or social aggregates in those communities, who may have legitimized their vertical escalation by the articulation of alternative mythical narratives and worldviews reflected in those social landscapes. In some cases, these variable settlement configurations could also be partly the result of the eventual manifestation of the community plans of Pre-Arawak societies, although evidence for this is lacking at the moment due to the nonexistence of open excavation in such contexts.

The temporal evidence also indicates the intensity of the interactions that were sustained within the island at this time, between groups that produced either the same or different types of pottery. For instance, the available dates indicate that the production of Cuevas pottery went from the north-central portion of the island (Paso del Indio, Rio Tanamá) to its extreme east

(Punta Guayanés) in less than a generation, while the Pure Ostiones style also appears in the north-central (Rio Tanamá), south-central (PO-23), as well as in the western part (Tecla 1, Punta Ostiones) of Puerto Rico almost at the same time. Interestingly, at Rio Tanamá, both of these pottery types are mixed, which might be indicating some sort of inter-societal relationships such as exogamy, competitive emulation, or spouse exchange, among others, that promoted the production of both pottery styles at this location. These interactions seem to have spread to neighboring contexts such as the Virgin Islands, where the start of the production of pottery styles such as the Monserrate are contemporaneous with those of Puerto Rico (Lundberg and Wild 2006).

All of this evidence indicates a much more complex cultural scenario than the one proposed in Rouse's model for the rise of the Ostionoid series. Styles such as the Cuevas and the Pure Ostiones, which according to Rouse were sequential, appear to be contemporaneous even occurring together in association to early dates, as is the case in Rio Tanamá. Instead of being characterized by the exclusive production of Cuevas ceramics, the cultural landscape of the island around A.D. 500 presented at least four different types of pottery (LH, Hacienda Grande, Cuevas, and Pure Ostiones), while 250 years later there were at least five ceramic styles being manufactured at the same time (LH, Cuevas, Pure Ostiones, Monserrate, and Santa Elena). All of this serves as evidence for the multiple nodes of development that were being articulated in the island at this time that resulted in the configuration of this messy pottery landscape. Perhaps the formation of this myriad of pottery styles reflects the variable outcomes of the negotiations established between and within communities comprised by peoples of different or combined ancestries (Pre-Arawak, LH, and Cedrosan) as a result of the increased intensity in the interactions between them at this time, being most notably reflected in the island interior. This

could also explain, at least partly, the supposed "demographic explosion" registered by a dramatic increase in inland sites at this time in Puerto Rico (Curet 2005; Rodríguez López 1990), which interestingly were the areas that most late dates from Pre-Arawak contexts have been obtained and where the formation of some of these pottery styles seems to have been registered. In this sense, the coeval traditions represented in the pottery styles that were configured at this time and the variability within them could be envisioned as resulting from the various negotiations of peoples with distinct systems of representation that were, at least partially, derived from their different ancestral traditions.

All of this evidence clearly puts to the question Rouse's contention about the mono-cultural scenario in the island at the time when Cuevas pottery was produced, which forms the basis for his model for the unilineal development of the Cedrosans into the "Taino people." As will be shown in the next section, this complexity is also noted in the lithic realm, in which a high degree of horizontal variability is observed from the practices of raw material procurement to the techniques applied for their transformation into tools.

Traditions of Doing Stone Things in the Late Precolonial Landscape of Puerto Rico

As was noted in the previous sections, the period that starts sometime around A.D. 500 witnesses major changes in the cultural landscape of the island. These changes reflect not only shifts in the nature of intra-societal dynamics, but also the different types of interactions that were taking place within Puerto Rico and with surrounding regions, which resulted in a highly diversified social and cultural context. This is also reflected in the lithic realm, which provides clues as to the variability that is observed at this point and of the merging of distinct traditions of making stone things. This next section will discuss such traditions and will be primarily focused on showing the high degree of horizontal variability observed at this time, even in communities that were making the same style of pottery and were located next to each other. Most of the

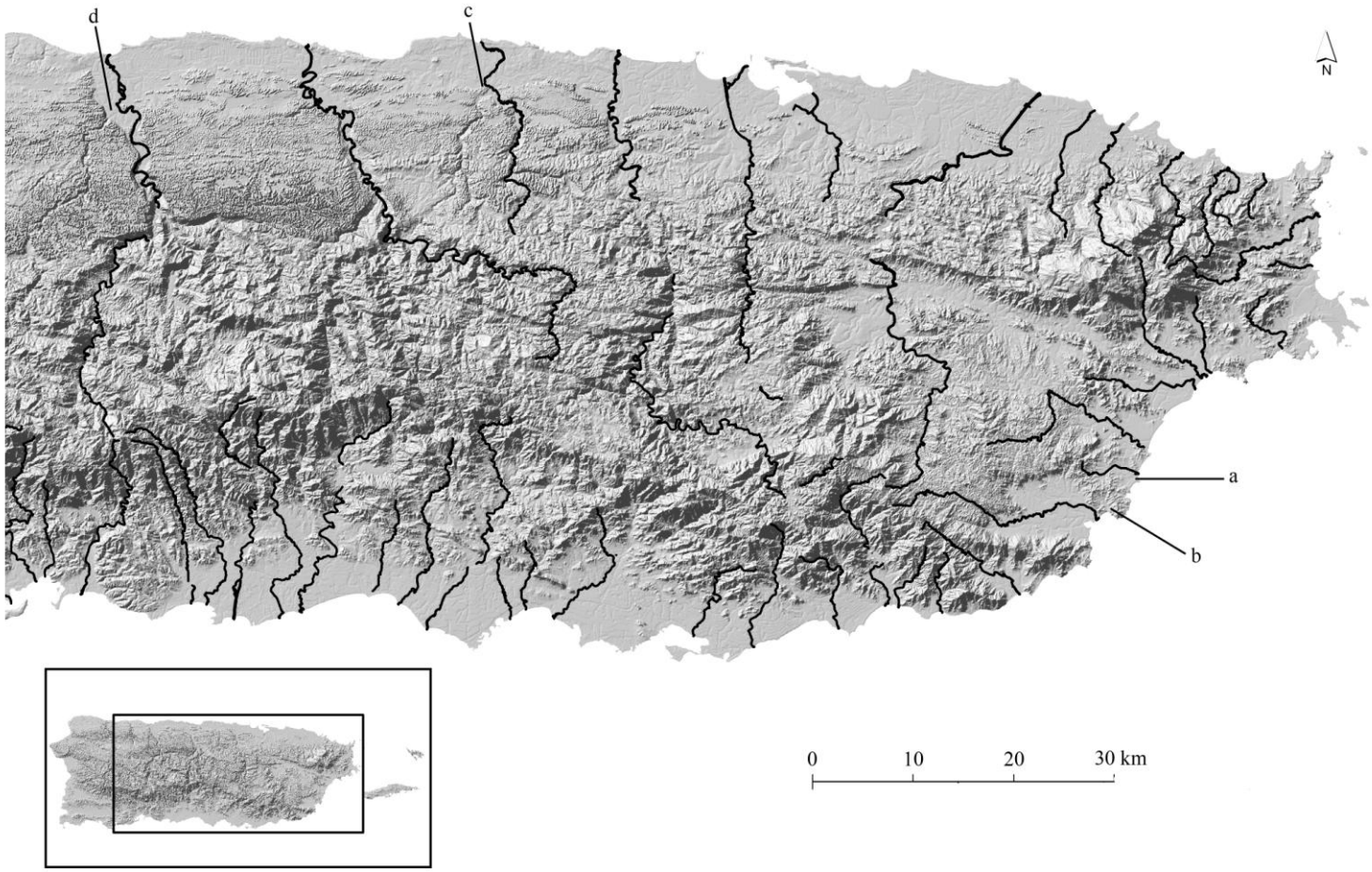

Figure 6-6. Location of selected sites. (a) Punta Candelero; (b) Punta Guayanés; (c) Paso del Indio; (d) Río Tanamá.

evidence that will be presented comes from the sites of Punta Candelero and Punta Guayanés located in eastern Puerto Rico and Paso del Indio and Rio Tanamá located in its north-central portion (Figure 6-6). All of these sites are contemporaneous through at least parts of their occupations (Figure 6-7) and are representative of the changes that took place and of the horizontal variability noted in this critical period.

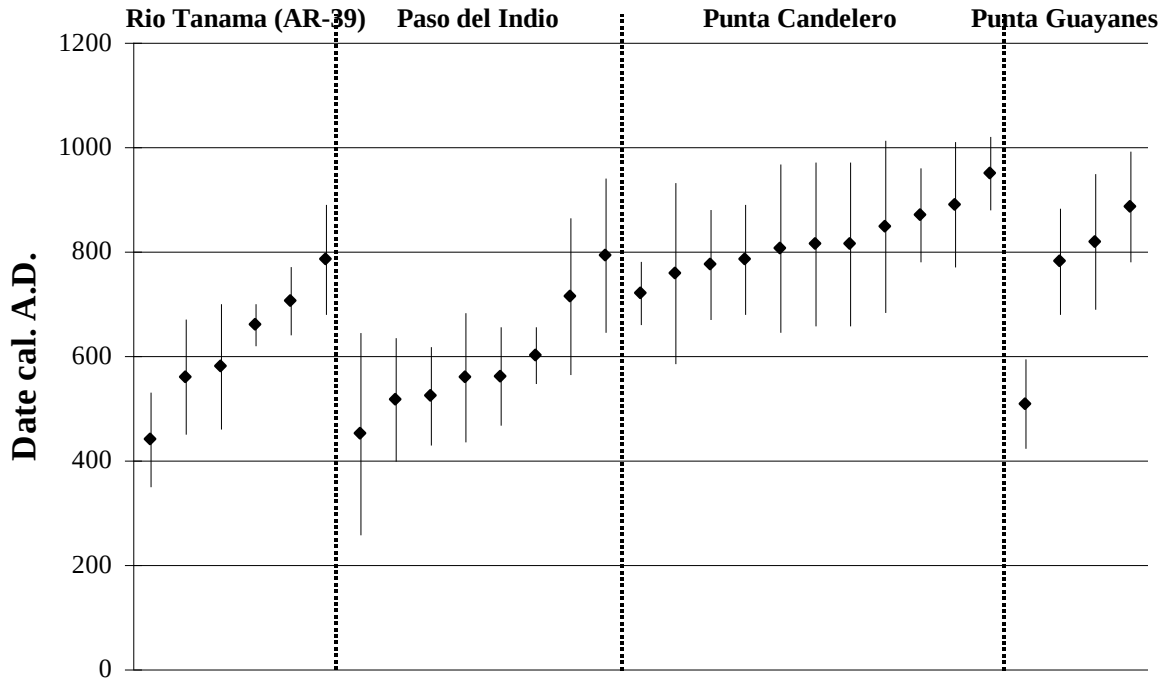

Figure 6-7. Calibrated 2σ ranges of radiocarbon dates from Rio Tanamá, Paso del Indio (lithostratigraphic unit D), Punta Candelero and Punta Guayanés.

Core-Flake Reduction

Procurement dynamics

While in LH and Hacienda Grande contexts dating prior to A.D. 500 there was an almost universal emphasis in the procurement of nodules of extraneous isotropic materials such as chert (from Antigua and the western part of Puerto Rico) and silicified tuff (from eastern Puerto Rico) for their intra-site reduction, now some of the sites begin evidencing other types of procurement behaviors that indicate marked alterations in the interaction networks within which such

materials were being moved. These changes are also indicative of the differential levels of entanglement of the practices of raw material obtainment observed in Pre-Arawak, LH, and Cedrosan contexts at the different locations. During this time, there seem to be three main focuses in raw material procurement: the import of chert nodules for bipolar reduction, previously noted more saliently in sites were LH and Hacienda Grande pottery was produced; the import of chert freehand flakes extracted through a parallel format at other locations, as was observed most prominently in Pre-Arawak contexts, and; the use of local materials (e.g., metavolcanic rocks in the case of Rio Tanamá and milky quartz in the case of Punta Guayanés) with morphological attributes that made them adept for freehand reduction by the cobble-slicing template, as was also documented in Pre-Arawak contexts.

The emphasis on either of these strategies and of the particular types of materials that were being imported seems to be highly variable between sites at this time, even in those located in neighboring areas were the same geologic sources of raw materials were present. Such is the case when comparing the raw material base exploited in the neighboring sites, Punta Guayanés and Punta Candelero (Figure 6-8). While in the Cuevas context of Punta Candelero around 63 percent of the materials employed in core-flake reduction was imported (i.e., chert and silicified tuff), in Punta Guayanés only 4 percent of the cores, flakes, and shatter were made of these extralocal raw materials. Interestingly, no silicified tuff was recovered from Punta Guayanés, while it constituted 59 percent of the imported materials in Punta Candelero. This is also the case when comparing Paso del Indio and Rio Tanamá. While in the former 77 percent of the materials was obtained from external sources, in the latter 57 percent of the materials was imported. This definitely indicates an unequal emphasis on these imported raw materials in the different locations at this time that might be related to a differential access to their sources or to

the networks that promoted their distribution. In some cases this decline in the importance of the import of these materials could also be related to the articulation of a distinct structure of preferences of the inhabitants these communities in which the mechanical properties, morphological qualities (i.e., color, shininess), and/or extraneous nature of such imported cherts was not as important. Regardless of the particular reason for this shift, the main point is that at this time some communities began to be divorced from the regional interaction circuits that promoted the movement of these raw materials between locations and of the ideological and economic structures that promoted their circulation.

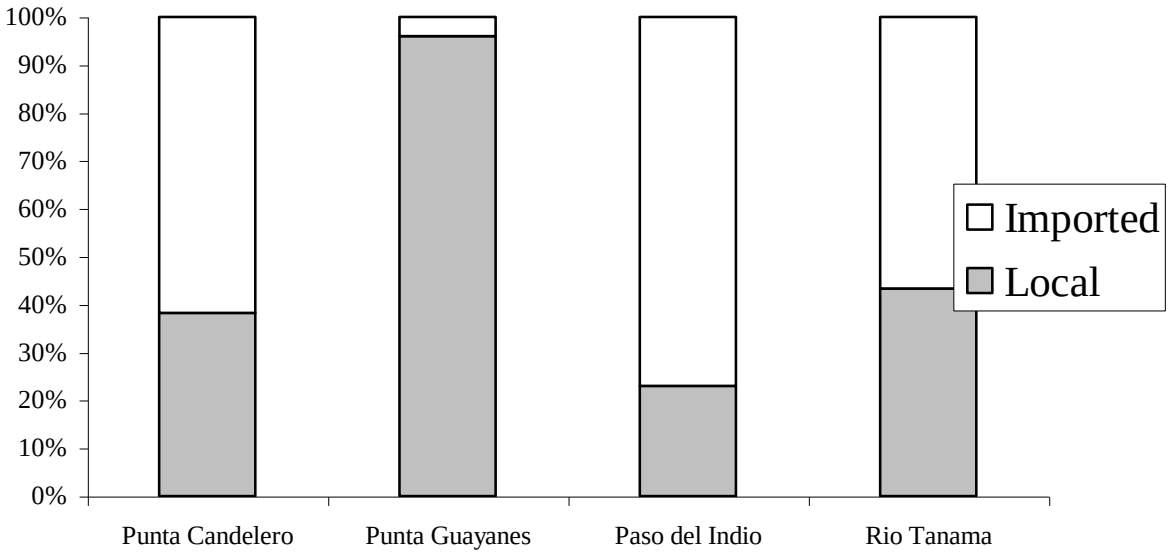

Figure 6-8. Comparison of proportions of imported versus local raw materials raw materials for core-flake reduction in Punta Candelero, Paso del Indio, Punta Candelero and Punta Guayanés.

Another change noted at these sites is that while in earlier periods cherts and silicified tuff nodules were being circulated for the production of both freehand and bipolar flakes, now these materials were being almost invariably employed in bipolar flaking. For instance, of the 347 chert artifacts from Rio Tanamá, 96 percent was associated to the bipolar technique (either in the form of bipolar flakes, cores, or shatter). This is the case also in Paso del Indio where 86 percent

of the cherts were reduced bipolarly, while all of the chert pieces from Punta Guayanés were also reduced by such technique. This could be indicating a much more specific function for the trade of chert nodules at this time, probably being mostly related to the manufacture of composite tools such as grater boards. The markedly low quantity of bipolar products in the Punta Guayanés site might be indicating that such grater boards were being imported in finished form, as these composite implements have been argued to constitute a highly traded item in precolonial times (Crock and Bartone 1998; Knippenberg 2006) and in ethnographic cultures as well (e.g., Roth 1924).

An interesting process also documented at this time is the much less variable occurrence of chert types in these sites in comparison with previous contexts. For instance, in Paso del Indio and Rio Tanamá a markedly high percentage of the cherts seem have been obtained from a single source as is indicated by their morphological homogeneity. In these two sites, the patterns of exploitation of this type of chert present some remarkable resemblances, particularly the bipolar treatment of the white weathering rind that encircles the nodules. The similarities in the procurement and reduction patterns noted in these sites suggest that the inhabitants of Paso del Indio and Rio Tanamá were active agents in the network that promoted the circulation of such raw material. Interestingly, as is the case in Punta Guayanés, both of these sites lack the import of other materials such as silicified tuff, which was present in 59 percent of the imported core-flake products in Punta Candelero. The fact that there seems to have been a decrease in the amount of sources of chert and other isotropic rocks (e.g., silicified tuff) that were being circulated in comparison with earlier period sites indicates a restriction in the vectors of interaction that promoted the movement of some of those materials for core-flake reduction. As

will be shown below, this change is also reflected in the production of personal adornments for which a much more restricted and localized raw material base is put to use at this time.

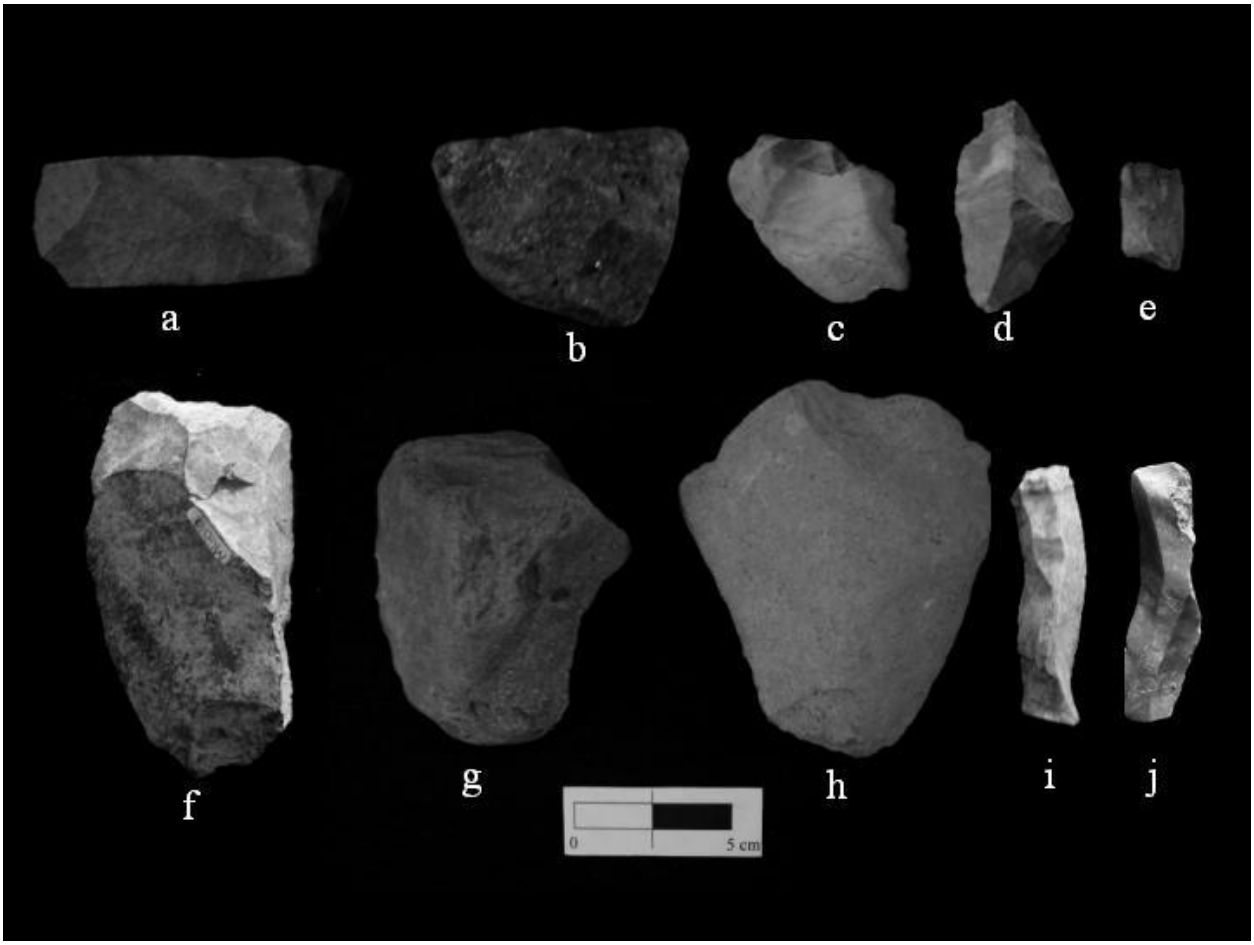

Figure 6-9. Cobble slicing cores and imported flakes from Rio Tanamá and Punta Candelero. (a-b) single platform cores, Rio Tanamá; (c-e) parallel flakes, Rio Tanamá; (f) massive flake, Maruca; (g) massive flake, Rio Tanamá; (h) massive flake, Punta Candelero; (i) parallel chert flake, Cueva Tembladera; (j) parallel chert flake, Punta Candelero.

The second major way in which chert was imported to the sites was in the form of flakes removed by parallel flaking (Figure 6-9j), as was observed in Pre-Arawak contexts (Figure 6-9i; see also Figure 4-4). This again could be indicating the continuous operation of sites that served as production areas from which flakes were being exported to the contexts of consumption. In fact, this could explain the late date (A.D. 650) obtained from the Cerrillos site, one of the main chert production contexts in western Puerto Rico (Pantel 1988). The fact that these flakes were

imported from other locations rather than being locally extracted is indicated by the relative absence of single or inverted platform cores made of chert at these sites, as well as by their production on chert types that usually are different from the ones most commonly observed at these locations in the bipolar products. This for instance is the case in Punta Candelero and Paso del Indio, where a small number of flakes of blade-like proportions were uncovered. This circulation of flakes seems also to have included the movement of the massive metavolcanic flakes similar to those documented in Pre-Arawak contexts (Figure 6-9f), which have been found in Punta Candelero, Paso del Indio, and Rio Tanamá (Figure 6-9g-h). In none of those sites is there any evidence of the massive freehand cores from which such flakes could have been detached, thus underlining their obtainment from external sources.

During this period, the third major process of raw material obtainment resided in the procurement of locally available products for their intrasite reduction. In obvious inverse correlation with the amount of imported materials, there was a high degree of variability in the emphasis ascribed to raw material procurement among these four locations. However, each of these locations began to witness a process similar to that documented in Pre-Arawak contexts in association to the cobble-slicing technique, in which there was a deliberate emphasis in the obtainment of angular metavolcanic cobbles (in the case of Rio Tanamá) or milky quartz nodules (in the case of Punta Guayanés and Punta Candelero) that presented a flat surface that served as the striking platform, which was usually located along the thinnest axis of the piece (Figure 6-9a). These objective pieces were then reduced at the sites, as is evidenced by the presence of discarded tested objective pieces, cortical shatter, and primary flakes. This increasing emphasis in the obtainment of locally available products indicates a much more intimate relation with their local landscapes as well as a decline in emphasis in the structures that promoted the import of

extraneous raw materials to previous contexts even when local rocks that served similar purposes were available.

Production dynamics

The core-flake protocols documented during this time present distinct combinations of the flaking formats documented in earlier periods, but there is evidence for an emphasis on the use of two major knapping protocols at the different locations: the bipolar technique and the parallel flaking format.

Figure 6-10. Chert bipolar cores, flakes, and shatter from Rio Tanamá.

In the case of bipolar flaking, which was most notably observed in previous Cedrosan and LH contexts (and in a minority of cases in Pre-Arawak loci), the evidence at this time indicates that it continued to be applied almost invariably over cherts. In most cases, this technique seems

to have been employed since the start of the reduction sequence, as is noted by the presence of split nodules, primary bipolar flakes, and cortex bearing shatter (Figure 6-10). However, in a limited number of cases it also seems to have been applied in a continuum with a multidirectional freehand approach, which created the necessary core setup for the further bipolar reduction of the objective pieces. In these sites, this technique seems to have been employed exclusively for the production of micro-flakes and shatter in association to the manufacture of composite tools such as the graters involved in the processing of tubers and other foodstuffs. In Punta Candelero, Pagán Jiménez (2006a) documented the use of such microflakes in the processing of *Zamia pumila* and maize. Berman and Pearsall (2000) and Perry (2005) have also documented the use of grater boards for the processing of maize in the Bahamas and Venezuela respectively. This definitely opens the door for rethinking the commonly assumed function for these implements as "cassava graters," since these were being used for processing a myriad of other types of materials besides manioc.

Although the application of the bipolar technique is represented at most, if not all, sites, its emphasis seems to have been more marked at some locations than others (Figures 6-11 and 6-12). For instance, in Paso del Indio the vast majority of the materials related to core-flake reduction consisted of bipolar flakes produced over cherts (98 percent of the cores and 78 percent of the flakes), while in Punta Guayanés the bipolar technique was represented only in 28 percent of the cores and 32 percent of the flakes. As previously indicated, it is possible that the differences in the occurrence of bipolar products at some of these sites might be related to the different activities that were registered in contexts where grater boards were being produced versus those where these were imported. In fact, Walker (2000) documented in La Trocha site in Vega Baja, just south of Paso del Indio, a context indicative of the refurbishing of grater boards

that were very likely imported from other locations, perhaps from Paso del Indio where there is evidence for their production. In contrast to previous contexts where freehand flaking was dominated by a multi-directional protocol, now the main emphasis observed in core-flake reduction resides on the application of the parallel flaking format performed in quite a similar fashion as that previously described for Pre-Arawak groups. In fact, some of the cores and the flakes found at the sites starting at this time are almost indistinguishable from the ones from Pre-Arawak contexts (Figure 6-9; compare to Figures 4-3 and 4-4). As was the case observed in Pre-Arawak loci, the application of this technique is documented at this time in two main types of materials. The first consists of the reduction of the locally available rocks using a protocol that adheres to the patterns observed in the previously discussed cobble-slicing tradition, from the criteria involved in the selection of suitable objective pieces to the format followed in the extraction of flakes from them. In these sites, the emphasis again resided on obtaining angular metavolcanic cobbles or residual angular nodules (in the case of milky quartz) that presented at least one flat platform from which flakes were detached sequentially along one of its faces. The resulting flakes tend to present flat platforms, in some cases prepared by trimming, and dorsal scars parallel to their longitudinal axis.

The second way in which the parallel flaking format is documented consists of the aforementioned import of chert flakes produced at other locations. These flakes usually constitute a minimal portion of the core-flake assemblages at this time. The reasons for the import of these flakes are not clear. In an effort to address this, Pagán Jiménez (2006a) conducted starch grain analysis from one of such flakes recovered from Punta Candelero (Figure 6-9j) but found no residues on its use margin. This could indicate that these were used over other non-food types of materials such as wood and/or fibers. The circulation of flakes and the

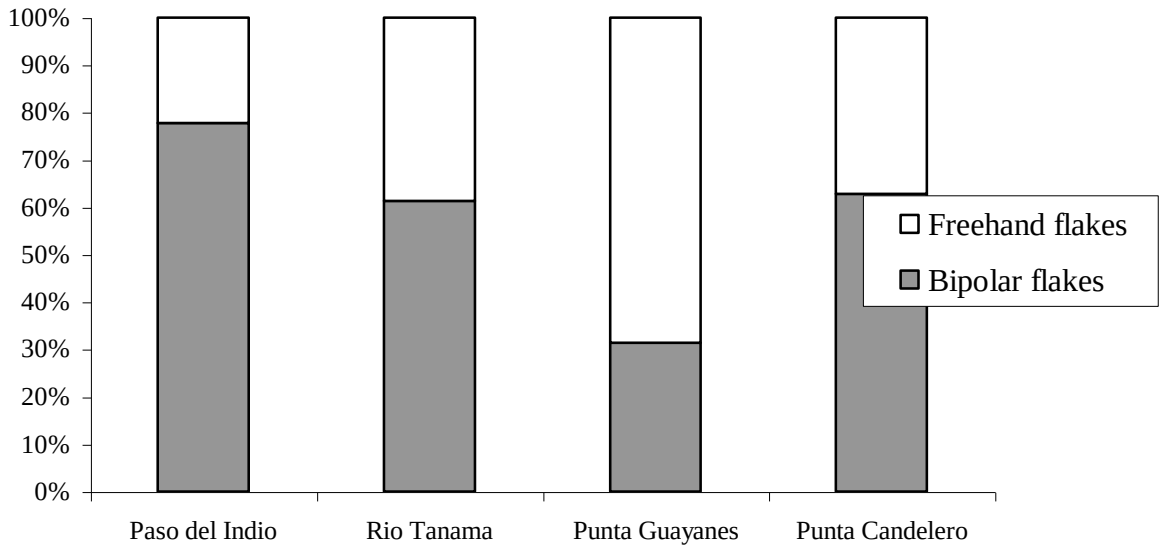

Figure 6-11. Comparison of proportions of bipolar and freehand flakes in Punta Candelero, Paso del Indio, Punta Guayanés, and Rio Tanamá.

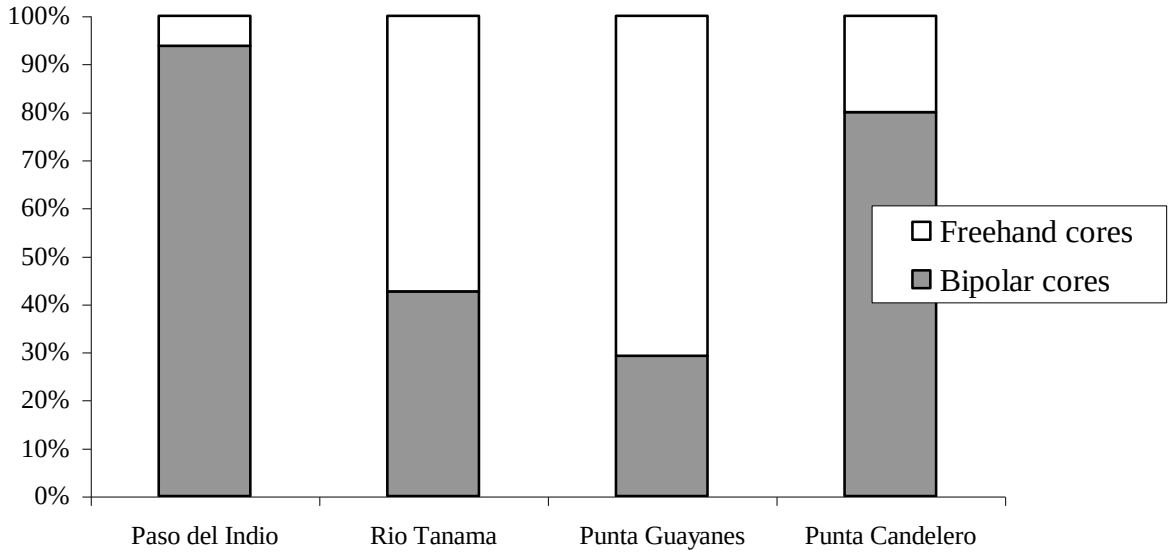

Figure 6-12. Comparison of proportions of bipolar and freehand cores in Punta Candelero, Paso del Indio, Punta Guayanés, and Rio Tanamá.

application of the "cobble-slicing" technique evidences the continued reproduction at this time of a highly conservative technological tradition of lithic making observed previously in Pre-Arawak contexts, while being virtually absent in Hacienda Grande components and of low representation in LH contexts (although it was more highly represented in Punta Candelero than in La Hueca-Sorcé). This indicates the merging of distinct traditions of core-flake reduction in some of these sites, which seems to denote again the higher levels of interaction and/or integration of the different peoples that were in the island at this time.

The application of multidirectional flaking is also observed in some of these sites, but is mostly limited to the reduction of cherts. This could be due to the fact that it was not employed as a flake production strategy *per se*, but to create the necessary core setup for further reduction by the bipolar technique as was documented by Walker (1980, 1985a) in the Hacienda Grande site and the Lesser Antilles. The least documented core-flake technique at this time is the use of a centripetal flaking format, documented in Pre-Arawak and LH contexts, which is represented in this sample by only two chert cores from the Paso del Indio site.

In some of these sites, there is also an increase in freehand flakes that present retouch. Even though the percentage of flakes that present post-extraction manipulations remains relatively small, there seems to be a slight increase in some of these contexts, particularly in those of Punta Guayanés and Rio Tanamá. The major form of retouch observed in these sites is unifacial-abrupt continuous retouch applied to the distal ends of the flakes to create rather flat working edges when seen in plan view, producing pieces that are similar to those described as end scrapers in other contexts. In other cases, this abrupt retouch was applied in a discontinuous fashion, leaving a space of the lateral margins of the flakes between each of the retouch blows, thus producing a serrated working edge. In addition, other flakes were retouched by the

application of a confined abrupt blow with the purpose of isolating a concave working edge, probably to use them in a spoke-shaving action as has been described previously.

Some of the flakes produced during this time also present heavily battered sections on their unretouched edges. This battering wear is noted by the presence of crushed margins with detached microflakes with step terminations that project bifacially. This type of wear was usually observed in flakes of considerable sizes. The size of these flakes as well as the step terminations of their negative bifacial edge scars seems to indicate their use in splitting or chopping a hard material, probably wood, as had been previously observed by Pantel (1986) amongst the materials from Monserrate. This, in combination with the types of retouches previously described and the absence of starch grains in the aforementioned flake indicative of food processing could be signaling that the emphasis in producing some of these freehand flakes by parallel flaking was related to their use as hand held tools for the manufacture of wooden implements and/or fiber commodities. If this is the case, then it could be argued that the production and circulation of materials made of wood and/or fibers became more important at this time, in comparison to the previous periods in which the movement of colorful stones and personal adornments was emphasized. The incorporation of the aforementioned Pre-Arawak knapping protocols could then be also reflecting the reproduction of some of their woodworking traditions in later contexts and perhaps the production of a similar array of materials.

Use-Modified Materials

Amongst the use-modified materials, the most distinctive type of implement that continues to be produced at this time is the edge-ground cobble (Figure 6-13a, d, e). Although it was commonly thought that this type of artifact was absent from contexts associated with Cuevas style of pottery (Pantel 1986; Rodríguez Ramos 2003b, 2005a; Walker 1985a), evidence from Punta Candelero and Rio Tanamá indeed indicate its continued use at this time, at least in some

locations since it is absent in Paso del Indio and Punta Guayanés. As previously indicated, these pieces tend to present a faceted ablation on one or more of their margins, as well as percussion marks on their broadly convex edges or angular projections.

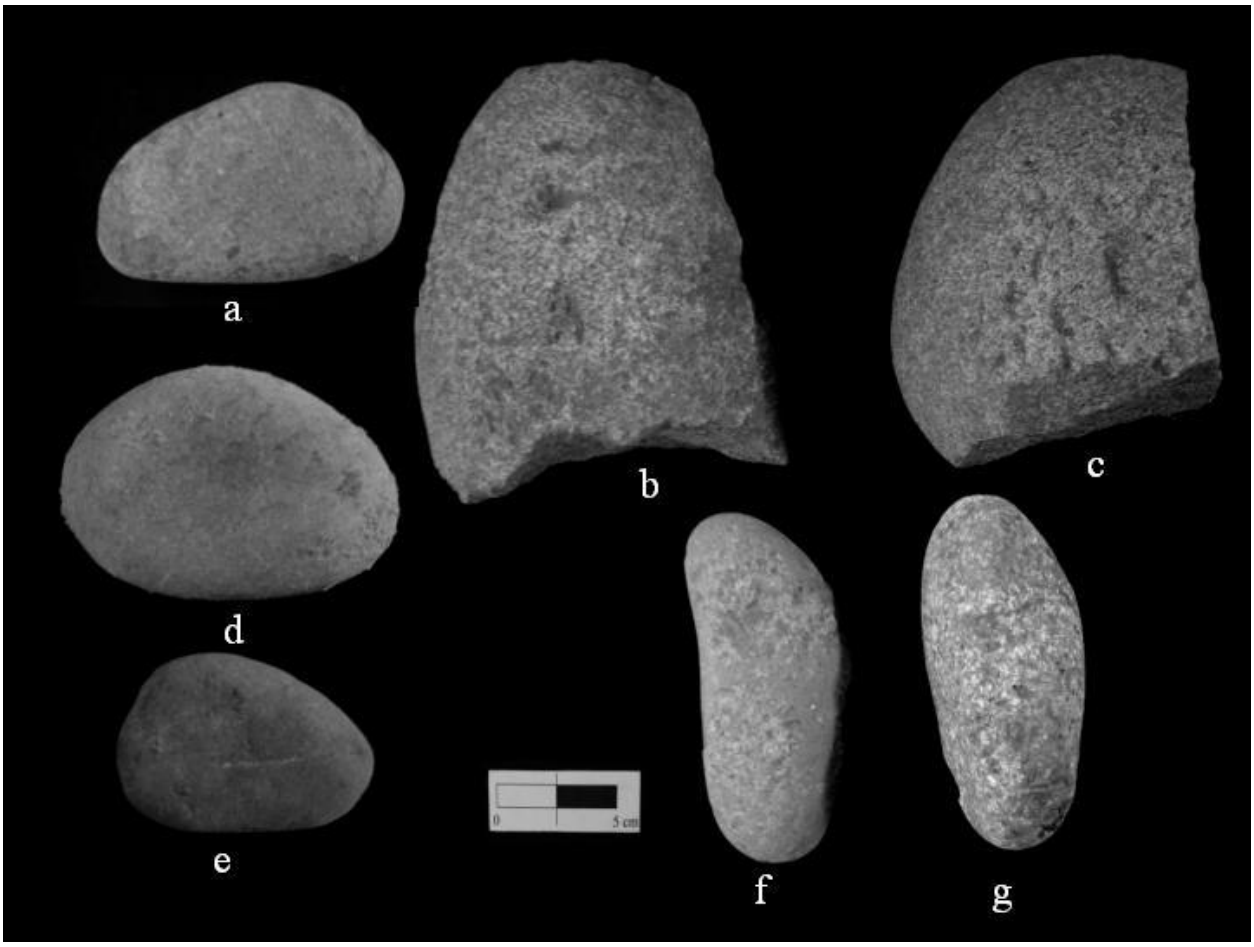

Figure 6-13. Use-modified materials from Punta Candelero and Rio Tanamá. (a) edge-ground cobble, Rio Tanamá; (d-e) edge-ground cobbles, Punta Candelero; (b-c) nuttingstones, Rio Tanamá; (f-g) edge-battered stones, Rio Tanamá.

As was the case in Pre-Arawak and LH contexts, the starch grain analyses conducted by Pagán Jiménez (2006a, 2006b) on edge-ground cobbles from Punta Candelero (Figure 6-13d-e) and Rio Tanamá (Figure 6-13a) indicate their use in the processing of maize and zamia. Interestingly, these were the two products that were also observed in the microflakes from Punta Candelero. This shows the use of different types of implements for the processing of a similar

array of foodstuffs, perhaps reflecting the confection of different recipes or the melding of distinct culinary traditions at some of these contexts.

In addition to the edge-ground cobbles, these sites continue to present a highly variable assortment of what seem to be food (grain and/or tuber) processing tools. These include end-pitted stones, mortars, metates, nuttingstones (Figure 6-13b-c), grinding slabs, and other subtypes of grinding implements including the edge-battered cobbles (Figure 6-13f-g). Pagán Jiménez's (2006b) study of edge-battered cobbles, which were originally documented in Pre-Arawak contexts, indicated its use in the processing of beans and maize. The battering wear observed in this type of item contrasts with the ground facet noted in edge-ground cobbles, which perhaps is indicative of their use in the confection of flour rather than the paste produced with the edge-ground cobbles. Interestingly, one of the maize varieties that Pagán Jiménez (2006b) documented in association to this type of implement is the *maiz Pollo*, which was already introduced and being consumed during Pre-Arawak times and processed with similar kinds of items (Pagán Jiménez et al. 2005).

This again shows the importance of the employment of use-modified implements for food processing during this time. This contrasts with previous indications of the predominance of the use of the manioc-grating tradition for the production of cassava bread brought by the producers of Hacienda Grande pottery as the main culinary emphasis in these sites. In fact, one of the foodstuffs that are absent in the starches documented by Pagán Jiménez's studies is manioc. This type of tuber is not only absent in the microflakes and the use-modified materials but is also absent in the residues obtained from the so-called "manioc-griddles" (Espenshade 2000:14) analyzed from Punta Candelero and Rio Tanamá, which rather had starches of zamia, maize, beans, and sweet potatoes (Pagán Jiménez 2006a, 2006b). This indicates that what was

previously considered as a manioc-grating toolkit consisting of the grater boards and the griddles used in the production of "cassava bread" seems to have had a much more generalized function than originally envisioned.

The evidence for maize in these implements also indicates that its use was not only more important than previously considered but that it was processed in a different fashion to that usually assumed on the basis of the Spanish ethnohistoric record, which indicates that it was supposedly consumed either uncooked in its tender state, baked, or boiled. This evidence indicates that maize was also being processed using some of the culinary traditions already introduced by Pre-Arawak groups, which may have included the production of pastes and flour from this type of grain. The combination of some of these tools previously associated to Pre-Arawak occupations with the production of grater boards might be indicating a plural culinary repertoire that incorporated different traditions, presenting variable emphases in each location. It combines the Cedrosan and LH emphasis on tuber grating, observed most notably in Paso del Indio, with Pre-Arawak culinary techniques that focused on the employment of use-modified materials for production of pastes for their confection in different types of dishes and/or breads (see Rodríguez Ramos 2005b) documented in Punta Candelero and Rio Tanamá. This again may be indicative of the intensity of the interactions that were taking place at the various locations and the disparate degrees of integration of the different traditions observed in each of them.

Pecked and Ground Materials

Celts and adzes

The production of bifacial ground woodworking tools also begins showing substantial changes during this time. The most salient change is noted by the decline in emphasis in the production and use of the plano-convex adze in post-AD 500 contexts that, as previously noted, has been identified as a *fossil directeur* of Cedrosan occupations on the island. Although this

type of implement is ubiquitous in all occupations associated to Hacienda Grande style pottery in Puerto Rico and several of these were also found in Punta Candelero and Paso del Indio in association to Cuevas pottery (Figure 6-14a-b), these were notably absent in Rio Tanamá and Punta Guayanés. These implements are also absent in other sites where Cuevas style pottery was produced such as Collores (Rodríguez López 1983) and Lower Camp (Oliver 1992). The production of this type of implement eventually becomes totally absent from the archaeological record of the island by around A.D. 800. Furthermore, this implement is totally absent in sites contemporaneous with Paso del Indio and Punta Candelero where the production of other types of pottery such as the Pure Ostiones or the Monserrate has been observed. For instance, it has not been documented in the Pure Ostiones context of Tecla 2 (Chanlatte 1976), PO-23 (Krause 1990), or Tierras Nuevas (Dávila Dávila 1979), or in the Monserrate context of the Monserrate site (Roe et al. 1990), or Praderas. This is particularly important because this adze type has been associated with sumptuary activities, as has been noted in Cueva Dolores (Roe 1985) where it was associated with an urn burial within a Cuevas style pot. The variable presence of this artifact type in contemporaneous sites indicates some differences in its ascribed ideological and/or utilitarian emphasis between the inhabitants of these communities and its eventual disappearance indicates a rupture or a reformulation of the practices that promoted its reproduction in earlier contexts.

In tandem with this, there is a marked increase in the production of what I termed petaloid adzes (Rodríguez Ramos 2005a). These adzes are characterized by their teardrop outline and by the offsetting of the tool's centerplane to alter their bit angle, providing them with an asymmetrical cross-section (Figure 6-14c-d). One interesting aspect is that these tools present traits similar to those found in the LH adzes described in Chapter 5, such as the common

presence of straight lateral margins that show a distinct boundary with their bits. These petaloid adzes were present in Punta Guayanés and Rio Tanamá, but were absent in Punta Candelero and Paso del Indio. If this represents an incorporation of the LH style of adze making, then this evidence indicates again its differential levels of integration of technological traditions in some of these contexts.

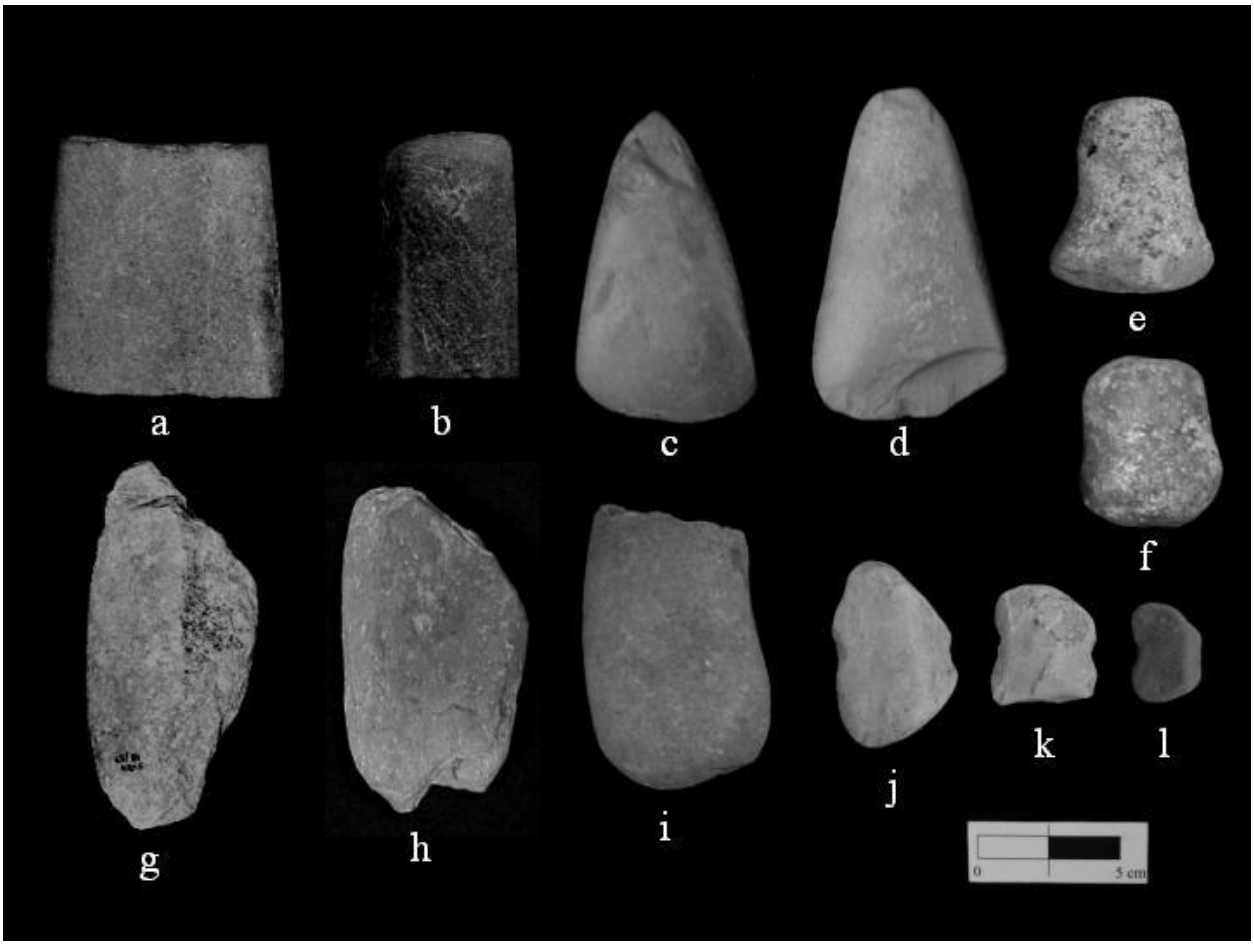

Figure 6-14. Ground tools from Paso del Indio, Rio Tanamá, and Praderas. (a-b) plano-convex adzes, Paso del Indio; (c-d) petaloid adzes, Rio Tanamá; (e) conical mano, Paso del Indio; (f) conical mano, Rio Tanamá; (g) edge-ground biface, La Hueca-Sorcé; (h) edge-ground biface, Paso del Indio; (i) edge-ground biface, Rio Tanamá; (j-l) netweights, Praderas.

In addition to this tool type, there was a continuous production of biconvex celts. However, in contrast to the overall form of those recovered from the Hacienda Grande and LH sites, their lateral margins tend to become more rounded and to present a less drastic boundary

with their bits. Also, these pieces tend to have increasingly finer terminations, putting more emphasis in polishing as a finishing technique, as was already noted in Hacienda Grande contexts. In fact, some of these celts do not present any evidence of use, perhaps indicating their employment for non-utilitarian activities.

With regards to the types of materials that were used for the production of celts and adzes, at this time there is also a decline in emphasis on the import of radiolarian limestone from Saint Martin in comparison to earlier contexts (Knippenberg 2006). This type of raw material was absent in Paso del Indio and Rio Tanamá while being present in Punta Guayanés and Punta Candelero. This might be indicating that some of the communities in the eastern section of Puerto Rico retained some of the trade partnerships with the inhabitants of the Lesser Antilles documented in earlier times that promoted the movement of this type of material to the island. As was the case noted in earlier contexts, there is no evidence for the local reduction of these radiolarian celts in Punta Guayanés or Punta Candelero, which may indicate that they were imported in finished form to those sites.

An interesting fact is the identification of Guatemalan jadeite used for the production of some of the celts documented at this time. The use of jadeite from the Motagua Valley of Guatemala is observed in a small petaloid adze and a biconvex celt fragment from the Pure Ostiones context of Tecla II, as well as in a biconvex celt fragment and in a flake extracted from the use of a jadeite biconvex celt from Rio Tanamá (Harlow 2007). This evidence conclusively indicates that the circulation of jadeite celts and the contacts with the Isthmo-Colombian area were still being registered during this time, as will be underlined again at the end of this Chapter.

Other ground materials

Edge-ground bifaces. As indicated in Chapter 5, the edge-ground biface is one of the types of materials produced exclusively in LH contexts (Figure 6-14g). Interestingly, this type of

implement was unearthed in finished form in Rio Tanamá, Punta Candelero, Paso del Indio, and Punta Guayanés (Figure 6-14h-i). The fact that these were not manufactured locally is indicated by the lack of discarded preforms or any debris associated to their production in any of these locations. Therefore, this could be indicating that LH peoples were still in operation during this period, as was previously suggested, and that they were engaged in exchange relationships from the eastern end of the island to at least its north-central portion.

Netweights. Another type of implement that reappears in later contexts is the netsinker, which was originally introduced by the Pre-Arawak peoples of the island. These implements consisted flat discoid pebbles that were alternately flaked at two opposite extremes in order to isolate notched sections, which were then ground (Figure 6-14j-l). The fact that these items were absent in LH and Hacienda Grande occupations and then reappear in later contexts, particularly in those of the island interior such as Praderas, indicates the later reproduction of, not only the production of this type of implement, but also the net fishing practice that is associated to it from an earlier Pre-Arawak tradition.

Conical manos. Another item that was found in earlier Pre-Arawak contexts that reappears after A.D. 500 is the conical mano. One of these pieces was unearthed from Paso del Indio and another one from Rio Tanamá (Figure 6-14e-f). In both cases, these pieces are made on fossilferous limestone obtained from the surrounding haystack hills and present pecking around their entire circumference to impart them with their conical shape, although their proximal ends are not as conical as those observed in some of the Pre-Arawak specimens found on the island. The convex shape of their use margin indicates their employment in a rocking motion, a trait that is characteristic of this type of artifact. Pagán Jiménez (2006b) conducted starch grain analysis from the conical mano recovered from Rio Tanamá and the only identifiable

residues that he found were of zamia, which was also a foodstuff of great importance in Pre-Arawak contexts. Interestingly, Pagán Jiménez (2006b) argues that this might be indicating that this form tool was being utilized for either the production of medicinal and/or ritual unguents that may be derived from this plant.

Channeled stone. An interesting find was that of a stationary channeled stone in Paso del Indio, an artifact whose production has been documented exclusively in the LH occupations of the island. This piece was produced from a large fossilferous limestone slab, presenting a linear incision with a round bottom that extended across one of its faces. This groove was around 10 mm in width and 6 mm in depth, 42 cm long presenting similar dimensions to the ones obtained from the LH context of La Hueca-Sorcé site, which had an average width of 7 mm and depth of 5 mm.

Beads and pendants. In no other artifact category are the shifts in the system of representation more evident at this time than in the production of personal adornments (Figure 6-15a-q). While in previous LH and Hacienda Grande contexts a great amount of the materials was imported from extralocal sources, many of them located outside the island, now there is an emphasis in the production of wearable art over locally available materials. The highly colorful and shiny materials that were previously circulated such as aventurine, citrine, nephrite, and turquoise, among others, declined in importance, while at this time in two main types of materials were employed: diorite and calcite/quartz crystals. This emphasis is evident in the four sites under discussion, where no materials from outside the island were used in bead production.

Another major change witnessed during this time is the marked decline in the production of zoomorphic lithic pendants. Now, the system of representation emphasized the production of beads and pendants of generic geometric forms, including the barrel, tubular, discoid, and

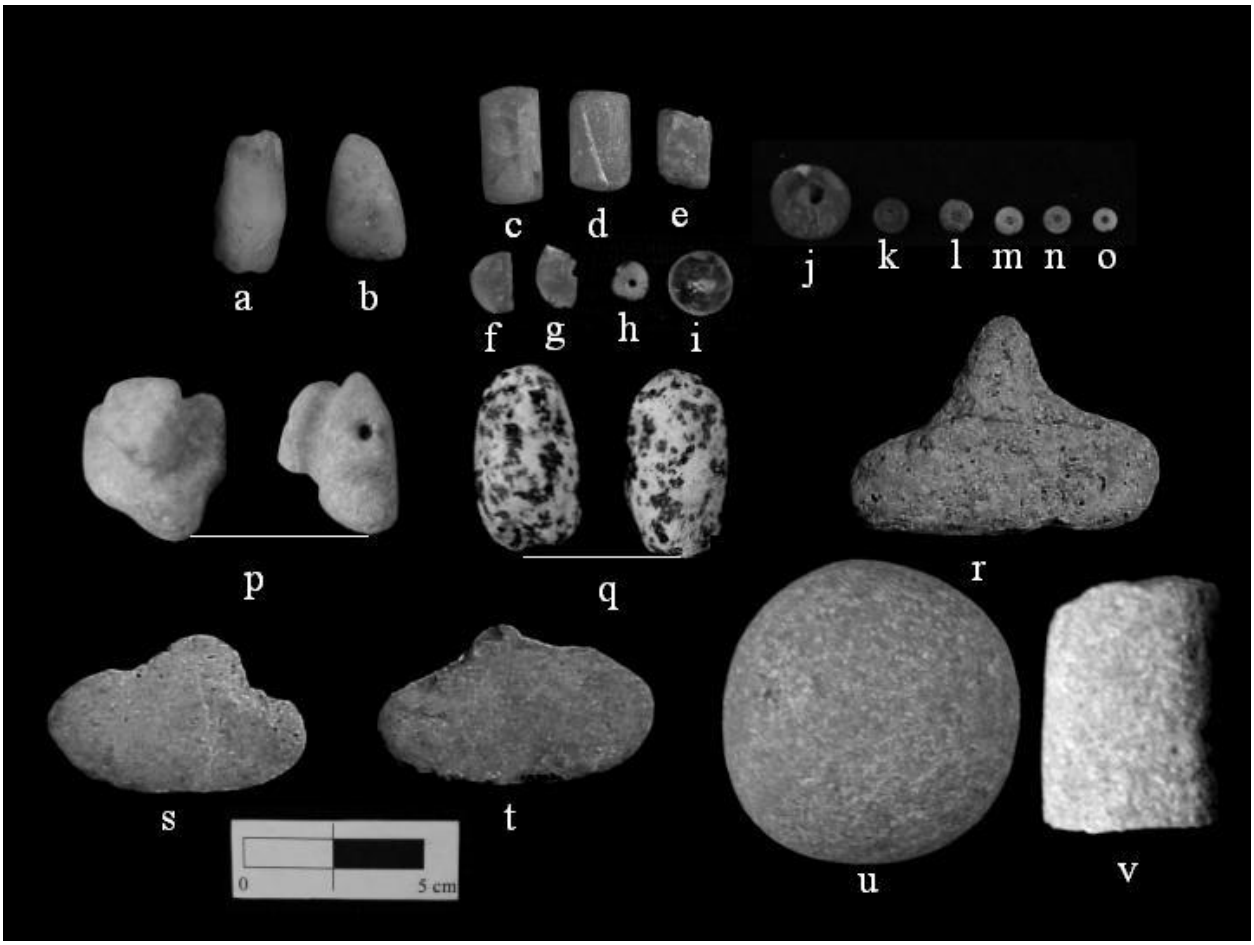

Figure 6-15. Other ground materials from Paso del Indio and Rio Tanamá. (a-b) bead blanks, Paso del Indio; (c-i) bead preforms, Paso del Indio; (j-o) finished beads, Punta Candelero; (p) dacite squatted pendant preform, Rio Tanamá; (q) diorite squatted pendant preform, Rio Tanamá; (r) ground three-dimensional cemí, Paso del Indio; (s-t) bidimensional cemíes, Paso del Indio; (u) stone sphere, Rio Tanamá; (v) possible stone belt fragment, Rio Tanamá.

biconical shapes. In most cases, these beads and pendants were produced with little or no additions of secondary elements such as incisions or engravings. The decline in the production of zoomorphic pendants definitely indicates marked shifts in the systems of representation in the island that promoted the manufacture of such figurative beads and pendants in earlier times.

Although the import of shiny and colorful materials from outside the island for the production of beads and pendants registered a marked decline, these personal adornments continued to be highly traded commodities within the island. Interestingly, while some sites bear

evidence of the production of some of these items others only have evidence of their consumption. This circulation of beads and pendants made of locally available materials is reflected, for instance, in the production of calcite and diorite personal adornments. While in Paso del Indio and Rio Tanamá there is evidence for the production of discoidal and tubular beads made out of locally available calcite as shown by the presence of blanks (Figure 6-15a-b) and discarded preforms (Figure 6-15c-i), in Punta Candelero there are only finished items of this raw material which is not locally available (Figure 6-15j-o). These inter-site differences may indicate the movement of finished beads and pendants from communities located near the raw materials sources in the north-central portion of the island to the contexts of consumption, perhaps in exchange of edge-ground bifaces or any other type of implement produced in the eastern part of Puerto Rico (most notably in the LH context of Punta Candelero).

This circulation of beads and pendants made of locally available materials is further illustrated by the presence of the squatted pendant in the sites of Punta Candelero and Punta Guayanés. In each of those locations, this type of anthropomorphic carving is found in finished form and made over dacite, a raw material not locally available. Interestingly, the occurrence of this raw material is also associated to the karst formations located around Rio Tanamá, where evidence of its production has been observed (Figure 6-15p). A preform of this type of pendant made out of locally available diorite was also found in Rio Tanamá (Figure 6-15q), which could be indicating again a case in which these personal adornments were being moved between communities, perhaps in tandem with new sets of mythical narratives and other types of information.

Stone spheres. The representation of Pre-Arawak traditions in these later contexts seems to have been observed in the superstructural domain as well, as is evidenced by the finding of a

stone sphere at Rio Tanamá (Figure 6-15u), a type of artifact that is usually associated with a ritual function in Pre-Arawak societies. Stone spheres are registered later in time in many contexts throughout the island and in other sites in the Greater Antilles (e.g., Île à Rat, Keegan 2007 personal communication), reflecting the persistence of this Pre-Arawak sumptuary element through millennia.

Three-pointed cemíes. As previously noted, the producers of Hacienda Grande pottery also used small three-pointed items made of shell and stone. The discovery of three-pointers in Hacienda Grande contexts is particularly important because these have been used as the primary indicators for the insular objectification of the religious practice of *Cemiísmo* that was supposedly brought by the Cedrosans from their ancestral homeland. However, the absence of three-pointed artifacts in any form in northeastern South America and the presence of the two aforementioned proto-*cemíes* in Puerto Ferro might be indicating that its origins should be looked for in the Pre-Arawak groups rather than the Hacienda Grande or any other manifestation of the Cedrosan Saladoid subseries, as was previously suggested by Crock (2000:246). Although the evidence for this is obviously too limited at the moment, this possibility should be considered in detail as it could be expressing yet another instance of the integration of some of the practices of Pre-Arawak groups in the ideological repertoire of the later immigrants to the island. This could also serve to explain Rouse's (1992:46-47) indication that the production of these three-pointed items followed a "Circum-Caribbean route" that, as noted in Chapter 4, is one of the trajectories followed by some of the Pre-Arawak societies that migrated to the Greater Antilles (see also Veloz Maggiolo and Angulo Valdés 1982).

Although three-pointers are rather common in early Cedrosan sites, these become much less common. For instance, in none of the four sites under discussion have any of these types of

items been found in association to Cuevas style pottery. These were not found either in other sites that present Cuevas pottery such as Collores (Rodríguez López 1983), Lower Camp (Oliver 1992), Cuevas (Rouse 1952), or La Mina (Rodríguez Ramos 2006). However, at Paso del Indio the cultural stratum that overlaid the Cuevas component, which was composed of Pure Ostiones pottery and is contemporaneous with the Cuevas component of Punta Candelero and Punta Guayanés, presented four of these items. Three of these items were coarsely made bi-dimensional three-pointers, in which their workmanship was mostly concentrated on the delimitation of their conoid projections leaving the rest of the piece in its natural form (Figure 6-15s-t). The raw material employed for their manufacture was exclusively fossilferous limestone, which is available in the immediate vicinity of the site. These three-pointers were not ground, thus remaining at the coarse level of termination. Three-pointers also lack the basal concavity commonly observed in more elaborated pieces. This lack work in their basal section makes unlikely that these cemíes were produced to be stood over a surface. In fact, these bi-dimensional three-pointers seem to be quite expedient items, probably manufactured to add superstructural meaning to a certain space or feature. Walker (1985b:G12-13) has observed the production of similar items at El Bronce, and noted that one of these was placed into a posthole soon after its manufacture. I have recreated some of these three-pointers in just a couple of minutes, which shows the expedient character of their manufacture and indicates that these were probably done for their immediate use.

The other kind of trigonolith found at Paso del Indio was a three-dimensional cemí (Figure 6-15r). It was rather small and presented a ground termination. It was made on the locally available calcarenite, a material that may also be obtained from the karst formations surrounding

the site. In contrast to the other three-pointers, this piece presented a basal concavity formed by pecking.

Stone collars. An interesting case is the finding of what seems to be a stone collar fragment in the Cuevas/Pure Ostiones context of Rio Tanamá (Figure 6-15v). This piece was rather coarse, presenting peripheral pecking that was not evened by grinding. It was classified as a collar fragment due to its curvature, which seems to correspond to an undecorated shoulder panel of what Fewkes (1907:163-167) calls a "slender collar." Unfortunately, the small size of this piece and its coarseness makes its attribution to a stone collar tentative, particularly when this type of artifact has not been found in association with such an early context (cal. AD 440-850) on the island. However, the possible production of this type of artifact during this period should not be discarded *a priori*, particularly when taking into consideration that Yvonne Narganes (2007, personal communication) has also documented a similar piece, although thicker, from the Hacienda Grande of La Hueca-Sorcé. Additional stone collar fragments have also been documented in other sites where Monserrate, Pure Ostiones, or Santa Elena pottery has been uncovered. For example, they have been found in Tibes (Walker 1993), Cagüitas (Pérez 2007), and Tierras Nuevas (Dávila Dávila 1979). The finding of stone collars in these sites indicates that this type of artifact was being produced much earlier than A.D. 1200, in contrast to Rouse's (1992:116) argument that the precolonial inhabitants of the island began to be "use ball belts of stone during period IVa." It should be noted though that the limited available evidence of stone collars recovered from archaeological excavations indicates that the ones produced during this time lack decoration and are rather coarse in comparison to the ones produced later, as will be discussed below. If corroborated, the finding of stone collars in Rio Tanamá and La Hueca-Sorcé may also indicate that the common correlation between these prestige enhancing

commodities and the ballgame as denoted by the construction of *bateyes* (stone enclosures) is unwarranted, as some of the earliest collars are found in sites where no monumental architecture has been unearthed (Walker 1993).

The Lithic Evidence: Some Final Remarks

The previously discussed lithic evidence shows the complex web of interactions between the people of the island after A.D. 500. It not only shows variations in the types of raw materials that were being consumed at the sites, even in those located in close proximity to each other, but also the variable merging of the distinct traditions of lithic making documented in previous Pre-Arawak, LH, and Hacienda Grande contexts of the island. This differential articulation of technological traditions signals the uneven degrees of interaction that were taking place at this critical time between the groups that inhabited the island, even in cases where the same pottery style was being produced. These interactions also involved the movement of some products from the center of the island to the east (e.g., calcite and dacite beads and pendants) while others were moving in the opposite direction (e.g., edge ground bifaces). Other products produced on the western end of the island moved to its center as well as to its extreme eastern portion (e.g., chert parallel flakes). This shows that these inter-societal engagements were not only highly varied but also multidirectional, involving peoples of different ethnic and social backgrounds.

This evidence also shows that the ideological and economic structures that promoted the movement of shiny personal adornments to the island in previous times began to decline in importance in most communities after A.D. 500. In tandem with this, the local procurement landscapes became much more important, not only in the production of flakes and celts, but also in the manufacture of personal adornments and other sumptuary materials such as three-pointers and stone spheres. The use of materials such as limestone and calcite obtained from the karstic hills (i.e., *mogotes*) became increasingly sought after, thus denoting more emphasis on such

procurement landscape. Also, the rivers increased in importance as an exploited space since they provided the diorites used in bead production, the angular cobbles used in core-flake reduction, as well as some of the materials used for making celts and adzes. This shows that the changes that were taking place after A.D. 500 crosscut the different lithic subsystems and impacted the production of both utilitarian and sumptuary goods. This emphasis in the local raw materials indicates a shift in the significance that was given to the extraneous character and the colorful and shiny nature of rocks within most communities in previous times, which seems to indicate profound changes in the ideological structures that promoted their circulation.

This focus on the local in lithic production, however, does not mean that the exterior contacts completely ceased in importance. Rather, I think that these shifts reflect a change in emphasis from the movement of lithic raw materials and shiny personal adornments to the circulation of other types of items, perhaps presenting more focus on wooden and/or fiber commodities. This might explain the concomitant changes in the technological repertoires noted in the Lesser Antilles, where also the formats of lithic making present similar shifts during this time (Allaire 1985; Hofman and Hoogland 2004; Knippenberg 2006). As will be shown at the end of this chapter, the movement of wooden implements became increasingly important not only in the Antilles but also in the Isthmo-Colombian area as well, which may be the reason for the continued emphasis on the import of woodworking tools (i.e., jadeite celts) from that area.

The changes noted in some of these contexts also signal the varying degrees of integration of the technological styles of lithic making noted in previous times. For instance, Punta Guayanés and Rio Tanamá presented a marked emphasis in the production of flakes of locally available materials using the parallel flaking format noted in Pre-Arawak loci, while others such as Punta Candelero and Paso del Indio still focused on the import of isotropic materials for their

bipolar reduction as was noted in LH and Cedrosan contexts. This differential emphasis between communities in the various lithic traditions is also noted in the culinary repertoire used in the different locations. For instance, while in Paso del Indio the emphasis resided on the production of microflakes for their employment for grating foodstuffs, in Rio Tanamá, Punta Candelero, and Punta Guayanés a substantial amount of use-modified materials similar to those found in Pre-Arawak contexts was put to use. The continuous enactment of Pre-Arawak traditions at this time is also noted in some locations by the presence of other highly conservative technologies such as those of fishing (denoted by the use of netweights) and other superstructural elements (e.g., stone spheres and probably the three-pointers). Even the focus in some sites on the consumption of marine products could also represent the continuity of Pre-Arawak subsistence practices (Chanlatte and Narganes 1990; Keegan 2006; Rainey 1940). This lithic evidence shows that most of the technological and culinary styles of Pre-Arawak societies continued to be reproduced until much later times, at least in some communities. In fact, if the pottery is taken away in some sites dating after A.D. 500, the remaining lithic and dietary assemblage would be indistinguishable from that of a Pre-Arawak context. This again shows the possibility that some of these contexts might indeed be reflecting the development of Pre-Arawak societies resulting from endogenous and exogenous processes.

This coeval enactment of distinct ancestral traditions within and between locations signals the fact that this period is characterized by high degrees of interaction and negotiations in what was very likely a context characterized by ethnic and social plurality rather than by the homogeneity that is assumed in Rouse' (1992) model. The interassemblage differences that are observed in the core-flake, use-modified, and pecked-ground spectrums between neighboring sites that have a similar raw material base and are contemporaneous is particularly illustrative of

these variable negotiations of distinct ancestral traditions in each of those locations when considering the conservative nature of lithic production practices, as was indicated in Chapter 1. This horizontal variability is also noted in other conservative aspects such as community plans, dietary preferences, culinary practices, and the presence of sumptuary paraphernalia even between contexts that share the same pottery style. This demonstrates how the emphasis in pottery as the primary element of material culture for defining people's identities blurs the variability of many other features that are as significant or even more important for eliciting the configuration of the cultural and social landscapes of the island at any point in time.

The combination of some of these traditions and/or pottery styles within some of these sites also indicates the possibility of the articulation of multiethnic communities, as has been suggested in other areas such as the southeast (e.g., Pauketat 2003). Perhaps, the articulation of these plural loci could explain the hybrid nature of the pottery assemblage and the multiple culinary traditions noted at Rio Tanamá as well as the myriad of burial protocols registered in Maisabel, where people were interred in extended, bundle, flexed, and residual forms (see Siegel 1992), which reflects the enactment of different practices for the disposition of the dead within a single location. This could also explain the reasons for the interment in a singular location of people with the LH tradition of tabular-oblique cranial deformation in the same burial spaces as others that lack such form of bodily modification, as is the case in Punta Candelero (see below). The configuration of plural communities might have an antecedent in La Hueca-Sorcé where, as noted in the previous chapter, peoples were reifying their differences by enacting LH and Hacienda Grande traditions in the same location for at least half a millennium. This cultural and social plurality within and between communities should be assumed as a key element when

interpreting other types of evidence because if not we will not be able to envisage the complexity of our precolonial landscape, examples of which will be provided below.

Public Display of Difference and Power

In addition to the changes noted in the lithic realm, the period after A.D. 500 also witnesses the reflection of two important developments in the island: the installation of rock enclosures and the practice cranial deformation. Previous studies on these two elements have commonly been erected on the basis of Rouse's unilineal evolution of the Cedrosans into the Ostionoid. However, as will be shown below, these two cases serve as good examples of the misinterpretations that might result from not taking into account the cultural and social plurality in existence on the island at this time.

The Embodiment of Difference: The Onset of Cranial Deformation

In tandem with some of the changes that were observed starting around A.D. 500, there were other shifts in the systems of representation noted in the island. The most marked change comprises the appearance of the practice of tabular-oblique fronto-occipital cranial deformation. Previous studies on this practice had assumed that it had entered the island with the Cedrosan immigrants and that its reflection in later contexts was basically an eventual reflection of its long-term reproduction. For instance, Rouse (1992:61) argues that this form of bodily modification, while being absent in previous Pre-Arawak groups, is "characteristic of the Taino and their ancestors." On the basis of the work in Maisabel, Budinoff (1991:123, cited in Crespo Torres 2000:222) indicates that "Another continuity is that fronto-occipital cranial deformation was practiced during the Saladoid, terminal Saladoid, and Ostionoid occupations" and further contended that "Inference based upon dental pathologies and cranial deformation observed in the Maisabel skeletal sample support the notion that there was an *in situ* development from Saladoid to the Ostionoid occupations in Puerto Rico."

However, a review of the evidence presented from Maisabel conducted by Crespo Torres (2000) showed that no intentionally deformed cranium was associated with the Hacienda Grande occupation of that site. The earliest modified crania were rather associated to the later Cuevas component. In fact, thus far there is no evidence in Puerto Rico or the Lesser Antilles for the practice of cranial deformation in association to Hacienda Grande sites or any other early Cedrosan context nor is it evident in northeastern South America at the time when these groups supposedly migrated into the Antilles. The only early evidence for this practice in the Lesser Antilles comes from the Morel site, but it was observed in a female that was interred with a necklace of beads indistinguishable from those documented in the LH manifestation, which led Durand and Petijean Roget (1991) to associate this interment with that cultural complex.

Interestingly, Crespo Torres (2000) documented this practice in Punta Candelero in a total of 13 individuals (including males, females, and subadults) in a context associated to Cuevas style pottery, as was the case in Maisabel. Taking into consideration the absence of this practice in early Hacienda Grande interments, its presence in the aforementioned burial associated to LH personal adornments, and the representation of deformed human heads clasped in the claws of the LH avian pendants, Crespo Torres (2000, 2005; see also Durand and Petijean Roget 1991) has argued that this practice was indeed introduced to the Antilles by the LH peoples rather than the Cedrosans and that it was registered later in time because of the eventual integration of these peoples in some locations. As will be noted in the last section of this Chapter, this hypothesis is further substantiated when taking into consideration that the only surrounding continental region in which this tradition is present is the Isthmo-Colombian area, the main area of influence for the configuration of the LH manifestation.

If the practice of this form of cranial deformation represented some form of ethnic and/or hierarchical identity, then its reproduction in later contexts indicates the continued use of this emblem of difference until much later times. In fact, the presence of individuals with deformed heads was one of the most salient features recorded by the Spaniards upon the arrival to the Greater Antilles. This practice was not only documented in Puerto Rico, but was also observed in Hispaniola, the Bahamas, and Cuba. Although the specific meaning of this practice might have shifted through time and space, its continuous reproduction indicates the persistence of an important tradition until "Taíno" times that cannot be traced to their supposed "ancestors." The fact that it was represented after A.D. 500 in Puerto Rico, while being absent previously, might also be denoting a change in the mortuary practices observed in the LH tradition in which no burial has been recovered thus far in earlier contexts, as indicated in Chapter 5. Although the particular reasons for such change are not clear at the moment, the mere consideration that this practice does not reflect an *in situ* development of a Cedrosan tradition opens the door for exploring it from a completely different perspective focusing on the ideological and/or social reasons for its continued reproduction in certain individuals through time.

Lithifying the Landscape: The Installation of Rock Enclosures

Another important development observed in Puerto Rico at this time is the installation of integrative facilities lined with erected macroliths and/or cobble pavements, commonly referred to as *bateyes*. The earliest dates for this type of architectural feature have been obtained from the Las Flores site located in south-central Puerto Rico, whose construction started sometime between A.D. 580 and 700 (Wilson 1991:145, citing the work of Juan José Ortiz Aguilú).

It has commonly been assumed that these rock enclosures are formalized delimitations of the earlier central clearings encircled by mounded middens in the concentric Saladoid villages (e.g., Allaire 1999; Curet et al. 2006; Siegel 1993). For instance, Oliver (2005b:260) argued that

the organization of these precincts "reflects ideas that originated in the early Saladoid semicircular coastal settlements, where families resided around a communal space in which their buried ancestors came together." Roe (2005:292) further adds that this reflects "the retention and elaboration of cultural traits and institutions from the ancestral jungles of Guiana-Amazonia."

The arguments regarding the reasons for the advent of this architectural development have been varied. For instance, Siegel (1992:414) understands that the replacement of central cleared spaces in Cedrosan Saladoid villages with formally constructed " ballcourts or ceremonial plazas" indicates the consolidation of power of the "individual (and his family) who presides over them," on the basis of the physical model of the universe derived from the ancestral Cedrosan Saladoid community plan. Others such as Curet et al. (2006:24) also assumed that these reflect an internal transformation of physical layout of the community from a previous Cedrosan Saladoid template due to "changes in intangible social, cultural, and political institutions" in association with the transition from an egalitarian to a stratified society, legitimized in part by the institutionalization of power within the community. Curet and Oliver (1998) argued these changes entailed a shift from a kin-based corporate system where there was a communal right over space and ideology to a formalized lineage based elite that now had control over those resources.

Irrespective of the different positions regarding the reasons for the onset of the construction of these architectural features, it has commonly been assumed that the "settlement plans in the Saladoid period laid the foundation for the development of batey ceremonialism" (Espenshade and Siegel 2007:14). This formalized development of the Cedrosan Saladoid space has almost universally been envisioned to be due to endogenous processes of social change.

However, when considering the possibility that multiple peoples, probably of distinct ethnic backgrounds, were operating in the island at the same time, then other reasons for the start of the construction of such *bateyes* in the island need to be considered. For instance, it could be argued that the start of the construction of at least some of these enclosures, instead of reflecting the "replacement of 'ancestral grounds' with monumental structures" (Curet et al. 2006:36), could indeed be indicating the installation of an architectural representation of discourse of domination of a competing social aggregate that had an alternative perspective of social space that occupied the communities where these were erected. This possibility is particularly feasible when considering the increasingly competitive, in some cases hostile, social landscape existing in the island at that time (Siegel 2004). This could be the case in Tibes, where two of the earliest enclosures were built over burial clusters associated with Cuevas style of pottery, although the ceramics associated to their construction were of the Monserrate style (Curet et al. 2006; González Colón 1984). In fact, in none of the sites where these stone enclosures were built over previous Saladoid spaces has the pottery associated to their construction been of any of the styles of that subseries. This is the case of Las Flores (Wilson 1991, citing Juan José Ortiz Aguilú) and Tierras Nuevas (Dávila Dávila 1979), where pottery associated to the construction of the enclosure over Cuevas deposits has been associated with the Pure Ostiones style.

When taking into consideration the existence of a culturally plural context in which pottery styles such as the Cuevas and the Pure Ostiones had independent origins and in which both of these styles were also contemporaneous in their later phases with others such as Monserrate and Santa Elena, then this other possible scenario needs to be considered in more detail as some of these enclosures could be reflecting a territorial expression of domination rather than evolution. The installation of architectural features as metaphors of dominance has been documented

worldwide, one of the most popular being the construction of the Spanish cathedral over the Templo Mayor in Mexico City (Fagan 1997). Furthermore, Curet et al. (2006) noted that after the construction of the enclosures in Tibes over the burial clusters, none of the later interments were located in such spaces but rather outside of them. This definitely could be read more like a rupture rather than a continuation in the mortuary practices in this site.

This idea is further substantiated by the fact that almost none of the major late Cedrosan sites that have a concentric community plan present evidence for the installation of stone enclosures. This is the case of sites such as La Hueca-Sorcé, Punta Candelero, Tecla, La Gallera, La Mina, Monserrate, and Maisabel, among others. This definitely weakens the argument for these enclosures being the monumentalization of the community plan introduced by the producers of Hacienda Grande pottery to the island, especially when taking into consideration the absence of their construction in the Lesser Antilles where a considerable number of concentric settlements have been documented (e.g., Trants, Indian Creek, Pearls). Furthermore, some of these concentric sites continued to be inhabited for at least half a millennium after the start of the construction of stone enclosures was registered in the island (e.g., Maisabel, Monserrate, La Hueca-Sorcé). The continuous inhabitation of concentric sites at the same time as others that contained stone-lined precincts and others that presented totally different layouts indicates again the plural ways in which people were articulating their communities and their social landscapes. Within this plural scenario, the construction of these stone enclosures might have initially served to objectify the alternative ideological discourses that were being produced by the emerging elite agents or social aggregates in different locations, who promoted their installation for reifying their difference from those inhabiting concentric settlements. In fact, the earliest *bateyes* that were built in Puerto Rico, rather than to adhering to the circular pattern of

the Cedrosan villages, were actually of a square shape. This again might represent an alternative notion of the geometric configuration of social space to that of represented in the round "plazas" of concentric settlements.

At any rate, when the start of this form of space domestication is rethought, taking into consideration that its articulation was embedded within a culturally plural scenario rather than by a single people reproducing itself in increasingly complex ways, then it becomes evident that more attention needs to be paid to alternative scenarios for the development of the only form of monumental architecture in the Antilles. Moreover, as will be noted at the end of this chapter, the fact that this type of architectural tradition is absent in northeastern South America and in the Lesser Antilles demands us to expand our scale of the possible areas from which it might have been derived. The available evidence indicates a marked correspondence of this type of feature with those of the Isthmo-Colombian area that need to be considered further when making interpretations about its origins and of the possible ideological narratives attached to its construction.

The A.D. 1000-1100 Event and the Intensification of Regional Political Integration

Around A.D. 1000 - 1100, there were marked climatic changes in Puerto Rico and the rest of the Antilles. In the north-central part of the island these are particularly reflected at the Paso del Indio site, where the alluvial stratigraphy indicates the onset of a system dominated by recurrent overbank depositions that led to quick floodplain aggradation (Clark et al. 2003). In less than a century, in what was previously an alluvial valley dominated by consistent deposition rates, more than 1 m of sediment was suddenly accumulated. This was the product of a continuous sequence of storms that led to several major flood events that resulted in a drastic vertical accretion of coarse-grained sediments at the site that stopped sometime around cal. A.D. 1100 (Clark et al. 2003; Rodríguez Ramos 2003a).

The climatic changes evidenced through these increments in sediment accumulation at Paso del Indio are indicative of atmospheric shifts that were taking place at this time, which covered a much wider geographical scale. For example, Nyberg et al. (2001) have documented increasingly humid conditions and precipitation rates in Puerto Rico around A.D. 1000 on the basis of lithological data from the southern and western parts of the island. This indicates that this atmospheric shift was registered all around Puerto Rico. These changes are also reflected to the west of Puerto Rico. Hodell et al. (1991) and Higuera Gundy et al.'s (1999) studies on ostracods and lake level indicators from Lake Miragoane in Haiti show that at the end of what was previously a drastically dry period registered in the Greater Caribbean (AD 800-1000), there was an onset of wetter conditions that may have triggered the storms noted at Paso del Indio. These atmospheric shifts have also been documented to the east of Puerto Rico. For instance, recent studies conducted by Beets et al. (2006:277) in Anse à la Gourde in Guadeloupe have shown the presence of "significant changes" taking place between A.D. 1000 and 1100, in which wetter conditions promoted the reoccupation of the site after that time.

The available data from Puerto Rico indicates that such climatic alterations led to the drastic floods in Paso del Indio and might have stimulated the intensification of some of the social processes that were taking place in earlier times. As is the case in other contexts where natural disasters have been registered, these types of events commonly result in social reorganization as new strategies were needed for coping with the new conditions brought about them (Oliver-Smith 1996; Torrence and Grattan 2002). In some cases, these provoke the destruction of communities, agricultural plots, and thus result in increases in mortality rates. This is particularly the case in Paso del Indio, where the aforementioned events led to the truncation of the layer formed sometime between A.D. 850 and 1000, which comprised a

community whose inhabitants were producing pottery of the Pure Ostiones style. The erosional stripping of the A horizon of this lithostratigraphic unit and its unconformable replacement with gravel sized sediments indicates the drastic effects that these flood events had on the community that inhabited this site at this time. Around A.D. 1000, the site was reoccupied or invaded by a group of people that produced completely different types of pottery, this time of the Elenan and Modified Ostiones styles, as well as a much more elaborated ritual paraphernalia. Interestingly, at this time the site evidences a markedly high incidence of burials, totaling 138 at the site. According to Crespo Torres (2000:189-190), these burials have a high rate of indicators of nutritional stress such as enamel hypoplasia, osteomelitis, porotic hyperostosis, and cribra orbitalia, among others. This indicates that the severe floods documented at the site and its derived environmental changes had the effect of altering the food supply available in this area, which may have promoted other rather rapid social changes at the local and regional levels. Interestingly, it is shortly after this same time (around A.D. 1200) that the Maisabel site (located downriver from Paso del Indio) was abandoned (Siegel et al. 2005), perhaps as an eventual result of these drastic events.

The punctuated changes noted at Paso del Indio serve as a microcosm of the impact that these climatic perturbations may have had on the cultural and social landscapes of Puerto Rico. These atmospheric disturbances may have provided a fertile ground for the vertical accommodation of certain individuals or social factions within and/or between communities. This is often noted in situations of social vulnerability, where particular agents or social aggregates negotiate alternative practices for the management of ideological and/or subsistence resources that may have resulted from the crisis in faith or the depletion of critical sources of food that result from such situations of environmental stress. The further political consolidation

of these individuals or social aggregates might eventually result in higher degrees of institutionalized asymmetry within autonomous social collectivities (e.g., Anderson et al. 1995; Arnold 1992). In fact, around this time the formal indicators of social asymmetry within locations are most clearly observed and when a more notable "realignment of the social and political landscape of the island" (Curet 2003:14) is registered. This for instance is documented by the presence of several interments with grave offerings such as decorated pots, shell beads, and lithics in a limited number of individuals at the Paso del Indio site. The consolidation of power by some individuals or social factions is also observed at this time in other sites such as Tibes (Curet et al. 2006) where between A.D. 1000 and 1200 there was a "major phase of spatial rearrangement of the site." This included the refurbishing of some stone enclosures and the constructions of others, which also happened in tandem with the increased evidence of other markers of social asymmetry such as the production of stone belts (Walker 1993) and the manufacture of other pottery manifestations, most notably of the Santa Elena style. Curet et al. (2006:34) associate this to the "consolidation of power in the process of political centralization" that served to organize the labor necessary for such monumental and quick paced constructions. These transformations in the political sphere are not only observed in Puerto Rico but also in the Lesser Antilles as well (Crock 2000; de Waal 2006; Hofman and Hoogland 2004; Petersen et al. 2004).

It is around this time that other types of pottery begin to be produced in the island in tandem with the others that were still being manufactured until much later times than previously supposed. These new styles of pottery are called Capá and the Esperanza, both of which were attributed by Rouse (1992) to the Chican Ostionoid subseries. For him, these are the regional manifestations of the "Taino ethnic subgroup" (Rouse 1992:135) in the western and eastern parts

of the island respectively. The available dates for these two styles of pottery indicate that they started to be produced between A.D. 1000 and 1100, which roughly correspond to Rouse's temporal estimations. One issue that becomes evident when looking at the temporality observed in sites where both of these styles are mixed versus those that present either style in isolation is their seemingly rapid mixture and spread across the island (Figure 6-16). Unfortunately, at this point the directionality of such spread is not clear since the earliest dates for both styles come from contexts where both are present, which again are mostly located in the north-central portion of Puerto Rico.

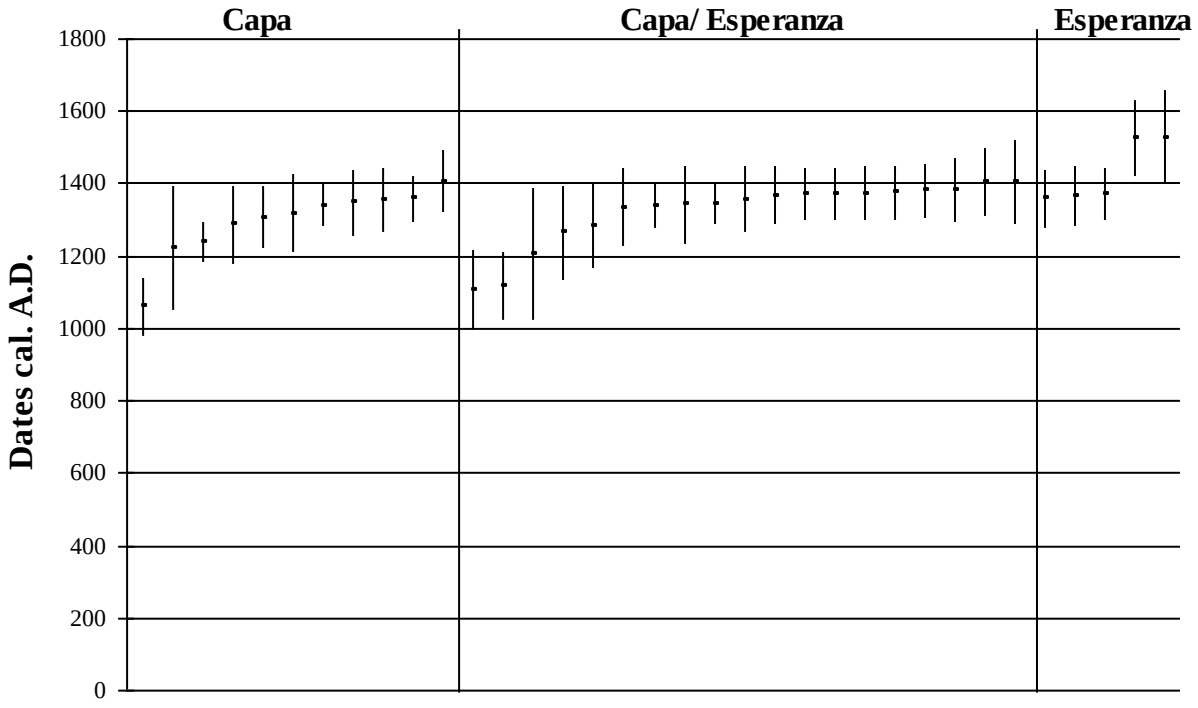

Figure 6-16. Calibrated 2σ ranges of radiocarbon dates associated to Capá and Esperanza pottery.

Interestingly enough, this is the area where most evidence for early pottery in association to Pre-Arawak assemblages has been uncovered (Rodríguez Ramos et al. 2008a). This, coupled with the fact that some of the motifs represented in these pottery styles such as the Capá eye and

the point-ended lineal incisions were initially documented in the Pre-Arawak pottery from sites such as Paso del Indio (Figure 4-11; Rodríguez Ramos 2008a), Angostura (Ayes Suarez 1989), and Palmar de Animas (Siegel and Joseph 1993), again indicates the continued recurrence to Pre-Arawak elements in the later cultural manifestations identified in the island. The reproduction of this Pre-Arawak grammar in pottery decoration could be indicating the more intense emphasis in recurring to such symbols from old times in order to justify ancestral authority. Perhaps this was one of the ideological practices used by political and/or religious elites to accommodate themselves in the context of the new set of circumstances registered in the island at this time (Sassaman 2005).

This reproduction of Pre-Arawak features is not only observed as decorative modes in pottery, but also in the location of some of the settlements. For instance, some of the major sites that were inhabited in these late times such as Paso del Indio and Los Indios were situated over landscapes that began to be humanized during Pre-Arawak times. The redundancy in the location of late settlements over previously humanized grounds and their probable use as landscapes of ancestry where a sense of historical continuity was enacted could be much more common, but unfortunately the limited number of deeply excavated sites may have limited its documentation.

The enactment of Pre-Arawak practices is also noted in the lithic realm. For instance, in the Finca de Doña Rosa, Vega de Nelo Vargas, and Paso del Indio the flake production traditions continue to be mostly based on a parallel flaking format conducted through the cobble-slicing techniques and the import of parallel chert flakes imported from nonlocal sources (Figure 6-17). The import of chert flakes produced by parallel flaking indistinguishable from those produced in

Pre-Arawak contexts has also been noted in Caguana (Alegría 1983), Batey del Delfín (Rivera Fontán 1998), and Viví (Oliver and Rivera Fontán 2005).

Figure 6-17. Imported chert parallel flakes from Finca de Doña Rosa and Cueva de los Muertos.

The Pre-Arawak tradition of the use of nets for fishing evidenced through the production of netweights also continues to be registered in most locations at this time. Pre-Arawak sumptuary materials such as the stone spheres also continue to be produced, as for instance is noted in post-A.D. 1000 of Rio Tanamá (AR-38) where two of these were uncovered (Figure 6-18g-h). Randomly shaped beads quite similar to those reported by Ayes Suárez (1992) from Angostura were also found at this time in Paso del Indio, which also shows the continued enactment of the system of representation of at least some Pre-Arawak peoples (Figure 6-18i-k).

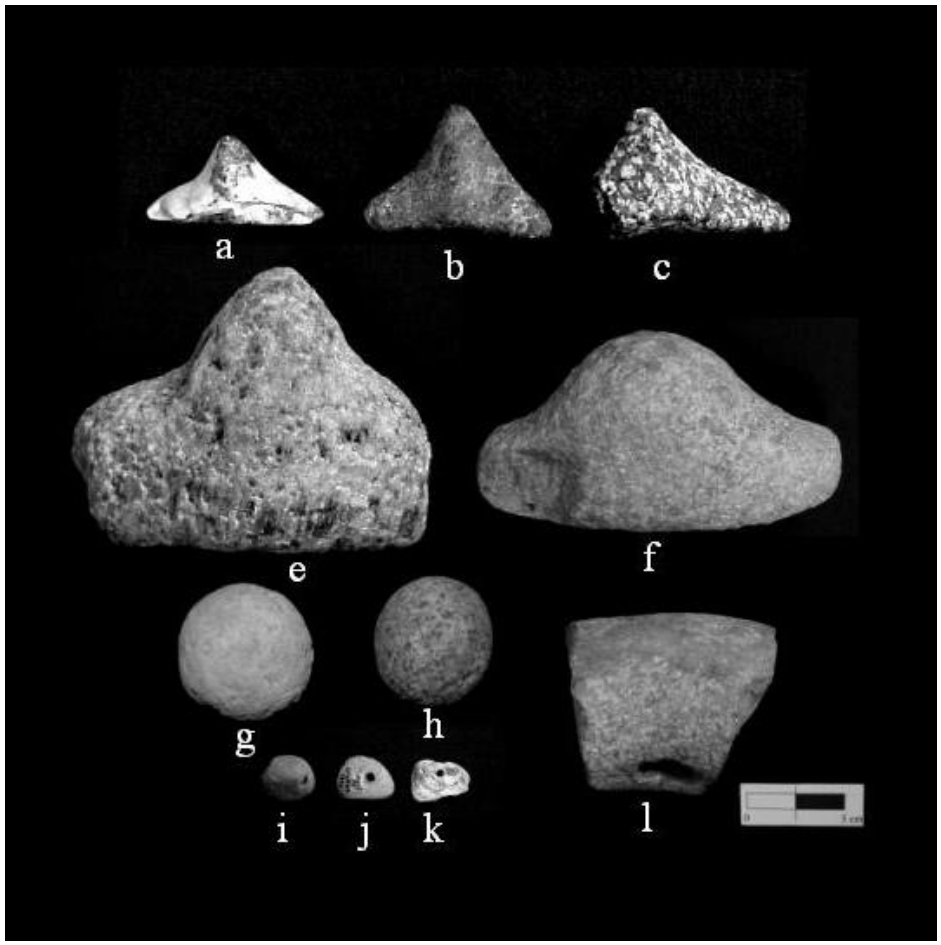

Figure 6-18. Sumptuary materials from Paso del Indio and Rio Tanamá. (a) marble three-pointer, Paso del Indio; (b) limonite three-pointer, Paso del Indio; (c) porphyry three-pointer, Paso del Indio; (e-f) massive three-pointers, Paso del Indio; (g-h) stone spheres, Rio Tanamá; (i-k) randomly shaped beads, Paso del Indio; (l) stone belt fragment, Paso del Indio.

Use-modified materials derived from Pre-Arawak culinary traditions such as the edge-ground cobble, nuttingstones, and end-battered stones also continue to be employed in late sites such as Viví (Oliver and Rivera Fontán 2005), La Trocha (Walker 2000), Salto Arriba (Rodríguez Ramos 2001b), and Paso del Indio. Pagán Jiménez's (2003) starch grain analyses have shown that zamia continued to form an important part of the botanical repertoire consumed during this period. Pagán Jiménez and Oliver (2007) have further noted that this plant was perhaps so important that some of the late inhabitants of the island intentionally altered its distribution. Pagán Jiménez's (2003; Pagán Jiménez and Oliver 2007) starch grain studies of late

contexts have also shown evidence of the processing of other wild plants as well as a myriad of cultigens, while presenting a limited representation of manioc. This clearly demands us to question the supposed ubiquitous emphasis that was placed to the consumption of this plant by the "Taíno" based primarily on the information provided in the ethnohistoric record.

All of this evidence indicates the continuous reproduction of Pre-Arawak ideological, technological, and culinary traditions until the latest period of the precolonial history of the island. This evidence also shows that these Pre-Arawak traditions were enacted not only by the possessors of sumptuary materials but also by the producers of the parallel flakes used for woodworking or basketry production and the women who used the edge-ground cobbles to cook for their families. This enactment of Pre-Arawak traditions makes evident that, in at least some communities, these ancestral practices had much deeper roots in the daily engagements of peoples than previously thought.

Although the production of Capá and Esperanza styles of pottery becomes more common on the island after A.D. 1100, other ceramic types continued to be manufactured until much later times than previously assumed. This is the case for instance for the Pure Ostiones pottery which has been documented as late as cal. A.D. 1200 in Cueva de los Muertos and up to cal. A.D. 1350 in Cueva Juan Miguel, both located in the Utuado Municipality of north-central Puerto Rico (Oliver et al. 1998, 2001). Interestingly, this type of pottery, which was supposed to have ceased in occurrence after A.D. 900 in Rouse's (1992) model, was still being produced in the localities at the same time when Modified Ostiones and Capá pottery was also being manufactured in neighboring sites such as UTU-44 (Oliver et al. 2001). Other types of pottery such as the Santa Elena were being produced in the type-site of such site, Santa Elena, until sometime between cal. A.D. 1050 and 1400 while at Tibes it was produced until between cal. A.D. 1270 (Curet et al.

2006) and cal. A.D. 1320 (González 1984). Santa Elena pottery, which was supposed to be mostly limited to the eastern part of Puerto Rico, has also been found in sites in the western portion of the island mixed with Capá and Esperanza pottery in the Villa Taina site (Goodwin and Walker 1975) in contexts dating to cal. A.D. 1200, in central Puerto Rico mixed with Capá pottery at Palo Hincado (Ortiz Aguilú et al. 2001), as well mixed with Esperanza pottery in eastern sites such as Luján in Vieques (dated as late as cal. A.D. 1300, Rivera 2000) and Playa Blanca, a site that extends to the contact period (Rodríguez López and Rivera 1991). Even the Cuevas and Monserrate styles of pottery also have been found in the Lilly-Caribe site, which has been dated to cal. A.D. 1330 (Ramos 2002). Other styles such as the Modified Ostiones have also been found mixed with Capá pottery in sites such as La Trocha in contexts dating to cal. A.D. 1370. In some sites such as Cayito, another pottery style supposedly derived from the Dominican Republic known as Boca Chica is also found in the island sometime between cal. A.D. 1290 and the contact period (Rouse and Allaire 1978). This pottery style has also been found mixed with Capá pottery in the Rio Tanamá site up to cal. A.D. 1490 (Carlson 2007). More recently, Rodríguez López (2003) has identified another late cultural manifestation in the northeastern part of the island that he has called the "Sin Burenes" because of the absence of griddles in the pottery assemblages, whose dates extend up to the contact period (López de Molina and Molina Feal 1988).

This temporal evidence again indicates a rather messy pottery landscape during this late period of Puerto Rican precolonial history, which contrasts to Rouse's clean picture of the Capá and Esperanza as the only styles of pottery that were being produced in the island after A.D. 1200. However, it is clear that after A.D. 1200 there is a more widespread distribution of these two pottery styles in the island, in many cases mixed with other types of pottery that were

previously being produced. The increasing presence of these pottery styles in ceramic assemblages might be related to a tighter regional system involving the transmission or emulation of the practices involved in the production of this decorated pottery and/or the exchange of such decorated wares between peoples of diverse ancestral heritages. However, the amount of decorated pots at this time of either style usually constitutes a low percentage of the ceramic repertoires, perhaps indicating their use for particular types of activities and/or its restricted use by a particular social sector or household within communities. In fact, the Capá style presents as its most conspicuous element the production of boat-shaped vessels, whose performance characteristics have been related to the serving of wet foods or beverages (Espenshade 2000; Rodríguez Ramos 2008a), perhaps in communalizing activities such as feasting and/or sharing.

This increased regional incorporation of Capá and Esperanza styles of pottery also corresponds with the rise in occurrence of a common set of elements associated to public displays of prestige. Features such as the construction of ballcourts for integrative activities, the production of increasingly larger and refined three-pointers, and the manufacture of stone belts become more common after A.D. 1200. The reproduction of some of these elements across the island indicates that there was an more pronounced formalization of some of the emblems of power that were being deployed in most communities, which serves as an indication of the higher levels of regional political and/or ideological integration observed in different parts of the island.

These shared elements, however, seem to have received markedly variable interpretations in the different locations (Curet 2003; McGinnis 1997; Ostapkowicz 1997; Wilson 1993, 2007b). For instance, the stone enclosures (i.e., *bateyes*) that were being built in different parts of the

island presented a highly variable iconography encoded in the macroliths that encircled them, the types and shapes of the stones used to delimit them, as well as in their methods of construction (Alegría 1983; Oliver 2005b; Rivera Fontán 1998; Wilson 2007a). For instance, while in the Batey del Delfín Rivera Fontán (1998) has documented an assortment of marine representations produced over erected macroliths of a volcanic origin that rested on earthen mounds, at the contemporaneous UTU-27 site a beak bird is represented in one of the petrogliphs produced over standing limestone slabs (Oliver et al. 2001). In other sites such as Caguana, some of these iconographic elements were combined in the petrogliphs of the main enclosure, which also present anthropomorphic carvings unlike those found in any other enclosure in Puerto Rico nor the Antilles (although interestingly these anthropomorphic representations are most commonly found in rockshelters) (Oliver 2005b). The combination of elements in this central enclosure (e.g., beak birds, sea creatures, anthropomorphic carvings) within a single location might be indicating an integration of distinct symbolic domains of peoples of diverse ancestral heritages that came together in the public gatherings that took place in these lithified spaces. This could be showing another instance, although on a larger scale, of the articulation of corporate territories for communalizing activities that united politically and/or ideologically peoples of multiple ancestral backgrounds (see Sassaman 2005 for a similar case in Poverty Point).

Interestingly, Oliver (2005b:234) has noted that in Caguana the central *batey* had a combination of limestones and calcarenites obtained from the surrounding karstic formations as well as meta-volcanic boulders procured from the river, which led him to argue that "This selective distribution of stone raw materials is not accidental, but partakes in the distinct symbolism embedded in these two contrasting landscapes." Interestingly, it is from these local contexts from which most of the lithics used for utilitarian (e.g., parallel flakes, celts) and

sumptuary (e.g., stone spheres, three-pointers, stone belts; Oliver 2005b:234) implements are obtained at this time, underlining again the ideological importance of these two local procurement landscapes of the objective pieces used in lithic production by the precolonial inhabitants of the island.

This variability observed in the construction of ballcourts is also noted in the production of other types of materials, as for instance the carved representations noted in the three-pointed *cemíes*, stone belts, and elbow stones (Fewkes 1907; Walker 1993). This variability of elements within what is commonly thought as the "Taíno" is not only noted within the island, but also in other surrounding contexts that have also been labeled as part of such "ethnic group." For instance, the distribution of *bateyes*, one of the defining features of the "Taíno," is mostly limited to Puerto Rico with a markedly lower occurrence in Hispaniola, eastern Cuba, the Bahamas, and Antigua, while being absent in other "Taíno" areas including Jamaica and most of the northern Lesser Antilles. Wilson (2007a) has not only noted differences in the distribution of this feature between the Greater Antilles, but has also noted marked dissimilarities in their construction in the different locations. This is the same case for the stone belts and the elaborated three-pointed *cemíes*, which are also mostly limited to Puerto Rico and parts of Hispaniola and present a high degree of variability in their representations between and within those two islands. Other prestige goods such as the *dujos* (i.e., ceremonial seats) are also most commonly represented in Hispaniola, Puerto Rico, and the Bahamas, while being of much lower representation in Cuba and Jamaica and virtually absent in the rest of the "Taíno" islands (Ostapkowicz 1997). Considerable differences have also been noted in the kinds of *dujos* that were produced in the different islands and the types of raw materials that were employed in their manufacture (McGinnis 1997; Ostapkowicz 1997).

Other sumptuary objects such as double-spouted and effigy vessels and shell *guaizas* (masks) are more commonly represented in the Dominican Republic, with a much lower occurrence in Puerto Rico while being of limited or no presence in the rest of the islands that were supposedly occupied by the "Taíno." Other differences in the distribution of ceremonial artifacts include the higher emphasis in the production of implements for the *cojoba* snuff inhaling practice in the Dominican Republic and Jamaica in comparison to the rest of the "Taíno" areas (McGinnis 1997). These differences are also noted in some of the interment practices such as the use of large urns for burial in some Dominican contexts, which have not been observed in late contexts in Puerto Rico or in any other "Taíno" island (Wilson 2007b). Interestingly, Veloz Maggiolo (1984) has noted that that there is a great degree of variability within the Dominican Republic, as for instance sites with Meillacan pottery that extend to the contact period do not have three-pointers and present markedly different layouts and subsistence practices when compared to other contemporaneous sites.

The reproduction of at least some of these elements and practices across different areas and the variability that is observed in them might have corresponded to the formalization of a common set of precepts in the ritual grammar stimulated by the water-based network of interacting high-status agents or social units from different communities who interpreted them in different ways on the basis of their particular historical contingencies. This might be a reflection of what Oyuela-Caycedo (1998, 2002) called a process of religious routinization. In this process, the chiefly and/or priestly elites of different interacting communities begin formalizing a religious complex that shares a set of precepts despite the political, cultural, economic, or linguistic particularities of each individual and/or social aggregate that participates in it. This process allows those elite agents or collectivities to legitimate their power by "maintaining the

material (for example, land, architecture, emblems, symbols, and ritual paraphernalia) and immaterial (rituals, specialized esoteric knowledge, titles, and prerogatives) wealth" derived from such belief system through their constant interactions (Oyuela-Caycedo 1998:39). It is through those relationships focusing on the ideological realm that alliances are established and that rank within communities is obtained and maintained on the basis of the transmission of those sources of wealth and the asymmetrical access to the esoteric information that is embedded in them (Helms 1987).

This routinization of religion is not only reflected in the reproduction of a common set of artifact types but is most notably depicted in the landscape through the construction of similar formal facilities for integrative activities (i.e., "cultic centers"; Oyuela-Caycedo 2002) in the different locations. These communalizing activities (e.g., feasting, sharing, *areytos*) provided a social landscape of collectivity that served to diffuse the differences between the people that came together. The negotiations that took place in these gatherings allowed for the creation of alliances between communities as well as to reify the cosmovision that was embedded in such religious tenets through public bodily displays that may have included dances, symbolic wars, the ballgame, or trance rituals, among others (Oliver 2005b). The increasing occurrence of the installation of stone enclosures at this time might then respond to a more widespread distribution of these religious practices. However, the variability in the facilities in which these are enacted is indicative of the objectification of the variable negotiations with such tenets by the inhabitants of the different communities that participated in them.

This variability is not only observed between sites, but also within sites as well. For example, in Caguana the central enclosure had more than 40 petroglyphs while the peripheral stone-lined precincts were of varying shapes with few or no petrogliphs (Oliver 2005b). The

variability noted in the construction of enclosures within such corporate territory may have resulted from the varying negotiations between the networks of interacting social units that shared the control of such integrative locus where their different systems of representation derived from their particular ancestral histories were objectified in the landscape. The central enclosure, with its larger size and syncretism of ancestral codes in its surrounding petrogliphs, might have then been the central arena for dissipating the differences between the diverse groups that engaged in the construction and eventually shared control of that communal space.

In association with the regional formalization of a ritual grammar, this process of routinization also includes the exchange of the paraphernalia used to represent it (Oyuela 2002). For example, according to Oliver (2006a) religious emblems for public display such as the three-pointed cemíes and stone belts were being moved between locations, probably in tandem with the power that each of these conferred its possessors. These exchanges or local reproductions of Taíno-like elite paraphernalia also extended to the Lesser Antilles. This was documented by Crock (2000), Hofman and Hoogland, and de Waal (2006) with the discovery of Hispaniolan-like *guaizas* in Anguilla and Guadeloupe. An example of the circulation of sumptuary goods is also noted in the Paso del Indio site, where there is evidence after A.D. 1200 for the import of finished three-pointers of two different rocks available in distinct locations of the island as well as another one from the Lesser Antilles: limonite from western Puerto Rico (Figure 6-18b), marble from southern Puerto Rico (Figure 6-18a), and porphyry, the famous cemí stone from St. Martin (Figure 6-18c). Interestingly, Crock (2000:243) has documented the import of porphyry from St. Martin to Anguilla for the local production of trigonoliths to be exported to other areas in contexts that are contemporaneous with the ones where the porphyry cemí from Paso del Indio was obtained, thus indicating a possible source for this particular imported commodity.

The fact that most of the moved artifacts at this time are for public display rather than serving as personal adornments as was the case earlier indicates that the source of power and/or prestige now began to reside outside the bodies of particular individuals. For instance, three-pointers grow in size at this time and other artifacts such as the *dujos*, stone belts, and elbow stones become more common (Walker 1993). This is noted at Paso del Indio, where three-pointers from lithostratigraphic unit D (ca. AD 850 - 1000) have an average maximum dimension of 62 mm, while the ones from lithostratigraphic units E and F (ca. 1000 - 1300) had a mean of 147 mm (Figure 6-18e-f). At this time, there is also evidence for the import of a stone collar fragment in Paso del Indio (Figure 6-18l) as well as in other nearby sites such as Finca Valencia (Walker 1997). This reinforces Oliver's (2005b, 2006a) and Walker's (1993) appreciation that the power now was more esoteric, being mostly derivative of the control that was exercised over the possession of the cemíes and the numinous beings that resided in those elaborate objects. These sources of power, as well as the important mythical narratives and other types of information attached to them, moved along with these artifacts. This in turn served to regulate the ideological foundation for the relationships established between networks of interacting elite agents and/or social units, which became increasingly formalized as part of the higher degrees of political and/or ideological integration noted in the different parts of the island (Curet 2003; Curet et al. 2006; Oliver 2005b; Siegel 2004; Torres 2005). This allowed the high-status agents or social collectivities of such communities a differential access to the tenets of this symbolic landscape and to the networks that regulated their circulation. This uneven access to those sources of prestige not only resulted in the consolidation of structures of social ranking within communities, but also created an ideological veneer that promoted groups to interact at

the microregional scale as well as at larger scales within the island and with people outside of it (Helms 1987).

These regional negotiations between elite members or social aggregates of autonomous social units focusing on the ideological realm might be indicative of what Renfrew (1986) called "peer polity interactions." In this case, the constant symmetrical inter-societal engagements between high-status members of autonomous communities or polities result in the development of a set of structural homologies in belief systems and social organization that provide the necessary means for making such interactions possible and at the same time result from those interactions. This causes the appearance of a suite of features in temporal concomitance in the different interacting entities that is usually a result of a combination of mechanisms such as competitive emulation, exchange, warfare, and/or symbolic entrainment. Any of these sorts of interaction or combinations of them result in the configuration of the shared homologous features between social aggregates within micro-regions or in larger territorial units. This, however, does not mean that each of those interacting entities looses its political, cultural, or ethnic autonomy but that the uniformities shared between communities are not necessarily derivative from a single ancestry, as is assumed by Rouse (1992) in the case of the "Taíno people" or from demands of a centralized authority (e.g., a paramount chief; Siegel 2004), but rather as a result of the interaction between autonomous social units.

This might explain both the homogeneity and the variability that is observed within the set of features of what is commonly thought to be the "Taíno." But, if such features are not necessarily indicative of a single ancestry or a common people then, what is the Taíno?

From the Taíno People to the Taíno Spectrum

Rouse (1992:185) defined the Taíno as the "Ethnic group that inhabited the Bahamian Archipelago, most of the Greater Antilles, and the northern part of the Lesser Antilles in the time of Columbus." Rouse (1992:33-34) further contended that:

> All the Historic-age Tainos made pottery belonging to a single Ostionoid series of local styles. The ancestry of the Classic Tainos can be traced back into prehistory through a Chican Ostionoid subseries, the ancestry of the Western Tainos through a Meillacan Ostionoid subseries, and the ancestry of the Eastern Tainos through an Elenan Ostionoid subseries. The three ancestries converge in the Cedrosan Saladoid subseries of Puerto Rico and the Lesser Antilles. From there the trail leads back to similar deposits on the Guianan and Venezuelan coasts.

This definition of the Taíno as an ethnically unified group of people that shared a single ancestry has been almost universally assumed in Antillean archaeology. Such ancestry has been traced back to the Orinoco, and many of the interpretations about the language, cosmovision, diet, and ethnicity, among others, about the "Taíno people" have been based on such an assumption.

However, in this work I have tried to demonstrate that the cultural geography of the island was composed of at least three distinct ancestral groups - the Pre-Arawak, the LH, and the Cedrosan - whose continued interactions led to the rise of a context characterized by social, linguistic, cultural, and biological plurality. On the basis of this, I consider that the variability that is observed within the group of elements that are indicative of the "Taíno," instead of reflecting stylistic variations within an ethnically unified people, shows the different ways in which peoples of distinct ancestral traditions negotiated this set of features within their own communities on the basis of their particular historical contingencies. This leads me to argue that what is commonly known as the "Taíno" does not reflect an ethnically homogeneous people but rather the ideological thread that allowed peoples to interact with one another despite their individualities. In this sense, instead of a "Taíno people," what existed was a spectrum of

Tainoness whose diverse representations resulted from the variable negotiations in which at least some of the indigenous peoples of the islands engaged in order to facilitate their interactions while retaining their differences. In some cases, some of the elements of such Tainoness show variable syncretisms of the ideological narratives that might have been derived from the different ancestral histories of each of the different groups that inhabited the islands where this spectrum was manifested. The mosaic of syncretisms observed at this time is thus the result of the myriad of interactions and negotiations in which those different people were engaged within the islands and with the inhabitants of the surrounding continental regions with which they were interacting.

This disentanglement of Tainoness from a Taíno ethnic group allows us to envision the ways in which some of those elements are shared across wide spatial areas and the high degree of variability in the local interpretations and negotiations with such imageries. This variability within the Taíno had previously been recognized by many, most notably by Veloz Maggiolo (1984), McGinnis (1997), and Wilson (1993). This variability has also been recently noted by Curet (2003) and Keegan (2004). Curet (2003:20) argued that "Judging from the striking differences mentioned, they [Hispaniolan and Puerto Rican polities] likely developed from distinct types of ancestral societies, and/or through different and divergent historical processes." With regards to those differences, Keegan (2004:42) further contends that the peoples of "the contact period of Puerto Rico were not Taíno. I would place Puerto Rico in an interaction sphere that was focused to the east and south, and although the ethnohistoric Taíno peoples of Hispaniola influenced them, they did not develop the same type of political integration."

However, I here take that argument further and argue that a "Taíno people" did not exist in Hispaniola, Puerto Rico or anywhere else and that such a label serves to blur the high degree of ethnic and social variability that existed within and between the islands during this time. In fact,

Veloz Maggiolo (1984), Oliver (2005b), and Petersen et al. (2004), among others, have noted that the label "Taíno" was not even used as an indicator of ethnicity by the indigenous groups of the island but was rather a homonym assigned much later in time. As noted by Oliver (2005b:281-282):

> It is worth remembering that the noun "Taíno" (in the past often equated with "Arawak") is essentially a modern anthropological construct that glosses over significant sociocultural, political, economic, ethnic, and linguistic variability in the Greater Antilles. Consistently, the early Spanish documents refer to the native populations as peoples of this Indies, or as Indians of this "island" or that "territory."

The possibility of a multiethnic set of groups that shared a common ideological spectrum that allowed them to interact with one another is not unique. In fact, this seems to have been the case in other archipelagic landscapes such as in Polynesia and Micronesia (Terrell et al. 2001) and in other water-based networks of interacting communities such as those of the Orinoco (Biord Castillo 2006; Heinen and García Castro 2000). In these areas, the same situation as in the Antilles unfolded, interactions in plural ethnic settings that created an ideological fabric that was reformulated in different ways in the different communities depending of their particular historical contingencies. For instance, what was previously thought to be a biologically, linguistically, and culturally unified Lapita culture has recently been considered the end result of the interactions of multiethnic communities united by the sea (Smith 1995; Terrell 1998). This has also been noted in the Mississippian tradition, which has been depicted as being constituted by a mosaic of multiethnic social aggregates interacting with one another that share a common set of features while retaining some of their differences as a result of their distinct ancestral histories (Pauketat 2003). In fact, this seems to have been the case of the Greater Caribbean in general, where a myriad of peoples from different ethnic backgrounds were engaged in intense interactions through long stretches of time (Amodio 1991). These examples indicate that there is no need for the existence of a single language, a single culture, or a single ancestry for groups to

interact with one another and to exhibit some commonalities between them as a result of such interactions.

This all shows that we cannot continue trying to ascribe particular traits to a "Taíno people" because by doing that we are essentializing an entity that did not exist. By separating Tainoness from a linguistically and biologically unified ethnic group that shared a single ancestry we are left free to examine the different manifestations that were in existence in the islands in their late precolonial histories. Furthermore, this shows that the finding of "Taíno" materials (e.g., Boca Chica style pottery) do not necessarily mean that the "Taíno peoples" of the Greater Antilles were present in those locations or established "Taíno outposts" (Hoogland and Hofman 1993; Rouse 1992), but perhaps that some of the grammar produced in association to such Tainoness was being mimicked and/or imported to the different locations in which their inhabitants were participating in such spectrum. In other cases in which the different pottery styles and/or lithic traditions are represented in a single community or household could be representing plural micro-scenarios where people of distinct ancestral histories or ethnic affiliations coexisted with one another while retaining their differences, as has been noted in other contexts (e.g., Grinker 1994; Lightfoot et al. 1998; Pauketat 2003).

We are also free to disentangle language, culture, and biology within such construction and thus to examine the information provided in the chronicles about the existence of at least three mutually unintelligible languages in the Dominican Republic instead of the common notion that the Arawak was the unique language of the Taíno (cf. Granberry and Vescelius 2004; Sued Badillo 1979b; Veloz Maggiolo 1984; Wilson 2007b). As has been previously indicated (e.g., Chanlatte and Narganes 1990; Sued Badillo 1979b) it is possible that the documentation of the Arawak language in different islands by the Spanish chroniclers could have resulted from its use

as a *lingua franca* to facilitate interactions rather than to the fact that everyone spoke the same language within their communities. This is particularly evident when considering the distinct locations from which Pre-Arawak, LH, and Cedrosan peoples migrated, where distinct languages were spoken.

This also allows us to explore further the mtDNA evidence that has indicated the haplogroup heterogeneity noted between the indigenous people of the Greater Antilles (Lalueza Fox et al. 2003) and even within Puerto Rico (Martínez Cruzado et al. 2001, 2005). This biological diversity is also noted in craniometric data. For instance, Ross (2004:295) has indicated that "the dissimilarity between Cuban Tainos and the rest of the Caribbean Tainos, was unexpected, and suggested that these groups had distinct origins," probably from Central America. This all shows that we can not continue to characterize the indigenous groups of the Antilles under the umbrella of the Taíno, especially when envisioning it on the basis of Rouse's (1992) model as a single group of people with a single ancestry deriving from a single migration to the Antilles that moved through the islands in a single direction from a single origin in northeastern South America where a single language was spoken. That just does not make sense.

The formational vectors that resulted in the configuration of the spectrum of Tainoness not only emerged from within the islands but also from the influences that continued to be generated from without. These influences were derived from the continued interaction networks by which some of these products, ideologies, and technological traditions were being circulated through time that continued to extend to the Isthmo-Colombian area. Some of this evidence will be presented in the next section.

Things that Show: Displaying Prestige and Ritualizing Power in the Greater Caribbean

Between A.D. 500 and 700, the Isthmo-Colombian area registers a shift from the movement of shiny objects made on jade, and thorny and pearl oysters, to the circulation of other

markers of prestige, particularly those produced on gold alloys or tumbaga (Cooke 2005; Cooke et al. 2003; Guerrero Miranda 1986, 1993; Snarskis 2003). Explanations for the jade to gold transition have been varied. For instance, Hoopes (2005) suggests that natural disasters disrupted the Mesoamerican networks that promoted the movement of jade, which led to the articulation of more intense relationships with South America from where this gold tradition originated. Snarskis (2003) on the other hand has suggested that this shift had to do with a legitimation crisis associated with a disarticulation of the ideological structures that promoted the movement of the main source of green objects in Mesoamerica, the Motagua Valley in Guatemala. Regardless of the particular reason for this shift, it is generally agreed that it was associated with marked social changes reflecting increased levels of social asymmetry within those societies.

As was previously discussed in this chapter, it is around this same time that some of the most marked changes in the types of interactions that were sustained within Puerto Rico and with surrounding regions began to be registered. Concomitant with these changes, other types of indicators of identity (ethnic and/or social) began to be observed in Puerto Rico, as for instance the aforementioned practice of tabular-oblique fronto-occipital cranial deformation. In South America, this tradition of bodily modification has been traced back to Ecuador (Munizaga 1992), from where it then projected north into Colombia by at least 200 B.C. (Correal et al. 2003). It has also been documented in Mexico as early as 1800 B.C. (Romano 1982). Thus far, there is no evidence for this form of bodily modification in contexts that predate those of the Antilles in northeastern South America, being mostly limited in north-central Venezuela to late contexts (post A.D. 1000) south of Lake Valencia (Montcourt de Kosan 1983). As indicated previously, Crespo Torres (2000, 2005) has argued that this tradition of bodily modification was introduced

by the producers of the LH manifestation, whose main features I have traced to the Isthmo-Colombian area.

As previously indicated, this evidence for Isthmo-Colombian interactions at this time were also noted in Harlow's (2007) study of celts and celt fragments from Puerto Rico (Figure 6-19). Harlow was able to document the use of Guatemalan jadeite from the Motagua Valley for the production of a small petaloid adze recovered from Tecla II (Figure 6-19c) as well as in the bit portion of a petaloid celt from that same site (Figure 6-19b). He also documented this type of material in a proximal fragment of a biconvex celt (Figure 6-19a) and in a flake detached by the use of a petaloid celt obtained from Rio Tanamá (AR-39) (Figure 6-19d). Further evidence for the import of celts made of Motaguan jadeite to the Antilles was also obtained from the Bahamas. Rose (1987) reports an x-ray diffraction study conducted in a celt from Pigeon Creek and documented again the source of the import of this type of Guatemalan material to the Antilles. This indicates the continued import of jadeite celts to Puerto Rico and perhaps other Antilles after A.D. 500. Interestingly, later in time we begin witnessing in the Greater Antilles the reproduction of the anthropomorphic axe-god theme noted in the Isthmo-Colombian area since earlier times (Figure 6-20g). The production of the axe-god motif is commonly represented in Costa Rican artwork since at least 300 B.C. (Stone 1993:145). Examples of these axes have been found in late contexts, mostly between Cuba and Puerto Rico (McGinnis 1997) (Figure 6-20h-i). This again might be indicating an interaction that not only involved the movement of materials but also a set of narratives and information attached to them. The importance of celts for ceremonial exchanges has been noted in South America (Boomert 1987) and the Isthmo-Colombian area as well (Fernández Esquivel 2006).

Figure 6-19. Jadeite celts from Puerto Rico. (a) biconvex celt, Rio Tanamá; (b) biconvex celt, Tecla II; (c) small petaloid adze, Tecla II; (d) use flake detached from a biconvex celt, Rio Tanamá.

Another important feature noted in Puerto Rico after A.D. 500 is the installation of stone enclosures. As previously indicated, this architectural tradition is most commonly observed in Puerto Rico, although their presence has been documented from Cuba to Antigua. The interpretations about the possible areas of provenience of the construction of this type of facility have been varied. These have been deemed as a carryover of Mesoamerican ballcourts either directly to the Greater Antilles (García Goyco 1984; Fernández Méndez 1979; Willey 1980), by way of northwestern Venezuela (Zucchi 1988), or via the Lesser Antilles (Alegría 1983, Rouse 1992). However, as Veloz Maggiolo (1984:19) and Wilson (2007b) have noted, some of these features, particularly the ones from Puerto Rico, bear close resemblances in their

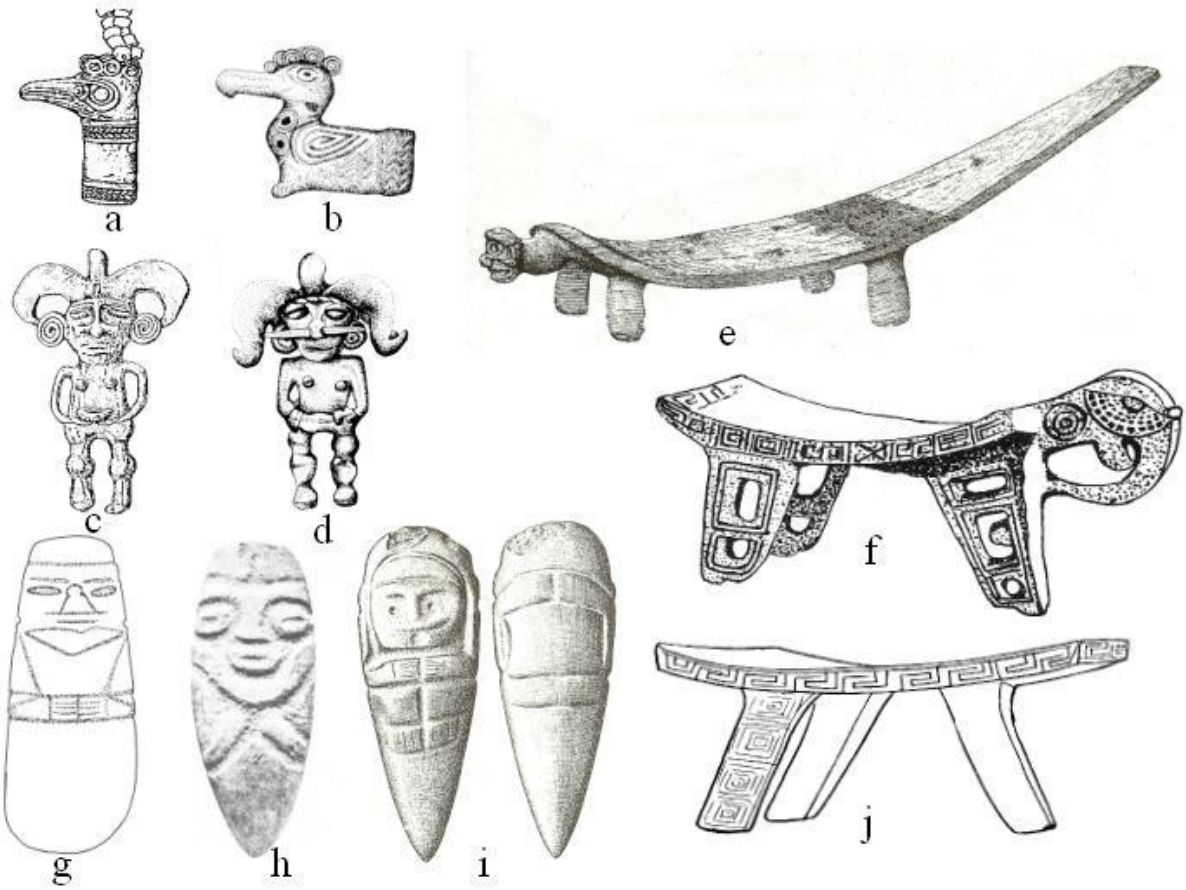

Figure 6-20. Comparison of artifacts from the Greater Antilles and the Isthmo-Colombian area. (Not to scale). (a) ornitomorphic tumbaga piece, Cuba, after Oliver 2000, Figure 10.6; (b) ornitomorphic tumbaga piece, Colombia, after Legast 1980, Figure 55; (c) anthropomorphic tumbaga piece, Cuba, after Oliver 2000, Figure 10.5; (d) anthropomorphic tumbaga piece, Colombia, after Falchetti 1995, Figure 73; (e) *dujo*, Puerto Rico, after Fewkes 1907, Figure 39; (f) three-legged metate, Costa Rica, after Ferrero 1981:411; (j) three-legged metate, Jamaica, after Joyce 1972, Figure 58; (g) axe-god, Costa Rica, after Lange 1993, Figure 21.4d; (h) axe-god, Puerto Rico, after Fewkes 1907, Plate XVa; (i) axe-god, Puerto Rico, after Fernández Méndez 1979, Figure 5.

architectural styles to those documented in the Isthmo-Colombian area, such as those from the Rivas site in Costa Rica. Other stone-lined precincts such those documented in El Caño site in Panama (Haller 2004) and el Infiernito in Colombia (Langebaek 2001), among others, show much closer architectural similarities with West Indian rock enclosures than those of Mesoamerica. The fact that we find no evidence of these features in the Lesser Antilles south of

Antigua or in northeastern South America seems to indicate that the template for their construction either developed in Puerto Rico without external inputs or resulted from its adoption from the Isthmo-Colombian area and/or Mesoamerica. The parallels between the rock enclosures from Costa Rica and Panama and those of the Greater Antilles had originally been noted by Stone (1982; see also Cooke 2005:160), who even provides ethnohistorical citations of the similarities of the ballgame played in the those areas with the one from the Antilles noted by Fernando Colón, among others.

The distribution of stone enclosures in the northern Antilles also coincides geographically with that of the import of other extraneous prestige goods such as guinea pigs (*Cavia porcellus*). This animal, whose earliest evidence of domestication comes from Peru and Colombia (Burcher de Uribe 1996), has been considered in the Andean region to be a "luxury food" (Hastorf 1997:545) consumed by the elite during feasting activities as well as a valued commodity in long-distance exchanges (Stahl 2003). In the Antilles, Wing (1997) and de France and Newsom (2005) have also associated this faunal element primarily to non-utilitarian practices, particularly because of the rarity of its occurrence and its recovery from ritual contexts such as that of Tibes (Curet et al. 2006). According to Newsom and Wing (2004:205), the ethnohistorical record of the Greater Antilles indicates that these were named *cori*, which was probably a loan word from *cuy*, its Andean name. Thus far there is no evidence for the presence of guinea pigs in northeastern South America (Burcher de Uribe 1996:80) nor the Lesser Antilles south of Antigua, a fact that led Newsom and Wing (2004:205) to postulate, among other alternatives, the probable direct movement of this faunal element to the Greater Antilles directly from South America.

Another element that seems to have been transacted during this period between the Isthmo-Colombian area and the Greater Antilles has been pieces of *tumbaga*, what in the Antilles we call *guanín*. In addition to the aforementioned evidence of a *tumbaga* fragment in the early Cedrosan context of Maisabel, pieces of this type of material have also been obtained from post-A.D. 500 contexts between Cuba and Puerto Rico (Oliver 2000). The scant, but important, presence of *tumbaga* pieces in the Greater Antilles is particularly interesting, not only because there is no evidence of gold smelting anywhere in the Antilles nor in northeastern South America, but also because of their close iconographic resemblances to pieces associated to the International Style that extends between Colombia and Costa Rica (Cooke and Bray 1985). In fact, the two most cited pieces from Cuba, the *ídolo de Yagahuay* (Alonso 1951) (Figure 6-20c) and the ornitomorphic piece recovered from the Chorro de Maita site in Banes (Figure 6-20a) (Valcárcel Rojas 2002), are almost indistinguishable from others produced in the Zenú area of Colombia during this time (Falchetti 1995; Legast 1980) (Figure 6-20b, d). The finding of tumbaga pieces in the Greater Antilles are of marked importance because the possession of *guanines* was an significant element of the prestige paraphernalia used by at least some Greater Antillean high status agents. According to Oliver (2000), these gold-copper alloys were highly valued for reasons such as their color and smell, both associated to the use of copper during their smelting, as well by their foreign character. The fact that the *guanín* was an important element within the mythical narratives documented in the ethnohistoric record (Oliver 2000), coupled with the evidence obtained from Maisabel, indicates that the history of use of this alloy in the Antilles has much earlier roots than commonly assumed (Oliver 2000; Siegel and Severin 1993). The lack of evidence thus far for similar items in the Lesser Antilles and northeastern South America in

contexts predating those of the Greater Antilles again seems to indicate a direct movement of such products by open-sea traveling.

Helms (1987) has also documented the presence of interactions between the Greater Antilles and the Isthmo-Colombian area through the traffic of *dujos*, or ceremonial seats (Figure 6-20e), and other ritual artifacts made of polished black wood. The ethnohistorical record not only indicates that wooden benches were used in Nicaragua and Costa Rica by the chiefs and probably presented similar decorations as those of the Greater Antilles, but also that the Antillean name *dujo* was used in those areas to make reference to them. This was indicated by Oviedo (1851-55:42:13, cited in Lange 1971:48) who, when in the house of the Agateyte chief of Tecoatega, Nicaragua, wrote"…and as a pillow he had a small four-legged bench, somewhat concave, *which they call duho*, and of a very handsome wood, skillfully carved, at the head." (emphasis mine).

These Isthmo-Antillean relationships have also been underlined by Balser (1954; see also Soto 1993:71; Stevenson Day 1993:298), who associated some of the motifs present in ceremonial vessels and metates from Costa Rica to the "Taíno myth" documented in the ethnohistoric record of the Greater Antilles. Rouse (1966) and Veloz Maggiolo (1972) report the finding of Costa Rican-like metates in Cuba, Jamaica, Dominican Republic, and Puerto Rico. One of such metates, illustrated by Joyce (1972) (Figure 6-20j), bears striking similarities to the ones produced in the Greater Nicoya, Costa Rica. Unfortunately, the contextual resolution of some of these pieces is low as these are mostly provenient from private collections. However, the marked evidence of contacts with the Isthmo-Colombian area makes evident that it is quite possible that these were brought to the Antilles in precolonial times.

The continued evidence for isthmo-Antillean contacts during this period could be indicating that the maintenance of these macro-regional engagements was an important element in the process of development and integration of elites in both areas, as has been suggested by Helms (1987). I would further suggest that these long-distance relationships, instead of simply being employed as emblems of the possession of esoteric knowledge from afar as suggested by Helms, might have also served to legitimize the genealogical hierarchy of some elite lineages on the basis of their affiliation with beings that lived in those remote areas. Perhaps, these trans-Caribbean political and genealogical relationships could explain the reproduction of the term Barahona, which was the name of one of the major chiefs of the Caribbean Watershed of northwestern Colombia (Langebaek and Dever 2000:19) (which by the way is the most likely area of provenience of the representations made of *tumbaga* recovered in the Greater Antilles), as an indigenous toponym associated to important archaeological areas from both Puerto Rico and the Dominican Republic. These long-distance relationships could also explain the use of a *flor the lis guanín* by the Jamaican chief encountered by Columbus (cited in Oliver 2000), who probably employed such emblem to associate himself to the people from the distant lands where it was produced. In fact, Whitehead (1996) and Keegan (2007) have noted that in Antillean cosmology there was a close relationship between the source of ancestral authority and the *guanín*, and that in some cases there was even a "link between the honorific titles of the elite and the names of the metals" as was the case of Caonabo - "he who is like gold."

In this line, the importance of the production of *bateyes* as integrative facilities deployed for feasting with people, not only from nearby communities, but also from other regions and ethnicities could also explain the architectural similarities noted in the construction of these enclosures in Panama, Costa Rica, Colombia, and the Greater Antilles (Wilson 2007b). This

may be indicating that the Isthmo-Colombian network of interacting elites (Hoopes 2005:25) extended into the Greater Antilles and vise versa, and that the production of "cultic centers" during this time in association to the process of religious routinization (Oyuela-Caycedo 1998, 2002) of such priestly and/or chiefly authorities may have had a more supra-regional character than originally envisioned (Hoopes 2005:31-32).

CHAPTER 7
CONCLUSIONS

In the previous Chapters, I have provided an alternative perspective of the precolonial landscape of Puerto Rico at different points in time employing as primary lines of evidence the study of the technological styles used in lithic production and the radiocarbon database from the island that I developed. By integrating these two sources of evidence and others as well, I have aimed to elicit the complex nature of the social and cultural landscape of the island throughout our precolonial history. This complexity had previously been hidden under the normative straightjacket that has been imposed on the archaeology of Puerto Rico and the rest of Antilles by the adherence to Rouse's model as the point of departure for reconstructing our ancient histories. This, however, is not Rouse's fault. The fault lies on those of us who have rested comfortably on the pillowed squares that form the basis of his model and have not made concerted attempts to critically evaluate its primitive axioms.

I consider that this critical evaluation has opened the door for rethinking some of the issues that we thought that had been solved in Antillean archaeology. Important aspects such as the introduction of agriculture and pottery production, the number and origins of the migrations to the islands, and the multidimensional nature of the processes that led to the configuration of its late precolonial landscapes were revisited and alternative perspectives were provided. I have also attempted to show that the relationships of the precolonial inhabitants of the Greater Antilles were not limited to northeastern South America, their so-called "motherland," but were perhaps even more related to the Isthmo-Colombian area, an important arena of interactions that had almost totally been ignored in Caribbean archaeology. These perspectives, however, are not aimed at sewing another straightjacket. Rather, I have proposed these ideas as a point of departure upon which later studies might be constructed taking them into consideration.

The issues raised here have implications at the different but mutually constituting scales within which this work has been framed. I will now provide my perspective on the repercussions that the evidence hereby presented has at the scale of Puerto Rico, the Antilles, and the Greater Caribbean. I will conclude this dissertation by delving into the impact that the viewpoint advocated here may have on our imagery of our precolonial past.

The Precolonial History of Puerto Rico

As I have established in this study, the evidence available from Puerto Rico shows a much different chrono-cultural scenario to that proposed in Rouse's model. This is particularly evident in the temporality established for the different pottery styles defined for the island and its derived phylogenetic relationships between the "cultures" represented in such pottery. The radiocarbon database that forms the temporal backbone upon which my interpretations have been built has demonstrated the inadequacy of relying on a framework that was first developed more than half a century ago, experiencing little or no change since its original construction. In order to further illustrate this, I took the calibrated means of the 2σ spreads of the radiocarbon dates available for each of the pottery styles defined in the island and collapsed them into high-low logs to get a better panorama of their temporal distribution (Figure 7-1). For comparison, I also include black boxes indicative of the dates for each pottery style as established in Rouse's (1992) most recent scheme.

At first glance, Figure 7-1 shows that when we evaluate these newly generated dates for the island, many of the temporal extensions and phylogenetic relationships of the cultural manifestations established by Rouse need to be reconsidered. In addition to the temporal incongruities observed for each of the ceramic manifestations defined for Puerto Rico, one thing that becomes evident when looking at these date ranges is the coexistence of various pottery styles in the different periods delimited by Rouse (1992), some of which contain up to five

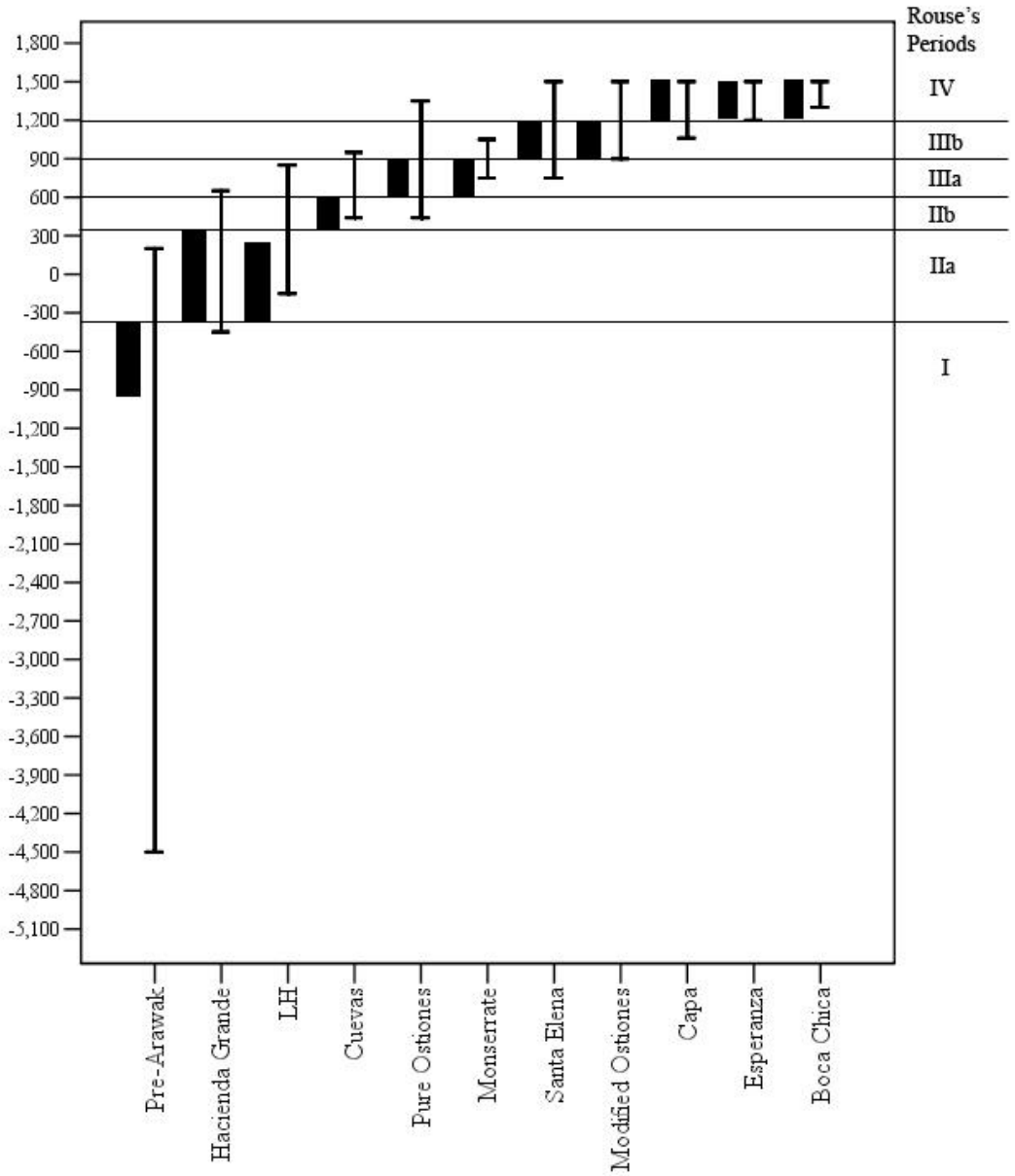

Figure 7-1. High-low logs showing the temporal distribution of the different pottery styles defined for Puerto Rico (the black boxes show the spread of such complexes according to Rouse's 1992 scheme).

ceramic complexes. This definitely hampers Rouse's (1986) requirement of geographical and chronological homogeneity of each of his defined periods. This figure also shows that the different pottery styles defined for the island have varying levels of resolution, ranging from about 300 years for the Monserrate to approximately 1100 years for the Hacienda Grande. This makes clear that not all ceramic complexes should be used as relative temporal indices for

addressing the same types of issues, some of which occur at much finer scales than the styles (cf., Curet et al. 2004; Oliver 2006b:477). Furthermore, the new dates generated for the island also seem to indicate that changes in some of the pottery styles did not always necessarily coincide with other social shifts, thus again showing the need to disentangle ceramics and society when addressing the temporality involved in such changes and their distribution.

This figure also shows that during some points in time there was a high degree of horizontal variability in Puerto Rico, most notably after A.D. 500. I have argued that such variability was the result of the mosaic of interactions that were being registered between communities in what was very probably an ethnically plural scenario. I have also contested that this complex cultural landscape was partly the result of the development of the Pre-Arawak peoples in concomitance with their interactions with the later LH and Hacienda Grande newcomers, as was originally proposed by Chanlatte and Narganes (1990). However, in contrast to their argument that the development of the Pre-Arawak peoples resulted from their adoption of agriculture and pottery manufacture from the producers of the LH and Hacienda Grande complexes that later gave way to the rise of other manifestations, I have argued that those practices were already registered at least in some Pre-Arawak societies before those immigrants entered the island and that these allowed them a higher degree of flexibility for the establishment of their interactions with the newcomers. Furthermore, I argued that Pre-Arawak groups previously delineated some of the intra-island, Antillean, and macro-regional vectors through which the circulation of some of the materials and information was registered between locations later in time. This, coupled with the reproduction of their technological styles and culinary traditions indicates that more symmetrical and mutually influential types of interaction between all those peoples need to be considered rather than the unidirectional nature of the colonization

or displacement of the "Archaic" by the later immigrants that is advocated in Rouse's model. Perhaps this development of at least some Pre-Arawak peoples in the island can explain Rainey's (1933) original impression of the parallels between Ciboney (i.e., Pre-Arawak) and Shell (i.e., "Ostionoid") culture artifacts and dietary remains, which he made even before a Pre-Arawak context was discovered in Puerto Rico.

It was as a result of these multidirectional and multiscalar interactions that the plural cultural landscape of the island was configured. Thus far, this possibility had not been considered in detail because of the prevalent emphasis in fitting archeological deposits to the homogenizing chrono-cultural units already established in Rouse's model based strictly on ceramic-based criteria. This has not only limited the comparison of sites that have different types of pottery on the basis of the premise that they are not contemporaneous, but also has commonly led to the labeling of "anomalous" those contexts whose dates do not adhere to the temporality of the different pottery styles established in Rouse's model. However, when considering that some of those pottery styles, instead of representing degenerated versions of ceramic traditions that derived from a Cedrosan stock could denote evolved versions of Pre-Arawak pottery, it opens the door for revisiting those "anomalous" contexts as they might indeed be showing the eventual result of the development of the initial occupants of the island. In fact, this could explain why some sites that have been identified within the "Ostionoid series" have dated earlier than what they are supposed to. For example, this was the case of LO-23 (Grossman et al. 1990), where an early date that went back to between cal. A.D. 350 and 500 was discarded because it did not match its relative chronological placement since it presented pottery associated to the Elenan Ostionoid subseries which is supposed to date between A.D. 600 and 1200. Moreover, this might also be one of the reasons for the chronological dilemma of

Cerrillos (Pantel 1976), which supposedly presents Pre-Arawak lithic assemblages dating as recently as A.D. 650. This chronological issue is particularly important when we take into consideration that the vast majority of the sites in Puerto Rico present ceramics identified within different styles of what Rouse (1992) defined as the Ostionoid series, which are the ones that might present the greatest degree of overlap with the wares that have been identified in association to Pre-Arawak pottery producing groups, as we have argued elsewhere (Rodríguez Ramos 2005a; Rodríguez Ramos et al. 2008a).

By stating this I am by no means pretending to imply that the development of these Pre-Arawak peoples explains by itself the advent of the late precolonial landscape of the island. What I am arguing is that their interactions with the Hacienda Grande and the LH immigrants might have been much more symmetrical, mutually influential, and long-lived than formerly suggested. These multiple inter-societal engagements resulted in a complex arena that was characterized by cultural and social plurality rather than by the homogeneity that is assumed in Rouse's model. This precolonial landscape of plurality led to the articulation of multiple nodes of development, which gave rise to the mosaic of peoples and practices that existed in Puerto Rico throughout our ancient history. This perspective then argues against the characterization of our past as a simple phylogenetic divergence of pottery styles and rather considers it as the result of a dynamic set of interactions and practices whose cumulative outcomes constitute the thread of our precolonial history.

Evidently, the big question of who were the "ancestors of the Taino" needs to be rethought in light of this scenario, where other ancestral traditions beside what Rouse termed the Cedrosan Saladoid might have been more prominent in the articulation of the late pre-Columbian cultural setting of Puerto Rico than was originally thought. Furthermore, I have argued here that what we

know as the Taíno was not an ethnically unified entity as has been commonly assumed, but rather a reflection of the veneer that allowed the different peoples of the island to interact with one another while retaining their differences. This veneer was constituted by a collage of the practices of the peoples whose lives were connected through the complex web of interactions that has been documented in this work to the extent of my abilities. In this sense, we cannot continue to summarize our precolonial past in an ethically unified Taino because, as indicated by Terrell (1998) for the case of the Lapita, we "might be committing the statisticians Type II Error: accepting the hypothesis of no difference in race, language, or culture when in fact it is false." As will be shown in the next section, this perspective not only has drastic implications for the archaeology of Puerto Rico but also for the rest of the Antilles, most notably the Greater Antilles.

From a Phylogenetic to a Reticulate Model of Antillean Archaeology

As indicated in the introductory Chapter, Puerto Rico served as a central area from which Rouse projected his model into the rest of the Greater Antilles, particularly after the rise of the Ostionoid series. According to his model, upon the development of the Cedrosans into the Ostionoid around A.D. 600, these people then invaded the Greater Antilles eliminating or displacing the Pre-Arawak groups that they met on their way. This is primarily based on the assumption that those people did not make pottery and thus that the dates for ceramic bearing sites in those islands post-date A.D. 600. However, a vast amount of work conducted primarily in Cuba and the Dominican Republic has conclusively demonstrated the production of pottery prior to the Cedrosan and LH expansion to the Antilles. In sites such as Cayo Jourajouría in Cuba, this pottery had dated back to 2160 B.C. (Jouravleva 2002) and to 1500 B.C. in the Punta Bayahabibe site of the Dominican Republic (Atiles and López 2005). This definitely shows that pottery was indeed being produced in those islands long before the so-called Ostionoid expansion from Puerto Rico. We have grouped these different early pottery manifestations in the

Antilles within what we have termed the Pre-Arawak Pottery Horizon (Rodríguez Ramos et al. 2008a).

Interestingly, most of the designs and vessel forms present in this early pottery are later repeated in most "Ostionoid" wares from the islands. For instance, the production of globular and boat-shaped vessel forms, the use of incisions parallel to the rims, and the use of quartz and sand as the main nonplastics observed in most varieties of Pre-Arawak pottery are all attributes that characterize wares such as those of the Santa Elena style from Puerto Rico and some of the Meillac pottery from the Dominican Republic and Haiti (Rouse 1952). This coincidence of attributes can also be observed in other "Ostionoid" pottery from Cuba, Jamaica, Haiti, the Bahamas, and the Dominican Republic. This makes obvious the need to conduct further studies of these early ceramic assemblages to see if there could be a "continuum of modes" with later styles, which based on the evidence collected thus far is highly possible.

This leads me to formulate an alternative hypothesis regarding the development of some of the late cultural manifestations from the Antilles. As previously indicated, Rouse's model assumes that the Cedrosan Saladoid developed into the Ostionoid series in Puerto Rico at circa AD 600, which later expanded to the Greater Antilles. Supposedly the cultural branching of these Ostionoid peoples and the gradual degeneration of their pottery-making abilities in the different areas eventually resulted in the different styles that have been identified in the Greater Antilles. This has led to the generalized idea that the Ostionoid migration to the Greater Antilles was of such scale and magnitude that allowed them in less than 50 years not only to reach, colonize, and establish themselves on islands that were inhabited by other rather large groups of peoples (Cuba, the Dominican Republic and Haiti), but also others that were supposedly previously unpopulated (Jamaica and the Bahamas).

However, as is the case of Puerto Rico, it could be argued that instead of those different styles being strictly a result of the degeneration of Cedrosan ceramic traditions (i.e., the Dark Age of Antillean cultural production; Rouse 1982) and the regional diversification of Ostionoid pottery making through time, some of these could at least partly represent evolved versions of the Pre-Arawak pottery of the islands (i.e., the Antillean Golden Age). In line with this, the regional variations that seem to have existed in this early pottery could have eventually evolved into the different pottery styles present in "Ostionoid" contexts. This multifocal development perhaps could explain the appearance of very distinctive "Ostionoid" styles in the Greater Antilles, which in some cases were supposed to have evolved in less than one generation (e.g., the Jamaican redware dates as early as AD 650). Thus, instead of looking for the origins of those different Greater Antillean pottery variations as arising either from subsequent migrations from outside the Antilles (e.g., Alegría 1965; Rainey 1940; Veloz Maggiolo et al. 1981) or from the westward expansion of Ostionoid populations (e.g., Rouse 1992), we should start looking for those answers within the islands as a consequence of both the internal developments of these Pre-Arawak societies and the great degrees of interaction that these were probably registering with peoples from other islands and/or with Circum-Caribbean populations (Rodríguez Ramos 2002a, 2005a). Obviously, the migration of Cedrosan and LH peoples must have had a great effect in the articulation of the cultural and political landscape of the time. However, my position is that the development of these Pre-Arawak societies in the islands should be taken into account as an important element when trying to make sense of the articulation of the sociocultural landscape of the Caribbean before, during, and after the migrations of the producers of the LH and Hacienda Grande traditions (see Curet 2005 and Keegan 2006 for a similar argument).

If this possibility is taken into account and if we accept the fact that some of the ideographic grammar expressed in the decoration of some of this early pottery is repeated in later styles, then the need to revisit the ritual aspects of the cultural manifestations grouped within the "Ostionoid series" is made evident, as it could indeed have a longer history than previously suspected. This would demand us to reinterpret the origins of the cosmovision of these groups not as arising only from without (e.g., Alegría 1978; Roe 2005; Siegel 1992) but also from within the Antilles (Rodríguez Ramos 2003b, 2005a).

The possibility that the articulation of the late precolonial landscape of the Antilles resulted from the multiple nodes of development of different ancestral groups within a connected landscape rather than from the dendritic diversification from a single ancestral cultural stock in a circumscribed space leads me to argue for a reticulate model for Antillean archaeology in contrast to the phylogenetic one that is prevalent thus far. As Terrell (1998, 2004) has noted in the Pacific, this type of model is most adept for addressing situations that feature plural scenarios where multiple developments that constitute each other over the long term are registered. Rather than assuming a single descent, it opens the door for addressing the anthropological processes that take place in a cultural landscape formed by multiple networks of people with different ancestries interacting with each other for extended periods of time. This results in a situation where the "reconstruction of ancestors is not possible" for particular cultural manifestations due to their hybrid character (Dewar 1995:312), as is the case hereby presented. The application of a reticulate model in the Antilles could accommodate the possible linguistic and biological variability that existed within and between the islands as well as the cultural variability evidenced through time without the limitations imposed by assuming a singular ancestral cultural, linguistic, and biological stock. By incorporating this reticulate model, we will be able

to describe the "interwoven structure of the multiple ethnic groups" that inhabited the Antilles, as Cody (1998:32) has successfully done in Grenada.

According to Terrell (2004:210), this model is particularly adept for situations in which peoples are connected by water, where multiple concomitant social, cultural, biological, and linguistic developments result from the "reticulate comings and goings of people from island to island." However, in contrast to other islandscapes such as those of the Pacific, the Antillean archipelago is surrounded by continents, which demands us to explore the interactions not only within and between the islands but also with the inhabitants of those continental regions. Therefore, this reticulate model also opens the door for desinsularizing the archaeology of the Antilles and for incorporating the macro-regional interactions within which this plural scenario was articulated, as will be indicated below.

From the Antilles to the Greater Caribbean

With this work, I have also attempted to show that the data that is being generated in the Antilles indicates much closer relationships to the processes that were taking place in surrounding continental regions beyond northeastern South America, particularly in the Isthmo-Colombian area, that are worthy of examination not only by those of us working in the insular Caribbean but also in those continental regions. It is very likely that these macro-regional relationships, in tandem with the multiple interactions that were taking place within the Antilles, served to constitute the aforementioned culturally plural scenario registered in the islands through time. Although I have focused my attention on the materiality indicative of those historical relationships, we have to take into consideration the fact that in the articulation of interaction networks most of these social transactions usually emphasized the exchange of information. This, coupled with the fact that in these areas the circulated materials were probably mostly perishable as has been documented ethnohistorically (e.g., Amodio 1991; Ibarra

Rojas 1990; Langebaek 1996; Lathrap 1973), make evident that the available data underestimates the magnitude of these processes.

The fact that most of the aforementioned archaeological indicators of such interactions are registered between the Greater Antilles and the Isthmo-Colombian area, being either inexistent or occurring in later contexts in the Lesser Antilles and northeastern South America, seems to indicate the possible articulation of transcaribbean vectors of interaction, as had been proposed by Callaghan (1990, 2003) on the basis of his computer based navigation models. This argues against Allaire's (1999:727) indications that, if interactions between these areas occurred, they took place "not in a circular manner [i.e, through the sea], as a maritime basin would suggest (because the gap to Cuba was never filled), but in a linear way [i.e, through the coast], like a domino effect." Allaire (1999:726) bases this suggestion partly on the premise that "No true 'sea peoples' were developed [in the Caribbean area] to engage in massive long-distance migrations…" and that "Maritime trade was therefore always limited." This downgrading of the navigational capacities of the indigenous peoples of the Antilles is unwarranted, especially when considering that these people not only came to the islands via the sea, but also lived within the Caribbeanscape for more than 6000 years and were the first navigators in this hemisphere to engage in long-distance maritime translocations.

On the other hand, the existence of these macro-regional relationships provides credence to Helms' (1987) emphasis on the social importance of long-distance engagements in the Isthmo-Colombian area and the Antilles. However, in contrast to Helm's argument which circumscribes these long-distance relationships to chiefdom societies, the available data indicates that these have a much longer history, extending back into the time when our earliest ancestors entered the islands. Importantly, the artifacts that denote some of these interactions make evident that in

addition to having served as commodities in social transactions, they embodied the transmission of important mythical narratives between these areas. This should make us reconsider the common interpretation regarding the origins of Antillean symbolism as deriving from the "modern and ancient lowland South American mythic symbolism" (Roe 1995:157; see also Alegría 1978; Boomert 1987, 2000). Rather, as stated before, I would suggest that we start envisioning the mythical structures observed during the late precolonial setting of the islands as mosaics of syncretisms of locally developed elements with those from surrounding continental areas.

The temporal, structural, and ideographic concomitance observed in the shifts in the character of the interactions within and between the Antilles and the Isthmo-Colombian area through time indicates their continuous (albeit changing) and mutually influential nature on the peoples that moved and maintained relationships amid the different areas united by the Caribbeanscape. These shifts in the interaction circuits seem not only to have had effects at the macro-scalar level, but might have also influenced some of the changes that are observed at the scale of the community in the two areas. For instance, I argued that the collapse in the social and ideological structures that promoted the movement of shiny personal adornments around A.D. 500 in the Isthmo-Colombian region and the Antilles was somehow related to the fissioning of the communities observed around that same date in Puerto Rico (Torres 2005), as well as on the marked social changes observed in Costa Rica during this period (Hoopes 2005). This indicates that there were different, albeit connected, scales of interaction that might have constituted each other in a fractal fashion (Brown et al. 2005). This underlines again the need to further address these interactions from a multiscalar perspective (Nassaney and Sassaman 1995; Sassaman

2005), which will allow us to understand the ways in which micro and macro processes in these different areas articulate and reproduce each other over the long term.

Although at this point I am in no position to suggest the directionality, magnitude, or character of these interregional engagements, the possibility that they existed should make those of us working in areas facing the Caribbean to establish a dialogue to address potential historical relationships between the ancient inhabitants of our territories. I am sure that by opening our eyes to each other's research, we'll come to the quick realization that we are working with different parts of a whole. In fact, just a browse of the collections housed in the Museo del Jade of Costa Rica revealed the presence of pieces that clearly have an Antillean derivation (e.g., Figure 7-2), thus making evident the multidirectional nature of these interactions. In this sense, I want to underline that my intention here has not been to view Puerto Rico and the rest of the Antillean chain as mere recipients of external influences, but rather as spaces whose inhabitants played an active and significant role in the articulation of the interaction circuits that took place within the Caribbeanscape through time. Therefore, instead of being marginal to the processes occurring in surrounding continental regions, the peoples of the Antilles were actually in the middle of all the action.

Interestingly enough, the geographic distribution of some of the introduced cultigens, shared iconographic themes, technological styles, raw materials, and architectural features that have been mentioned in this work seems to correspond spatially with what Steward (1948) identified as the Circum-Caribbean (which included the Isthmo-Colombian area and the Greater Antilles) (Figure 6-3) rather than to Rouse's (1960) definition of the Caribbean culture area (which is constituted by the Greater and Lesser Antilles and northeastern South America). However, I consider that the parallelisms that Steward observed in this area, instead of being

analogous elements resulting from responses to similar environmental contingencies or diffusion as he suggested, were the eventual outcome of the long-lived interaction networks that were established, reproduced, and reformulated locally by the peoples of these areas, whose vectors began to be delineated by the first groups that moved to the Antilles.

Figure 7-2. Squatted pendant on display at the Museo del Jade, Costa Rica.

This leads me to suggest, as already has been proposed by historians (Amodio 1991; Briceño Guerrero 2002; Vidal 2003) and geographers (Bentley 1999; Lewis 1999), the consideration of the Caribbean Basin as a geohistorical area of study, as it might provide a useful context to explore the nature, motivations, extent, duration, and effects that such interactions had

on the people that trekked through its waters. This will allow us to address the historical connections between the native inhabitants of our territories despite their cultural, social, biological, or linguistic particularities, and will make feasible understanding the millenary character of the Greater Caribbean as a landscape of plurality, as it is still today. In adopting this perspective we should conceptualize the Caribbean Sea, rather than as the space in between, as a fluid island encircled by land within which our precolonial histories intersected. Hopefully, this perspective will allow us to look beyond our particular culture areas and engage in the unitary agenda of addressing the Caribbean experience in wider horizontal and vertical scales.

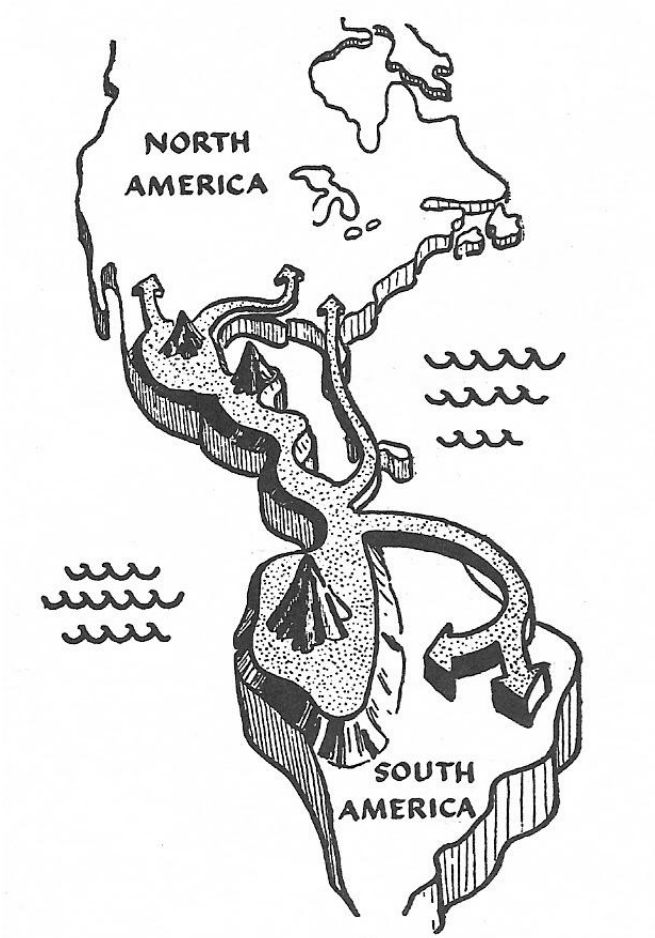

Figure 7-3. Julian Steward's model for the spread of Circum-Caribbean cultures. (After Rouse 1992, Figure 7).

Five Hundred Years of What? Some Final Thoughts

As has been made evident throughout this work, the precolonial history of Puerto Rico is a far cry from simple shifts in pottery styles. The available evidence indicates that our island in pre-Columbian times was anything but an island in cultural terms; it was a context where different peoples, traditions, histories, ideologies, and practices intersected and created the complex socio-cultural scenario that we are just starting to unravel.

The ground within which such complex socio-cultural scenario took place started to be transformed from its natural state into what it is today since the arrival of our earliest ancestors. These peoples not only humanized the ecosystem but also introduced some of the foods that we still serve in our kitchens, some of which we continue to prepare with recipes that were handed down between generations through millennia since the earliest occupations of the island.

The reproduction of some of these practices through such a long stretch of time shows a history that, far from being one of "sitting ducks" (Rouse 1992:71) at the mercy of the colonial shooters, is one of continuous resistance which has allowed us to retain and negotiate our identities despite those colonial forces that are still in operation in the island today. It has been my aim to show that such history of resistance has its roots in our precolonial past, and that it is time that we study such past using models that are emancipated from the colonialist narratives that serve to keep us stuck as the last colony in the world.

It has also been my aim to show that our history did not start when the Spaniards arrived to our shores 500 years ago. That history has a much deeper past, which goes back to when our earliest indigenous ancestors discovered the island. The developments of those peoples in concomitance with those of the later immigrants to the island and the interactions registered between all of them led to the configuration of the indigenous societies that encountered Columbus upon his arrival. This leads me to the conclusion that what is classed under the

“Taíno,” the initial layer of our historical cake, is the lattice created by the amalgam of internal developments, external influences, combinations of different ancestral traditions, multiscalar and multidirectional interactions, and the processes of change and reproduction that took place throughout our precolonial history. As such, our history is one that goes back to at least 6000 years ago, instead of the 500 years to which it has been limited thus far. It is the precolonial portion of those 6000 years of history that I have addressed to the extent of my abilities in the present work. Hopefully, this serves as a step forward in our understanding of such past and shows the need of continuing to further its understanding for the future generations of people of our island and those others with which we have shared this complex and long-lived history through time.

LIST OF REFERENCES

Aceituno Bocanegra, Francisco J.
2002 Interacciones fitoculturales en el Cauca Medio durante el Holoceno temprano y medio. *Arqueología del Area Intermedia* 4:89-113

Ahler, Stan A.
1989 Mass Analysis of Flaking Debris: Studying the Forest Rather than the Tree. In *Alternative Approaches to Lithic Analysis*, edited by D. O. Henry and G. H. Odell, pp. 85-118. Archaeological Papers of the American Anthropological Association, Number 1.
1993 Chapter 6: Chipped Stone Artifact Analysis. In *The Mud Wallow Site: An Archaeological Discovery at An Indian Health Service Water Line Project, Red Lake, Arizona*, by V. H. Clark, pp. 66-126. Navajo Nation Archaeology Department Report No. 92-145, Window Rock, Arizona.

Alegría, Ricardo E.
1955 La Tradición cultural arcaica antillana. In *Miscelánea de estudios dedicados al Dr. Fernando Ortiz por sus discípulos y amigos*, pp. 2-19. Editorial Academia: La Habana.
1965 On Puerto Rican Archaeology. *American Antiquity* 31(2):246-249.
1978 *Apuntes en torno a la mitología de los Indios Taínos de las Antillas Mayores y sus orígenes suramericanos*. Centro de Estudios Avanzados de Puerto Rico y el Caribe: San Juan.
1981 El uso de la terminología etnohistórica para designar las culturas aborígenes de las Antillas. *Cuadernos Prehispánicos* 8:2-30.
1983 *Ball Courts and Ceremonial Plazas in the West Indies*. Yale University Publications in Anthropology Number 79, New Haven.

Alegría, Ricardo E., H. B. Nicholson and Gordon R. Willey
1955 The Archaic Tradition of Puerto Rico. *American Antiquity* 21(2): 113-121.

Allaire, Louis
1985 Changement Lithiques Dans l'Archeologie de la Martinique. *Proceedings of the 10th International Congress for Caribbean Archaeology*, 299-310.
1997 The Lesser Antilles Before Colombus. In *Indigenous People of the Caribbean*, edited by S. Wilson, pp. 20-28. University Press of Florida, Gainesville.
1999 Archaeology of the Caribbean Region. In *The Cambridge History of the Native Peoples of the Americas*, Volume III, Part 1: South America, edited by F. Salomon and S. B. Schwartz, pp. 668-773. Cambridge University Press: Cambridge.

Alonso, Enrique
1995 *Fundamentos para la historia del Guanahatabey de Cuba*. Editorial Academia: La Habana.

Alonso, Orencio M.
1951 *El primer ídolo precolombino encontrado en Cuba*. Contribución del Grupo Guama, Núm. 19, Editorial Lex, La Habana.

Alvarado, Pedro A.
1992 *Estudios adicionales, PR-53, Guayama-Salinas*. Copies available at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.

Amodio, Emanuelle
1991 Relaciones interétnicas en el Caribe indígena: Una reconstrucción a partir de los primeros testimonios europeos. *Revista de Indias* 51(193):571-606.

Anderson, David G., D. W. Stahle and M. K. Cleaveland
1995 Paleoclimate and Potential Food Reserves of Missisipian Societies: A Case Study from the Savannah River Valley. *American Antiquity* 60(22):258-286.

Andrefsky, William
1998 *Lithics: Macroscopic Approaches to Analysis*. Cambridge University Press, Cambridge.

Appadurai, Arjun
1986 Introduction: Commodities and the Politics of Value. In *The Social Life of Things: Commodities in Cultural Perspective*, edited by A. Appadurai, pp. 3-63. Cambridge University Press: Cambridge.

Ardila, Gerardo
1996 *Los tiempos de las conchas*. Editorial Universidad Nacional:Bogotá.

Arnold, Jeanne E.
1992 Complex Hunter-Gatherers-Fishers of California: Chiefs, Specialists, and Maritime Adaptations in the Channel Islands. *American Antiquity* 57(1):60-84.
1995 Transportation Innovation and Social Complexity among Maritime Hunter-Gatherer Societies. *American Antiquity* 57:60-84.
1996 The Archaeology of Complex Hunters-Gatherers. *Journal of Archaeological Method and Theory* 3:77-126.

Arrom, José J.
2000 *Estudios de lexicología antillana*. Editorial Universidad de Puerto Rico: San Juan.

Arvelo, Lilliam and Erika Wagner
1984 Relaciones estilísticas cerámicas del noroeste de Sudamérica con las Antillas. In *Relaciones prehispánicas de Venezuela*, pp. 51-66, Fondo Editorial Acta Científica Venezolana, Caracas.

Atiles, Gabriel and Adolfo López
2005 El sitio arqueológico "La Punta de Bayahibe": Primeros agricultores tempranos de las Antillas asentados en la costa sureste de la isla de Santo Domingo. Electronic document, http://bayahib.blogspot.com/, accessed October 22, 2006.

Ayes Suárez, Carlos M.

1988 Evaluación arqueológica tipo Fase 2, Angostura, Florida Afuera, Barceloneta, Puerto Rico. Copies available at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.
1989 Angostura: un campamento Arcaico temprano del Valle del Manatuabón. *Revista Universidad de América* 1(2):24-37.
1991a Un ídolo zoomórfico arcaico descubierto en el barrio Pesas de Ciales. *Ecos de la Plazuela* 3(11):13-14.
1991b El descubrimiento de un dagolito arcaico en el barrio Garrochales de Arecibo. *Ecos de la Plazuela* 3(12):13-14.
1992 El vestido y el adorno corporal entre los arcaicos de nuestro archipiélago. *Horizontes* (febrero-abril):12-14.
1994 El descubrimiento de puntas de proyectil en el yacimiento Angostura. *Ecos de la Plazuela* 6(21):18-20.
1996 *La Cueva del Cupey*. Serie Arqueológica Publicación Ocasional no. 1. Centro Gráfico Grafito: Vega Baja.

Ayes Suárez, Carlos M. and Ovidio Dávila Dávila
1993 Angostura: Un campamento arcaico temprano del valle del Manatuabón Bo. Florida Afuera, Barceloneta, Puerto Rico. Copies available at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.
1995 Mitigación parcial del montículo A del yacimiento Angostura. Copies available at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.

Balser, Carlos
1954 A Fertility Vase from the Old Line, Costa Rica. *American Antiquity*, 20 (4): 384-387.
1961 Some Costa Rica Jade Motifs. En *Essays in Pre-Columbian Art and Archaeology*, S.K. Lothrop (ed.), pp. 210-217, Harvard University Press, Cambridge.

Bartone, Robert N. and John G. Crock
1993 Stone Industries at the Early Saladoid Trans Site, Monserrat, West Indies. *Proceedings of the 14th International Congress for Caribbean Archaeology*, 126-146.

Baudez, Claude F. and Michael D. Coe
1966 Incised Slate Disks from the Atlantic Watershed of Costa Rica: A Commentary. *American Antiquity* 31(3):441-443.

Bauer, Daniel E.
2007 The Reinvention of Tradition: An Ethnographic Study of Spondylus Use in Coastal Ecuador. *The Journal of Anthropological Research* 63:33-50.

Beets, C.J., S. R. Troesltra, P.M. Grootes, M-J Nadeau, K. van der Borg, A.F.M. de Jond, C.L. Hofman, and M.L.P. Hoogland
2006 Climate and Precolumbian Settlement at Anse a la Gourde, Guadeloupe, Northeastern Caribbean. *Geoarchaeology: An International Journal* 21(3):271-280.

Bentley, Jerry H.
1996 Cross-Cultural Interaction and Periodization in World History. *The American Historical Review* 101(3): 749-770.
1999 Sea and Ocean Basins as Frameworks of Historical Analysis. *Geographical Review* 89(2):215-225.

Bérard, Benoît
2007 Lithic Technology: A Way to More Complex Diversity in Caribbean Archaeology. In *New methods and techniques in the study of archaeological materials in the Caribbean*, edited by C. Hoffman, M. L. P. Hoogland, and A. van Gijn. University of Alabama Press: Tuscaloosa, in press..

Berman, Mary J. and Deborah M. Pearsall
2000 Plants, People, and Culture in Prehistoric Central Bahamas: A View from the Three Dog Site, an Early Lucayan Settlement on San Salvador Island, Bahamas. Latin American Antiquity 11(3):219-239.

Bernaldez, Andrés
1896 Historia de los Reyes Católicos Don Fernando y Dona Isabel. In *Biblioteca de autores españoles*, edited by Rosell, Cayetano, pp. 651-696. Ediciones Atlas: Madrid.

Binford, Lewis
1977 Forty-seven Trips. In *Stone Tools as Cultural Markers: Change, Evolution and Complexity*, edited by R.V.S. Wright. Prehistory and Material Culture Series, No. 12, pp. 24-36. Australian Institute of Aboriginal Studies, Humanities Press, Inc., New Jersey.

Binford, Lewis and George Quimby
1963 Indian Sites and Chipped Stone Materials in the Northern Lake Michigan Area. *Fieldiana Anthropology* 36:277-307.

Biord Castillo, Horacio
2006 Sistemas interétnicos regionales: el Orinoco y la costa norte de la actual Venezuela en los siglos XVI, XVII y XVIII. *Diálogos Culturales*: 85-118.

Boëda, E.
1993 Le Débitage Discoide et le Débitage Levallois Recurrent Centripéte. *Bulletin de la Societé Préhistorique Française* 90:392-304.

Bonzani, Renée M. and Augusto Oyuela Caycedo
2006 The Gift of the Variation and Dispersion of Maize: Social and Technological Context in Amerindian Societies. In *Histories of Maize*, edited by J. Staller, R. Tykot, and B. Benz, pp. 344-356. Academic Press: Massachusetts.

Boomert, Arie
1987 Gifts of the Amazon: "Green Stone" Pendants and Beads as Items of Ceremonial Exchange in Amazonian and the Caribbean. *Antropológica*, 67: 33-54.

2000 *Trinidad, Tobago and the Lower Orinoco Interaction Sphere: An Archaeological/Ethnohistorical Study*. Cairi Publications, Holanda.

Bray, Warwick
1977 Maya Metalwork and its External Connections. In *Social Process in Maya Prehistory: Studies in Honor of Sir Eric Thompson*, edited by N. Hammond, pp. 365-403. Academic Press: New York.

Briceño Guerrero, José M.
2002 Integración de la Región Caribe. *Boletín Antropológico* 20(54):535-542.

Brown, Clifford T., Walter R. T. Witschey, and Larry S. Liebovitch
2005 The Broken Past: Fractals in Archaeology. *Journal of Archaeological Method and Theory* 12(1):37-78.

Brumfiel, Elizabeth M.
1992 Distinguished Lecture in Archaeology: Breaking and Entering the Ecosystem-Gender, Class, and Faction Steal the Show. *American Anthropologist* 94:551-567.
2003 It's a Material World: History, Artifacts, and Anthropology. *Annual Review of Anthropology* 32:205-223.

Bullbrook, J.A. and Irving Rouse
1953 *On the Excavation of a Shell Mound at Palo Seco, Trinidad, British West Indies*. Yale University Publication in Anthropology, No. 50. Yale University, New Haven.

Burcher de Uribe, Priscilla
1996 *Origen de los animales domésticos*. Editorial de la Universidad de Antioquia:Medellín.

Burney, David A., Linda P. Burney and R. D. E. McPhee
1994 Holocene Charcoal Stratigraphy from Laguna Tortuguero, Puerto Rico, and the Timing of Human Arrival on the Island. *Journal of Archaeological Science* 21: 273-281.

Callaghan, Richard T.
1990 *Mainland Origins of the Preceramic Cultures of the Greater Antilles*. Department of Anthropology, University of Calgary. University Microfilms: Michigan.
1995 Antillean Cultural Contacts with Mainland Regions as a Navigation Problem. In *Actas del decimoquinto congreso internacional de arqueología del Caribe*, pp. 181-190, San Juan.
2003 Comments on the Mainland Origins of the Preceramic Cultures of the Greater Antilles. *Latin American Antiquity* 14(3):323-338.
2008 Patterns of Contact between the Islands of the Caribbean and Surrounding Mainlands as a Navigation Problem. In *Islands in the Stream: Interisland and Continental Interaction in the Caribbean*, edited by L.A. Curet. University of Alabama Press: Tuscaloosa, in press.

Carbone, Victor A.

1980 Some problems in cultural paleoecology in the caribbean area. In *Proceedings of the VIII International Congress for the Study of the Precolumbian Cultures of the Lesser Antilles*, edited by S. Lewenstein, pp. 98-126. Arizona State University Press: Tempe.

Carini, Stephen P.
2001 *Compositional Analysis of West Indian Saladoid Ceramics and their Relevance to Puerto Rican Prehistory*. Ph.D. Dissertation, University of Connecticut. University Microfilms, Ann Arbor.

Carlson, Betsy
2007 Side by Side: Two Prehistoric Villages in the Lower Rio Tanamá. Paper presented at Conservación práctica: La práctica de la conservación, San Juan, Puerto Rico.

Champion, Timothy
1990 Medieval Archaeology and the Tyranny of the Historical Record. In *From the Baltic to the Black Sea: Studies in Medieval Archaeology*, edited by D. Austin and L. Alsuck, pp. 79-95. Unwin Hyman: London.

Chanlatte, Luis A.
1976 *Investigaciones arqueológicas en Guayanilla, Puerto Rico, Parte 1*. Privately Printed, Santo Domingo.
1981 *La Hueca y Sorce (Vieques, Puerto Rico): Primeras Migraciones Agroalfareras Antillanas*. Privately Printed, Santo Domingo.
1983 Sourcé-Vieques: Climax Cultural del Igneri y su Participación en los Procesos Socioculturales Antillanos. *Proceedings of the 9th International Congress for Caribbean Archaeology*, 73-96.
1985 Asentamiento Agro-I, Complejo Cultural La Hueca, Vieques, Puerto Rico. *Proceedings of the 10th International Congress for Caribbean Archaeology*, 225-250.
1991 *El hombre de Puerto Ferro*. Museo de Antropología, Historia y Arte, San Juan.
1995 Presencia Huecoide en Hacienda Grande, Loíza. *Proceedings of the 15th International Congress for Caribbean Archaeology*, 501-509.

Chanltatte, Luis A. and Yvonne Narganes
1980 La Hueca, Vieques: nuevo complejo cultural agroalfarero en la Arqueología Antillana. *Proceedings of the 8th International Congress for Caribbean Archaeology*, 501-523.
1990 *La nueva arqueología de Puerto Rico (su proyección en las Antillas)*. Editora Taller: Santo Domingo.
2005 *Cultura La Hueca*. Museo de Historia, Antropología y Arte, Universidad de Puerto Rico, Río Piedras.

Chauviere, F.
1998 Les Industries Lithiques de Hope Estate. In *Fouille Programme du Site Amerindiene de Hope Estate, Saint Martin*, edited by D. Bonissent and C. Stouvenot, Appendix E, pp. 1-11. Service Regional de l'Archaeologie, San Martin.

Chenault, Mark L.

1986 Technical Analysis of Precolumbian Costa Rican Jadeite and Greenstone Artifacts. Unpublished Master's thesis, Department of Anthropology, University of Colorado, Boulder.
1988 Jadeite, Greenstone, and the Precolumbian Costa Rican Lapidary. In: *Costa Rican Art and Archaeology, Essays in Honor of Frederick R. Mayer*, edited by Frederick W. Lange, pp. 91-109. University of Colorado Press.

Clark, Jeffrey J., Jeffrey B. Walker and Reniel Rodríguez Ramos
2003 Depositional History and Evolution of the Paso del Indio Site, Vega Baja, Puerto Rico. *Geoarchaeology* 18(6): 625-648

Cobb, Charles R. (editor)
2003 *Stone Tool Traditions in the Contact Era*. University of Alabama Press: Tuscaloosa.

Cobb, Charles R.
2000 *From Quarry to Cornfield: The Political Economy of Mississippian Hoe Production*. University of Alabama Press: Tuscaloosa.

Cody, Anne
1991 Distribution of Exotic Stone Artifacts through the Lesser Antilles: Their Implications for Prehistoric Interaction and Exchange. *Proceedings of the 14th International Congress for Caribbean Archaeology*, 204-226.
1998 *Raiders and Traders: Caraïbe Social and Political Networks at the Time of European Contact and Colonization in the Eastern Caribbean*. Ph.D. Dissertation, University of California, Los Angeles. University Microfilms: Ann Arbor.

Collins, Michael B.
1975 Lithic Technology as a Means of Processual Inference. In *Lithic Technology: Making and Using Stone Tools*, edited by Earl Swanson, pp. 14-34. The Hague, Mouton.
1999 *Clovis Blade Technology*. University of Texas Press, Austin.

Coll y Toste, Cayetano
1897 *Prehistoria de Puerto Rico*. Editorial Vasco Americana, S.A.: Bilbao.

Cooke, Richard
1998 Cupica (Chocó): A Reappraisal of Gerardo Reichel-Dolmatoff's Fieldwork in a Poorly Studied Region of the American Tropics. En *Recent Advances in the Archaeology of the Northern Andes, In Memory of Gerardo Reichel-Dolmatoff*, A. Oyuela-Caycedo y J. Scott Raymond (eds.), pp. 91-108, The Institute of Archaeology Monograph 39, University of California, Los Angeles.
2005 Prehistory of Native Americans on the Central American Land Bridge: Colonization, Dispersal and Divergence. *Journal of Archaeological Research* 13(2):129-187.

Cooke Richard G. and Luis A. Sánchez
2001 El papel del mar en el Panamá pre-hispanico y del periodo del contacto: Redes locales y relaciones externas. *Revista de Historia* 43:15-60.

Cooke, Richard G., Ilean Isaza, John Griggs, Benoit Desjardings, and Luís Alberto Sánchez
2003 Who Crafted, Exchanged, and Displayed Gold in Pre-Columbian Panama? In *Gold and Power in Ancient Costa Rica, Panama, and Colombia*, edited by J. Quilter and J. W. Hoopes, pp. 91-158. Dumbarton Oaks, Trustees for Harvard University, Washington, D.C.

Cooke, Richard G., Luis A. Sanchez, Ilean I. Isaza and Aguilardo Perez
1998 Razgos mortuorios y artefactos inusitados de Cerro Juan Diaz, una aldea precolombina del Gran Cocle. *Revista La Antigua* 53:127-196.

Cooke, Richard G. and Warwick M. Bray
1985 The Goldwork of Panama: An Iconographic and Chronological Perspective. In *The Art of Precoloumbian Gold: The Jan Mitchell Collection*, edited by J. Jones, pp. 35-49. Wiedenfeld and Nicolson: London.

Correal Urrego, Gustavo, Leonor Herrera Angel, Marianne Cardale de Schrimpff and Carlos A. Rodríguez
2003 Estudio de los restos humanos y de fauna del sitio arqueológico Hacienda Malagana. *Revista de Arqueologia del Area Intermedia* 5:191-250.

Cosculluela, Jorge A.

1918 *Cuatro años en la Ciénaga de Zapata*. Edición de la Comisión Nacional Cubana de la UNESCO: La Habana.
1946 Prehistoric Cultures of Cuba. *American Antiquity* 1:10-19.

Crabtree, D. E.
1964 *An Introduction to Flintworking*. Occasional Papers of the Idaho Museum of Natural History, No. 28. Idaho Museum of Natural History, Pocatello.

Creamer, Winifred
1984 Costa Rican Trade in Context. In *Inter-Regional Ties in Costa Rican Prehistory*, edited by E. Skirboll and W. Creamer, pp. 179-202. BAR International Series No. 226, Oxford.

Crespo Torres, Edwin
2000 Estudio comparativo biocultural entre dos poblaciones prehistóricas de la isla de Puerto Rico: Punta Candelero y Paso del Indio. Unpublished Ph.D. Dissertation, Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México, México.
2004 Análisis osteológico de restos humanos procedentes de Maruca: Un sitio precerámico al sur de Puerto Rico. In Excavaciones en el yacimiento Arcaico de Maruca, Ponce, Puerto Rico, compiled by Miguel Rodríguez López, Appendix 7. Report on file at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.
2005 La cultura Huecoide y su conexión con la introducción de la práctica de la deformación cefálica intencional en las Antillas. In *Cultura La Hueca*, edited by L. Chanlatte Baik

and Y. Narganes Storde. Museo de Historia, Antropología y Arte, Universidad de Puerto Rico, Río Piedras.

Crock, John G.
1995 The Forest North Site and Post Saladoid Settlement in Anguilla. *Proceedings of the Sixteenth International Congress for Caribbean Archaeology*, pp. 74-87, Guadeloupe.
2000 *Inter-island Interaction and the Development of Chiefdoms in the Eastern Caribbean*. Ph.D. Dissertation, University of Pittusburgh. University Microfilms: Ann Arbor.

Crock, John G. and Robert N. Bartone
1998 Archaeology of Trants, Monserrat. Part 4: Flaked Stone and Stone Bead Industries. *Annals of the Carnegie Museum* 67(3):97-224.

Curet, Luis A.
1992 *The Development of Chiefdoms in the Greater Antilles: A Regional Study of the Valley of Maunabo, Puerto Rico*. PhD dissertation, Arizona State University. University Microfilms, Ann Arbor.
1998 New Formulae for Estimating Prehistoric Populations for Lowland South America and the Caribbean. *Antiquity* 72:359-375.
2003 Issues on the Diversity and Emergence of Middle-Range Societies of the Ancient Caribbean: A Critique. *Journal of Archaeological Research* 11(1):1-42.
2005 *Caribbean Paleodemography: Population, Culture-History, and Sociopolitical Processes in Ancient Puerto Rico*. University of Alabama Press: Alabama.

Curet, Luis A. , Lee A. Newsom, and Susanne de France
2006 Social and Cultural Change in the Civic and Ceremonial Center of Tibes, Ponce, Puerto Rico. *Journal of Field Archaeology* 31: 23-39.

Curet, Luis A. and Jose R. Oliver.
1998 Mortuary Practices, Social Development and Ideology in Precolumbian Puerto Rico. *Latin American Antiquity* 9(2):277-319

Curet, Luis A., Joshua M. Torres, and Miguel Rodriguez López
2004 Political and Social History of Eastern Puerto Rico: the Ceramic Age. In *LateCeramic Age Societies in the Eastern Caribbean* (A. Delpuech and C. L. Hoffman, eds): 59-86. BAR International Series 1274. Oxford: Archaeopress.

Dávila Dávila, Ovidio
1979 Excavaciones arqueológicas en Manatí. *Revista del Instituto de Cultura Puertorriqueña* 22(85):8-16.
1981 Cueva los Gemelos: Un yacimiento Arcaico de Morovis, Puerto Rico. Unpublished Master's Thesis, Estudios Puertorriqueños, Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan.
1985 El poblamiento aborigen precerámico de las Antillas. *Cuadernos Pehispánicos* 11:5-49.
2003 *Arqueología de la Isla de Mona*. Editorial Instituto de Cultura Puertorriqueña: San Juan.

Davis, David D.
1988 Coastal Biogeography and Human Subsistence: Examples from the West Indies. *Archaeology of Eastern North America* 16:177-185.

de la Rosa, Gabino
2003 La orientación este de los entierros aborígenes en cuevas de Cuba: Remate de una fábula. *Latin American Antiquity* 14(2):143-158.

de France, Susanne D.
1989 Saladoid and Ostionoid Subsistence Adaptations: Zooarchaeological Data from a Coastal Occupation on Puerto Rico. In *Early Ceramic Population*, edited by P. E. Siegel, pp. 57-77. BAR International Series 56. British Archaeological Reports, Oxford.

de France, Susanne D. and Lee A. Newsom
2005 The Status of Paleoethnobiological Research on Puerto Rico and Adjacent Islands. In Ancient Borinquen: Archaeology and Ethnohistory of Native Puerto Rico, edited by P. E. Siegel, pp. 122-184. University of Alabama Press: Tuscaloosa.

de Mille, Christy
1996 *Archaeological Investigations at Muddy Bay (PH-14), Antigua, West Indies: A Post-Saladoid Settlement*. Unpublished Master's Thesis, Department of Anthropology, Trent University, Ontario.

de Waal, Maaike S.
1993 *The Tools from the Hope Estate Excavations, Saint Martin, F.W.I.* Ms. on file, Archaeological-Anthropological Institute of the Netherlands Antilles, Curazao.
2006 *Pre-Columbian Social Organization and Interaction Interpreted through the Study of Settlement Patterns*. Ph.D. Dissertation, University of Leiden. Digital Printing Partners Utretch P.V.: Houten.

Deagan, Kathleen
2004 Reconstructing Taino Social Dynamics after Spanish Conquest: Gender and Class in Culture-Contact Studies. *American Antiquity* 69(4): 597-626.

Desrayaud, Gilles
2001 Ceramica monócroma esgrafiada/incisa de la Gran Nicoya (siglos I-XVI D.C.). *Journal de la Societé de Americanistes* 87:38-88.

Dewar, Robert E.
1995 Of Nets and Trees: Untangling the Reticulate and Dentritic in Madagascar Prehistory. *World Archaeology* 26(3):301-318.

Dickau, Ruth

2005 Resource Use, Crop Dispersals, and the Transition to Agriculture in Prehistoric Panama: Evidence from Starch Grain Analysis and Macroremains. Unpublished Ph.D. Dissertation, Department of Anthropology, Temple University, Philadelphia.

Dobres, Marcia-Anne
1995 Gender and Prehistoric Technology: On the Social Agency of Technical Strategies. *World Archaeology* 27(1):25-49.
2000 *Technology and Social Agency: Outlining a Practice Framework for Archaeology*. Blackwell: Oxford.

Dobres, Marcia-Anne and John E. Robb
2005 "Doing" Agency: Introductory Remarks on Methodology. *Journal of Archaeological Method and Theory* 12(3):159-166.

Duany, Jorge
2005 The Rough Edges of Puerto Rican Identities: Race, Gender and Transnationalism. *Latin American Research Review*, 40 (3): 177-190.

Durand, Jean F. and Henry Petijean Roget
1991 A Propos d'un Collier Funeraire, Morel, Guadeloupe: Les Huecoids Sont-Ils un Mythe? *Proceedings of the 12th International Congress for Caribbean Archeology*, 53-72, Martinique.

Edmonds, Mark
1995 *Stone Tools and Society*. B.T. Batsford Ltd.: London.

Espenshade, Christopher T.
2000 Reconstructing household vessel assemblages and site duration at an Early Ostionoid site from south-central Puerto Rico. *Journal of Caribbean Archaeology* 1:1-22.

Espenshade, Christopher T., Dennis Blanton, J. W. Joseph, and David Lorne
1986 *Site Specific Archaeological Survey and Additional Reconnaissance of Selected Portions of the Proposed Voice of America Relay Station, Cabo Rojo, Puerto Rico*. Copies available at the Puerto Rico State Historic Preservation Office, San Juan.

Espenshade, Christopher T. and Peter E. Siegel
2007 Detailed Phase II Archaeological Testing and Data Recovery Planning, Site PO-29, Portugues Dam and Pool, Puerto Rico. Copies available at the Puerto Rico State Historic Preservation Office, San Juan.

Evans, Clifford and Betty J. Meggers
1960 *Archaeological Investigations in British Guiana*. Bureau of American Ethnology, Bulletin 197. Smithsonial Institution, Washington D.C.

Fagan, Brian M.
1997 *Clash of Cultures*. AltaMira Press: Walnut Creek.

Falchetti, Ana
1995 El oro del Gran Zenú. Banco de la República: Bogotá.

Farber, Brigitte
1989 Saladoid Settlement Patterns on St. Croix. *In Early Ceramic Population Lifeways and Adaptive Strategies in the Caribbean*, edited by P. E. Siegel, pp. 29-42. BAR International Series 506. British Archaeological Reports, Oxford.

Febles, Jorge
1988 *Manual para el Estudio de la Piedra Tallada de los Aborígenes de Cuba*. Editora de la Academia de Ciencias de Cuba, La Habana.

Febles, Jorge and Guillermo Baena
1995 La industria de piedra tallada del sitio arqueológico Medialuna, El Guaso, Provincia de Guantánamo. In *Contribuciones al conocimiento de las industrias líticas en comunidades aborígenes de Cuba*, edited by J. Febles, pp. 4-6. Editorial Academia: La Habana

Fernández Esquivel, Patricia
1999 Símbolos de prestigio y expresiones de rango en la Costa Rica prehispánica. In *Oro y jade en la Costa Rica prehispánica*, pp. 38-66. Museo del Oro, Bogotá.
2005 *Oro precolombino de Costa Rica.* Fundación Museos del Banco Central, San José.
2006 *Artesanos y piedras: Herramientas y escultura precolombina en Costa Rica*. Fundación Museos del Banco Central, San José.

Fernández Méndez, Eugenio
1979 *Arte y mitología de los indios Taínos de las Antillas Mayores*. Ediciones El Cemí: San Juan.

Ferrero, Luis
1981 *Costa Rica precolombina*. Editorial Texto Ltda.: San Jose.

Fewkes, Jesse W.
1907 *The Aborigines of Porto Rico and the Neighboring Islands*. Government Printing Office: Washington.
1908 Prehistoric Culture of Cuba. *American Anthropologist* 6(5):585-598.

Figueredo, Alfredo
1976 Caño Hondo, un residuario precerámico en la isla de Vieques. Proceedings of the Sixth International Congress of Caribbean Archaeology, pp. 247-252, Guadeloupe.

Figueroa, Jesús
1991 La Fase Arcaica Cayo Cofresí y las Culturas Recolectoras de las Antillas. . Unpublished Master's Thesis, Estudios Puertorriqueños, Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan.

Fitzpatrick, Scott M.
2006 A Critical Approach to ^{14}C Dating in the Caribbean: Using Chronometric Hygiene to Evaluate Chronological Control and Prehistoric Settlement. *Latin American Antiquity* 17(4):389-418.

Flenikken, Jeffrey
1981 *Replicative Systems Analysis: A Model Applied to the Vein Quartz from the Hoko River Site*. Washington State University Laboratory of Anthropology Reports of Investigations, No. 59. Washington State University, Pullman.

Ford, James A.
1969 *A Comparison of Formative Cultures in the Americas: Diffusion or the Psychic Unity of Man*. Smithsonian Contributions to Anthropology Vol. 2, Smithsonian Institution Press: Washington D.C.

Fortuna, Luis
1980 El maíz en la dieta indígena. *Boletín del Museo del Hombre Dominicano* 13:159-169.
1981 Informe palinológico. In *Estudio de cuatro nuevos sitios paleoarcaicos en la Isla de Santo Domingo*, edited by Ortega, Elpidio and José Guerrero, pp. 83-89. Editora Taller: Santo Domingo.

Futato, Eugene M.
1995 The Lithic Assemblage from Site PO27, Plan Bonito, Cerrillos River Valley, Ponce, Puerto Rico. Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis.

Gamble, Lynn H.
2002 Archaeological Evidence for the Origin of the Plank Canoe in North America. *American Antiquity* 67(2):301-315.

García Goyco, Osvaldo
1984 *Influencias Mayas y Aztecas en los Tainos de las Antillas Mayores*. Editorial Xibalbay: San Juan.
1998 Proposal for the Analytical Studies and Final Report for the Paso del Indio Archaeological Site, Vega Baja, Puerto Rico. Manuscript on file, Puerto Rico State Historic Preservation Office, San Juan.

García Goyco, Osvaldo and Adalberto Maurás Casillas
1993 Proyecto extensión al plan de mitigación arqueológica del Área de Impacto de la Carretera PR-22, sector Paso del Indio, Río Abajo, Vega Baja, Puerto Rico. Copies available from the Instituto de Cultura Puertorriqueña, San Juan, Puerto Rico.

González, Dyalma

1995 The Ciboney Culture Complex in Cuba. In *Proceedings of the XVth International Congress for Caribbean Archaeology*, edited by Alegría, Ricardo and Miguel Rodríguez, pp. 263-272. Editora Corripio: Santo Domingo.

González Colón, Juan
1984 *Tibes: Un Centro Ceremonial Indígena.* Masters Thesis. San Juan: Centro de Estudios Avanzados de Puerto Ricoy el Caribe.
2006 Evaluación de Recursos Culturales Fase II, Sitio Praderas, Gurabo, Puerto Rico. Report on file at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.

Goodfriend, G. A. and D. G. Hood
1983 Carbon Isotope Analysis of Land Snail Shells: Implications for Carbon Sources and Radiocarbon Dating. *Radiocarbon* 25(3): 810-830.

Goodwin, Christopher R.
1979 The Prehistoric Cultural Ecology of St. Kitts, West Indies: A Case Study in Island Archaeology. Unpublished Ph.D. Dissertation, Department of Anthropology, Arizona State University, Tucson.

Goodwin, Christopher R. and Jeffrey B. Walker
1975 Villa Taína de Boquerón: The Excavation of an Early Taino Site in Puerto Rico. Interamerican University Press: San Juan.

Gosden, Chris
2004 *Archaeology and Colonialism: Cultural Contact from 5000 B.C. to the Present*. Cambridge University Press: Cambridge.
2005 What Do Objects Want? *Journal of Archaeological Method and Theory* 12(3):193-211.

Gosden, Chris and Yvonne Marshall
1999 The Cultural Biography of Objects. *World Archaeology* 31(2): 169-178.

Granberry, Julian W. y Gary S. Vescelius
2004 *Languages of the Pre-Columbian Antilles*. Tuscaloosa: University of Alabama Press.

Grayson, Donald K.
2001 The Archaeological Record of Human Impacts on Animal Populations. *Journal of World Prehistory* 15(1):1-68.

Griggs, John C.
2005 *The Archaeology of Central Caribbean Panama*. Ph.D. Dissertation, University of Texas, Austin. University Microfilms: Ann Arbor.

Grinker, Robert R.
1994 *Houses in the Rainforest: Ethnicity and Inequality among the Farmers and Foragers in Central Africa*. University of California Press: Berkeley.

Grossman & Associates, Inc.
1990 Excavation and Analysis Results of Archaeological Investigations at Medianía Alta (LO 23) and Vieques (LO 22), Loíza, Puerto Rico. Copies available at the State Historic Preservation Office, San Juan, Puerto Rico.

Guerrero Miranda, Juan Vicente
1986 El contexto del jade en Costa Rica. *Vínculos* 12(1-2):171-188.
1993 The Context of Jade in Costa Rica. In *Precolumbian Jade: New Geological and Cultural Interpretations*, edited by Frederick W. Lange, pp. 191-202. University of Utah Press: Salt Lake City.

Haller, Mikael J.
2004 The Emergence and Development of Chiefly Societies in the Rio Parita Valley, Panama. Unpublished Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh, Pittsburgh.

Harlow, George E.
1993 Middle American Jade: Geologic and Petrologic Perspectives on Variability and Source. In *Precolumbian Jade: New Geological and Cultural Interpretations*, edited by F. W. Lange, pp. 9-29. University of Utah Press: Salt Lake City.

Harlow, George E.
2007 Technical Report on Jadeite Celts from Puerto Rico. Manuscript on file at the Department of Earth and Planetary Sciences, American Museum of Natural History, New York.

Harlow, George E., A. Reg Murphy, David J. Hozjan, Christy N. de Mille, and Alfred A. Levinson.
2006 Pre-Columbian Jadeite Axes from Antigua, West Indies. *Canadian Mineralogist* 44:305-321.

Harrington, Mark R.
1921 Cuba Before Columbus. Indian Notes and Monographs, Volume II, Part 1. Heye Foundation: New York.
1924 A West Indian Gem Center. *Indian Notes* 1(4):184-189.

Harris, Peter O. B..
1983 Antillean Axes/Adzes: Persistence of an Archaic Tradition. *Proceedings of the 9th Congress for Caribbean Archaeology*, 257-290.

Hastorf, Christine A.
2003 Andean Luxury Foods: Special Food for the Ancestors, Deities, and the Elite. *Antiquity* 545-554.

Haviser, Jay B.

1991a Preliminary Results from Test Excavations at the Hope Estate Site (SM-026), St. Martin. *Proceedings of the 13th International Congress for Caribbean Archaeology*, 647-666.
1991b Development of Prehistoric Interaction Sphere in the Northern Lesser Antilles. *Nieuwe West-Indische Gids* 65 (3-4):29-151.
1997 Settlement Strategies in Early Ceramic Age. *Indigenous People of the Caribbean*, edited by S. Wilson, pp. 57-69. University Press of Florida, Gainesville.
1999 Lithics. In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by C. L. Hofman and M.L.P. Hoogland, pp. 189-202. Faculty of Archaeology, Leiden University, The Netherlands.

Hayden, Brian
1994 Competition, Labor, and Complex Hunter-Gatherers. In *Key Issues in Hunter-Gatherer Research*, edited by E. S. Barch, Jr. and J. J. Ellama, pp. 223-239. Berg: Oxford.
1995 The Emergence of Prestige Technologies and Pottery. In *The Emergence of Pottery: Technology and Innovation in Ancient Societies*, edited by W. K. Barnett and J. W. Hoopes, pp. 257-265. Smithsonian Institution Press: Washington.

Headland, T. and L. Reid
1989 Hunters-Gatherers and their Neighbors from Prehistory to Present. *Current Anthropology* 30:43-46.

Heckenberger, Michael
2002 Rethinking the Arawakan Diaspora: Hierarchy, Regionality, and the Amazonian Formative. En *Comparative Arawak Histories*, editado por Fernando Santos y Jonathan Hill, pp. 99-121. University of Illinois Press: Illinois.
2004 *The Ecology of Power: Archaeology, History, and Memory in the Southern Amazon*. Routledge: New York.

Heinen, H. Dieter and Alvaro García Castro
2000 The Multiethnic Network of the Lower Orinoco in Early Colonial Times. *Ethnohistory* 47(3-4):561-579.

Helms, Mary W.
1987 Art Styles and Interaction Spheres in Central America and the Caribbean: Polished Black Wood in the Greater Antilles. In *Chiefdoms in the Americas*, edited by R. D. Drennan and C. A. Uribe, pp. 67-83. University of America Pre

Herrera Fritot, René
1964 *Estudio de las Hachas Antillanas*. Empresa Consolidada de Artes Gráficas, Habana.

Higuera Gundy, Antonia, Mark Brenner, David Hodell, Jayson Curtis, Barbara Leyden y Michael Binford
1999 A 10,300 ^{14}C yr Record of Climate and Vegetation Change from Haiti." *Quaternary Research* 52:159-170.

Hocquenghem, Anne M. and Manuel Peña

1994 La talla del material malacológico en Tumbes. *Bulletin de L'Institut Francais D'Etudes Andines* 23(2):209-229.

Hodell, David A., Jason H. Curtis, Glenn A. Jones, Antonia Higuera-Gundy, Mark Brenner, Michael W. Binford, and Kathleen T. Dorsey
1991 Reconstruction of Caribbean Climate Change over the Past 10,500 Years. *Nature* 352:790-793.

Hofman, Corinne L.
1993 In Search of the Native Population of Pre-Columbian Saba. Part I. Pottery Styles and their Interpretations. Unpublished PhD dissertation, Leiden University, Leiden.
1999 Pottery. In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by C. L. Hofman and M.L.P. Hoogland, pp. 149-188. Faculty of Archaeology, Leiden University, The Netherlands.

Hofman, Corinne L. and Menno L. P. Hoogland
2004 Social Dynamics and Change in the Northern Lesser Antilles. In *Late Ceramic Age Societies in the Eastern Caribbean*, edited by A. Delpuech and C. L. Hofman, pp. 47-58. BAR International Series 1273, London.

Hofman, Corinne L. and L. Jacobs
2001 The Dynamics of Technology, Function and Style: A Study of Early Ceramic Age pottery from the Caribbean. *Newsletter of the Department of Pottery Technology* 18-19: 7-44. Leiden University, Leiden.

Holmes, William H.
1914 Areas of American Culture Characterization Tentatively Outlined as an Aid in the Study of the Antiquities. *American Anthropologist* 16:413-446.

Holtorf, Cornelius
2002 Notes on the Life History of a Pot Sherd. *Journal of Material Culture* 7(1):49-71.

Hoogland, Menno L.P.
1999 Methods and Strategies. In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by C. L. Hofman and M.L.P. Hoogland, pp. 129-148. Faculty of Archaeology, Leiden University, The Netherlands.

Hoogland, Menno L. P. and Corinne Hofman
1993 Kelbey's Ridge 2. A 14th Century Taino Settlement on Saba, Netherland Antilles. *Analecta Praehistorica Leidenesia* 26:161-181.

Hoopes, John
1994 The Tronadora Complex: Early Formative Ceramics in Northwestern Costa Rica. *Latin American Antiquity* 5(1):3-30.
1995 Interaction in Hunting and Gathering Societies as a Context for the Emergence of Pottery in the Central American Isthmus. In *The Emergence of Pottery: Technology and*

Innovation in Ancient Societies, edited by W. K. Barnett and J. W. Hoopes, pp. 185-198. Smithsonian Institution Press: Washington.
2005 The Emergence of Social Complexity in the Chibchan World of Southern Central America and Northern Colombia, A.D. 300-600. *Journal of Archaeological Research* 13(1):1-47.

Hoopes, John W. y Oscar M. Fonseca
2003 Goldwork and Chibchan Identity: Endogenous Change and Diffuse Unity in the Isthmo-Colombian Area. In *Gold and Power in Ancient Costa Rica, Panama, and Colombia*, edited by J. Quilter and J. W. Hoopes, pp. 49-89. Dumbarton Oaks, Trustees for Harvard University, Washington, D.C.

Houston, David
2001 *Vultures and Condors*. Colin Baxter Photography LTD: Scotland.

Ibarra Rojas, Eugenia
1992 *Las sociedades cacicales de Costa Rica*. Editorial Universidad de Costa Rica: San José.

Johnson, Mathew
1999 Commentary: Mute Passive Objects? *International Journal of Historical Archaeology* 3(2):123-129.

Jones, S.
1997 *The Archaeology of Ethnicity: Constructing Identities in the Past and Present*. Routledge: London.

Jouravleva, Irina
2002 Origen de la alfarería de las comunidades protoagroalfareras de la región central de Cuba. *Caribe Arqueológico* 6:35-43.

Joyce, Thomas A.
1972 *Central American and West Indian Archaeology, Being an Introduction to the Archaeology of the States of Nicaragua, Costa Rica, Panama, and the West Indies*. Phillip Lee Warner: London.

Keegan, William F.
1989a Creating the Guanahatabey (Ciboney): The Modern Genesis of an Extinct Culture. Antiquity 63(239): 373-379.
1989b Transition from a Terrestrial to a Maritime Economy: A New View of the Crab-Shell Dichotomy. In Early Ceramic Population Lifeways and Adaptive Strategies in the Caribbean, edited by Peter Siegel, pp. 119-128. BAR International Series 56.
1994 West Indian Aachaeology 1: Overview and Foragers. *Journal of Archaeological Research* 2: 255-284.
2004 Islands of Chaos. In *Late Ceramic Age Societies in the Eastern Caribbean*, edited by A. Delpuech and C. L. Hoffman, pp. 33-44. BAR International Series 1273, London.

2006 Archaic Influences in the Origins and Development of Taino Societies. *Caribbean Journal of Science* 42(1):1-10.
2007 *Taino Indians Myth and Practice: The Arrival of the Stranger King*. University of Florida Press: Gainesville.

Kelly, Robert L.
1995 *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways*. Smithsonian Institution Press: Washington D.C.

Kepecs, Susan
1997 Introduction to New Approaches to Combining the Archaeological and Historical Records. *Journal of Archaeological Method and Theory* 4(3/4):193-198.

Kirch, Patrick V.
1984 *The Evolution of Polynesian Chiefdoms*. Cambridge University Press: Cambridge.

Knippenberg, Sebastiaan
1995 Provenance of Flint and Chert in the Leeward Region, West Indies. *Proceedings of the 16th International Congress for Caribbean Archaeology*, 261-271.
1999a Lithic Procurement During the Saladoid Period within the Northern Lesser Antilles. Paper presented at the 18th International Congress for Caribbean Archaeology, Grenada.
1999b Lithics. In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by C. L. Hoffman and M.L.P. Hoogland, pp. 87-104. Faculty of Archaeology, Leiden University, The Netherlands.
1999c Lithics of Sorce, Vieques. MS on file, Centro de Investigaciones Arqueológicas, Universidad de Puerto Rico, San Juan, Puerto Rico.
2006 Stone Artifact Production and Exchange among the Northern Lesser Antilles. Ph.D. Dissertation, University of Leiden. DPP: Utrecht.

Kobayashi, Hiroaki
1975 The Experimental Study of Bipolar Flakes. In *Lithic Technology: Making and Using Stone Tools*, edited by E. Swanson, pp. 97-102. Mouton Publishers: Paris.

Kooyman, Brian.P.
2000 *Understanding Stone Tools and Archaeological Sites*. University of Calgary Press, Alberta.

Koski-Karell, Daniel
1993 Status Report on Archaeological Phase III Mitigation Investigation for the Condominio Flamboyán Project in Boquerón, Cabo Rojo. Copies on file at the Consejo para la Protección del Patrimonio Arqueólogico Terrestre de Puerto Rico, San Juan, Puerto Rico.

Kozlowski, Janus. K.
1975 *Las industrias de la piedra tallada de Cuba en el contexto del Caribe*. Serie Arqueológica, No. 5. Academia de las Ciencias de Cuba, Habana.

Krause A. Richard
1990 Coffee, Sugar and Baked Clay: From Prehistory to History in Puerto Rico's Cerrillo's River Valley. Submitted to the U.S. Army Corps of Engineers, Jacksonville District. Copies available at the Puerto Rico State Historic Preservation Office, San Juan, Puerto Rico.

Kuhn, Steven L.
1995 *Mousterian Lithic Technology: An Ecological Perspective*. Princeton University Press: New Jersey.

Kuijt, I., W. C. Prentiss and D. L. Pokotylo
1995 Bipolar Reduction: An Experimental Study of Debitage Variability. *Lithic Technology* 20(2):116-127.

Lalueza-Fox, C., M.T P. Gilbert, A. J. Martinez Fuentes, F. Calafell, and J. Bertranpetit
2003 Mitochondrial DNA from pre-Columbian Ciboneys from Cuba and the prehistoric colonization of the Caribbean. *American Journal of Physical Anthropology* 121: 97-108.

Lange, Frederick W.
1971 Northwestern Costa Rica: Pre-Columbian Circum-Caribbean Affiliations. *Folk* 13:43-64.
1993 Formal Classification of Prehistoric Costa Rican Jade. In *Precolumbian Jade: New Geological and Cultural Interpretations*, edited by Frederick W. Lange, pp. 269-288. University of Utah Press: Salt Lake City.

Langebaek, Carl H.
1992 *Noticias de caciques muy mayores: origen y desarrollo de sociedades complejas en el nororiente de Colombia y el norte de Venezuela*. Bogota: Editorial Universidad de Antioquia.

Langebaek, Carl H. (ed.)
2001 *Arqueología Regional en el Valle de Leiva: Procesos de Ocupación Humana en una Región de los Andes Orientales de Colombia*. Informes Arquelógicos del Instituto Colombiano de Antropología e Historia, No. 2, Bogotá, Colombia.

Langebaek, Carl H. and Alejandro Dever
2000 *Arqueología en el Bajo Magdalena: Un Estudio de los primeros agricultores del Caribe colombiano*. Informes Arqueológicos del Instituto Colombiano de Antropología e Historia, No. 1, Bogotá.

Lathrap, Donald W.
1970 *The Upper Amazon*. Thames and Hudson, London.
1973 The Antiquity and Importance of Long-Distance Trade Relationships in the Moist Tropics of Pre-Columbian South America. *American Antiquity*, 5 (2): 170-186.
1987 The Introduction of Maize in Pre-historic Eastern North America: The View from Amazonia and Santa Elena Peninsula. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by W.F. Keegan, pp. 345-371, Occasional Papers 7, Southern Illinois University, Center for Archaeological Investigations, Carbondale.

Legast, Anne
1980 *La fauna en la orfebrería Sinú*. Publicaciones de la Fundación de Investigaciones Arqueológicas Nacionales, Núm. 9, Litografía Arco, Bogotá.

Lemonnier, Pierre
1989 Bark Capes, Arrowheads, and Concord: On Social Representations of Technology. In *The Meaning of Things: Material Culture and Symbolic Expression*, edited by I. Hodder, pp. 156-176. Unwyn Hyman: London.
1992 *Elements for an Anthropology of Technology*. Museum of Anthropology, University of Michigan, Ann Arbor.
1998 Towards an Anthropology of Technology. *Man* 24(3):526-527.

Lewenstein, Susanne
1980 Analyzing Chipped Stone Artifacts: The Study of Lithic Technology, Function and Exchange. *Proceedings of the 8th International Congress for Caribbean Archaeology*, 406-425.

Lewis, Martin W.
1999 Dividing the Ocean Sea. *Geographical Review* 89(2):188-214.

Lightfoot, Kent G.
1995 Culture Contact Studies: Redefining the Relationship between Prehistoric and Historical Archaeology. *American Antiquity* 63:199-217.

Lightfoot, Kent G., Antoinette Martinez, and Ann M. Schiff
1998 Daily Practice and Material Culture in Pluralistic Social Settings: An Archaeological Study of Culture Change and Persistence from Fort Ross, California. *American Antiquity* 69:119-222.

Linares, Omar J.
1987 Evidencias de domesticación en cánidos precolombinos del oriente de Venezuela. *Boletín de la Asociación Venezolana de Arqueología* 4: 38-48.

Linville, Marlene S.
2005 *Marine Shell as Medium in Amerindian Aruba*. Ph.D. Dissertation, Department of Anthropology, City University of New York. University Microfilms: Ann Arbor.

Liston, Jolie
2005 As Assessment of Radiocarbon Dates from Palau, Western Micronesia. *Radiocarbon* 47(2):295-354.

López de Molina, Diana and Daniel Molina Feal
1988 Archaeological Data Recovery at La Planta (L-19), Loiza, Puerto Rico. Report on file at the State Historic Preservation Office, San Juan.

López Sotomayor, Diana
1975 Vieques: Un Momento de su Historia. Unpublished Master's Thesis, Department of Anthropology, Universidad Nacional Autónoma de México, México, D.F.

Lothrop, Samuel K.
1955 Jade and String Sawing in Northeastern Costa Rica. *American Antiquity* 21(1):43-51.

Luedke, Barbara E.
1992 *An Archaeologist's Guide to Chert and Flint*. Archaeological Research Tools No. 7, University of California, Los Angeles.

Luna Calderón, Fernando
1996 Caracteristicas del cementerio indigena de Punta Cana, Republica Dominicana. In *Ponencias del Primer Seminario de Arqueología del Caribe*, edited by Marcio Veloz and Caba, Angel, pp. 15-28. Museo Regional Altos de Chavón: La Romana.

Lundberg, Emily R.
1980 Old and New Problems in the Study of Antillean Aceramic Traditions. *Proceedings of the 8th International Congress for Caribbean Archaeology*, 131-138.
1985a Interpreting the Cultural Association of Aceramic Deposits in the Virgin Islands. *Journal of Field Archaeology* 12:201-212.
1985b Settlement Pattern Analysis for South Central Puerto Rico. In *Archaeological Data Recovery at El Bronce, Puerto Rico- Final Report, Phase* 2 (L. S. Robinson, ed.): 1-23 (Appendix L.). Archaeological Services, Inc., Army Corps of Engineers, Jacksonville District, Jacksonville, Florida.
1989 *Preceramic Procurement Patterns at Krum Bay, Virgin Islands*. Unpublished Ph.D. Dissertation, Department of Anthropology, University of Illinois, Urbana.
1991 Interrelationships among preceramic complexes of Puerto Rico and the Virgin Islands. In Ayubi, E. N., and Haviser, J. B. (eds.), *Proceedings of the XIII International Congress for Caribbean Archaeology*, Reports of the Archaeological-Anthropological Institute of the Netherlands Antilles, Curaçao, pp. 73-85.

Lundberg, Emily R. and Ken S. Wild
2006 Virgin Islands Monserrate Complex: An Initial Understanding Emerges through Compliance Archaeology. Paper presented at the 71st Meeting of the Society for American Archaeology, San Juan, Puerto Rico.

Lyman, R. Lee and Michael J. O'Brien
2004 A History of Normative Theory in Archaeology. *Journal of Archaeological Method and Theory* 11(4):369-396.

Maiz Lopez, Edgar J.
2002 El sitio arqueológico Hernández Colon: Actividades subsistenciales de los antiguos habitantes del Valle del Rio Cerrillos-Bucana, Ponce, Puerto Rico. Unpublished Masters Thesis, Estudios Puertorriqueños, Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan.

Marquardt, William H.
1985 Complexity and Scale in the Study of Fisher-Hunter-Gatherers: An Example from the Eastern United States. In *Prehistoric Hunter-Gatherers: The Emergence of Cultural Complexity*, edited by T. D. Price and J. A. Brown, pp. 59-98. Academic Press: Orlando.
1992 Dialectical Archaeology. In *Archaeological Method and Theory*, Vol. 4, edited by M. B. Schiffer, pp. 101-140. University of Arizona Press: Tucson.

Martin, Richard and Garth Bawden
1996 Introduction. In *Environmental Disasters and the Archaeology of Human Response*, edited by G. Bawden and R. Martin, pp. 1-10. Anthropological Papers No. 7, Maxwell Museum of Anthropology, University of New México, Albuquerque.

Martínez, Roberto
1994 El Yacimiento Arcaico La Tembladera en Morovis, Puerto Rico. . Unpublished Master's Thesis, Estudios Puertorriqueños, Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan.

Martínez-Cruzado Juan C., G. Toro-Labrador, V. Ho-Fung., M.A. Estévez-Montero, A. Lobaina-Manzanet, D. A. Padovani-Claudio, H. Sánchez-Cruz, P. Ortíz-Bermúdez, A. Sánchez-Crespo
2001 Mitochondrial DNA analysis reveals substantial Native American ancestry in Puerto Rico. *Human Biology* 73: 491-511.

Martínez-Cruzado Juan C., G. Toro-Labrador, J. Viera-Vera, M. Rivera-Vega, J. Startek, M. Latorre-Esteves, A. Román-Colón, R. Rivera-Torres, I. Y. Navarro-Millán, E. Gómez-Sánchez, H. Caro-González H, P. Valencia-Rivera
2005 Reconstructing the population history of Puerto Rico through mtDNA phylogeographic analysis. *American Journal of Physical Anthropology* 128:131-155.

Mártir de Anglería, Pedro
1944 *Décadas del Nuevo Mundo*. Editora Libre: Buenos Aires.

Massuci, Maria A.
1995 Marine Shell Bead Production and the Role of Domesticated Craft Activities in the Economy of the Guangala Phase, Southwest Ecuador. *Latin American Antiquity* 6(1):70-84.

Mauss, Marcel
1990 *The Gift: The Form and Reason for Exchange in Archaic Societies*, translated by W. D. Halls. Norton: New York.

Mayo Torné, Julia del Carmen
2004 La industria prehispánica de concha marina en "Gran Coclé", Panamá. Unpublished Ph.D. dissertation, Departamento de Historia de América II, Universidad Complutense de Madrid, Madrid.

Mc Ginnis, Shirley A.
1997 *Ideographic Expression in the Precolumbian Caribbean*. PhD. dissertation, University of Texas at Austin, Austin. University Microfilms: Ann Arbor.

Meggers, Betty J. and Clifford Evans
1983 Lowland South America and the Antilles. In *Ancient South Americans*, edited by J. D. Jennings, pp. 287-335. W. H. Freeman and Company: San Francisco.

Montcourt de Kosan
1983 Características craneológicas de los indígenas precolombinos de Cano Rico, Estado Aragua, Venezuela. In *Proceedings of the Ninth International Congress for the Study of the Pre-Columbian Cultures of the Lesser Antilles*, pp. 399-407, Montreal.

Moore, C.
1991 Cabaret: Lithic Workshop Sites in Haiti. *Proceedings of the Thirteenth International Congress for Caribbean Archaeology*, pp. 92-102, Curacao.

Moscoso, Francisco
1999 *Sociedad y economía de los Taínos*. Editorial Edil, San Juan.

Munizaga, Juan R.
1992 Antropologia física de los Andes del Sur. In *Prehistoria sudamericana: Nuevas perspectivas*, edited by B. J. Meggers, pp. 65-76. Taraxacum: Washington.

Murra, John V.
1982 El tráfico de *mullu* en la costa del Pacífico. In *Primer simpsio de correlaciones antropológicas andino-mesoamericanas*, edited by J. E. Marcos and P. Norton, pp. 265-273. Escuela Superior Politécnica del Litoral (Espol), Guayaquil.

Narganes, Yvonne
1985 Restos faunísticos vertebrados de Sorcé, Vieques, Puerto Rico. *Proceedings of the 10th International Congress for the Study of the Pre-Columbian Cultures of the Lesser Antilles*, 251-264.
1991 Secuencia cronológica de dos sitios arqueológicos de Puerto Rico (Sorcé, Vieques y Tecla, Guayanilla). *Proceedings of the 14th International Congress for Caribbean Archaeology*, 628-646.
1995 La lapidaria de la Hueca, Vieques, Puerto Rico. *Proceedings of the 15th International Congress for Caribbean Archaeology*, 141-149, San Juan.
2004 Análisis de los restos faunísticos, yacimiento Maruca, Ponce, Puerto Rico. In Excavaciones en el yacimiento Arcaico de Maruca, Ponce, Puerto Rico, compiled by Miguel Rodríguez López, Appendix 5. Report on file at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.
2007 Nueva cronologia de varios sitios de Puerto Rico y Vieques. *Proceedigns of the 21st International Congress for Caribbean Archaeology*, Trinidad, in press.

Nassaney, Michael S. and Kenneth S. Sassaman [eds.]

1995 *Native American Interactions: Multiscalar Analyses and Interpretations in the Eastern Woodlands*. University of Tennessee Press: Knoxville.

Neff, Hector, Deborah M. Pearsall, John G. Jones, Barbara Arroyo, Shawn K. Collins, and Dorothy E. Freidel
2006 Early Maya Adaptive Patterns: Mid-Late Holocene Paleoenvironmental Evidence from Pacific Guatemala. *Latin American Antiquity* 17(3):287-315.

Newsom, Lee A.
1993 Native West Indian Plant Use. Unpublished Ph.D. Dissertation, Department of Anthropology, University of Florida, Gainesville.

Newsom, Lee A. and Deborah M. Pearsall
2003 Trends in Caribbean Archaeobotany. In *People and Plants in Ancient North America*, edited by Minnis, P. N., pp. 347-412. Smithsonian Books: Washington.

Newsom, Lee A. and Elizabeth S. Wing
2004 *On Land and Sea: Native American Uses of Biological Resources in the West Indies*. University of Alabama Press: Tuscaloosa.

Nyberg, Johan, Antoon Kuijpers, Björn A. Malmgren, and Helmar Kundzendorf
2001 Late Holocene Changes in Precipitation and Hydrography Recorded in Marine Sediments from the Northeastern Caribbean Sea. *Quaternary Research* 56:87-102.

Odell, George H.
2004 *Lithic Analysis*. Plenum Publishers: New York.

Oliver, José R.
1992 *Results of the Archaeological Testing and Data Recovery Investigations at the Lower Camp Site, Culebra Island, Puerto Rico*. Submitted to the U.S. Department of the Interior, National Park Service, Atlanta. Copies available from the State Office for Historical Conservation, San Juan, Puerto Rico.
1999 The "La Hueca Problem" in Puerto Rico and the Caribbean: Old Problems, New Perspectives, Possible Solutions. In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by C. L. Hofman and M. L.P. Hoogland, pp. 253-298.Faculty of Archaeology, Leiden University, The Netherlands.
2000 Gold Symblism among Caribbean Chiefdoms: Of Feathers, Çibas, and Guanín Power among Taíno Elites," In *Precolumbian Gold: Technology, Style and Iconography*, edited by C. McEwan, pp 196-219. British Museum Press: Londres.
2005a Comentarios en torno a La temprana introducción y uso de algunas plantas domésticas, silvestres y cultivos en las Antillas precolombinas de Jaime Pagán Jiménez et al. (Diálogo Antropológico 3(10), 2005). *Diálogo Antropológico* 10:35-41.
2005b The Proto-Taíno Monumental *Cemís* of Caguana: A Political-Religious "Manifesto." In *Ancient Borinquen: Archaeology and Ethnohistory of Native Puerto Rico*, edited by P. E. Siegel, pp. 230-284. University of Alabama Press: Tuscaloosa.

2006a Taíno Interaction and Variability Between the Provinces of Higüey, Eastern Hispaniola, and Otoao, Puerto Rico. Paper presented at the 71st Meeting of the Society for American Archaeology, San Juan.
2006b Review Article: 'People of the Caribbean: Cuba and Puerto Rico' *Antiquity* 80(308):475-477.

Oliver, José R. and Juan A. Rivera Fontán
2005 Trabajos adicionales en 'Los Bateyes de Vivi' (U-1), Vivi Arriba, Utuado. Report on file at the Puerto Rico State Historic Preservation Office, San Juan, Puerto Rico.

Oliver, José R., Juan A. Rivera Fontán, and Lee A. Newsom
1998 Arqueología del Barrio Caguana, Puerto Rico: Resultados preliminaries de las temporadas 1996-1997. In *Trabajos de Investigación Arqueológica en Puerto Rico: Tercer Encuentro de Investigadores*, edited by J. Rivera Fontán, pp. 7-26. Occasional Publication of the Division of Archaeology, Instituto de Cultura Puertorriqueña, San Juan.
2001 Proyecto Arqueológico Utuado-Caguana. Breve Resumen de las Actividades de Investigaciones y Análisis. Report on file at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.

Oliver-Smith, Anthony
1996 Anthropological Research on Hazards and Disasters. *Annual Review of Anthropology* 25:303-328.

Ortega, E., G. Atiles and J. Ulloa
2004 Investigaciones arqueológicas en el yacimiento La Iglesia, Provincia de Altagracia, República Dominicana. *Caribe Arqueológico*:

Ortiz Aguilú, José, Edgar J. Maiz, Jalil Sued Badillo, and Timothy R. Sara
2001 Palo Hincado, Puerto Rico: New Insights from Ongoing Investigations. Paper presented at the XIX International Congress for Caribbean Archaeology, Aruba.

Osgood, Cornelius
1942 *The Ciboney Culture of Cayo Redondo, Cuba.* Yale University Publications in Anthropology, Number 25. Yale University Press: New Haven.

Ostapkowicz, Joanna M.
1997 To Be Seated with "Great Courtesy and Veneration": Contextual Aspects of the Taíno Duho. In *Taíno: Pre-Columbian Art and Culture from the Caribbean*, edited by F. Bercht, E. Brodsky, J. A. Farmer, and D. Taylor, pp. 56-67. Monacelli Press: New York.

Oyuela-Caycedo, Augusto
1995 Rock versus Clay: The Evolution of Pottery Technology in the Case of San Jacinto 1, Colombia. In *The Emergence of Pottery: Technology and Innovation in Ancient Societies*, edited by Barnett, William A. and John W. Hoopes, pp. 133-144. Smithsonian Institution Press: Washington.

1996 The study of collector variability in the transition to sedentary food producers in Northern Colombia. *Journal of World Prehistory* 10(1): 49-93.
1998 Ideology, Temples, and Priests: Change and Continuity in House Societies in the Sierra Nevada de Santa Marta. In *Recent Advances in the Archaeology of the Northern Andes*, edited by A. Oyuela Caycedo and J. S. Raymond, pp. 39-53. Monography 39, The Institute of Archaeology, University of California, Los Angeles.
2002 El surgimiento de la rutinización religiosa: La conformación de la élite sacerdotal Tairona-Kogi. *Arqueología del Area Intermedia* 4:45-64.

Pagán Jiménez, Jaime R.
2002 Agricultura precolombina de las Antillas: retrospección y análisis. *Anales de Antropología* 36:43-91.
2003 Reporte de progreso: Estudio de almidones en artefactos líticos de los sitios arqueológicos SR-1 y Utuado-27, Proyecto Utuado-Caguana, Puerto Rico. Manuscript on file at the División de Arqueología, Instituto de Cultura Puertorriqueña, San Juan.
2005 Estudio interpretativo de la cultura botánica de dos comunidades precolombinas antillanas: La Hueca y Punta Candelero, Puerto Rico. Unpublished Ph.D. Dissertation, Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México.
2006a Uso de plantas en una comunidad Saladoide tardío del Este de Puerto Rico (Punta Candelero): estudio de residuos vegetales (almidones) en artefactos líticos, cerámicos, y de concha. Electronic document, http://arqueologiaantillana.blogspot.com/, accessed May 8, 2007.
2006b Envisioning Ancient Human Plant Use at the Rio Tanama Site #2 (AR-039) through Starch Análisis of Lithic and Clay Griddle Implements. Electronic document, http://arqueologiaantillana.blogspot.com/, accessed May 8, 2007.

Pagán Jiménez, Jaime R. and José R. Oliver
2007 Starch Residues on Lithic Artifacts from Two Constrasting Contexts in Northwestern Puerto Rico: Los Muertos Cave and Vega Nelo Vargas Farmstead. In *New methods and techniques in the study of archaeological materials in the Caribbean*, edited by C. Hoffman, M. L. P. Hoogland, and A. van Gijn. University of Alabama Press: Tuscaloosa, in press..

Pagán, Jaime R., Miguel Rodríguez, Luis A. Chanlatte and Ivonne Narganes
2005 La temprana introducción y uso de algunas plantas domésticas, silvestres y cultivos en Las Antillas precolombinas. *Diálogo Antropológico* 3(10):1-27.

Pagán Jiménez, Jaime and Reniel Rodríguez Ramos
2007 Sobre los orígenes de la agricultura en las Antillas. In *Proceedings of the XXIst International Congress for Caribbean Archaeology*, edited by Basil Reid. Trinidad-Tobago, West Indies, in press.
2008 Towards the Liberation of Archaeological Praxis in a "Postcolonial Colony" of a "Postcolonial" World: The Case of Puerto Rico. In *Post-colonialism and Archaeology*, edited by Matt Liebman and Uzma Z. Rizvi. Altamira Press: Lanham, in press.

Pantel, Agamemnon G.

1976 Excavations at the Preceramic Cerrillo Site, Southwest Puerto Rico. *Proceedings of the 6th International Congress for Caribbean Archaeology*, 269-271.
1984 Orígenes y Definición de la Cultura Taína: Sus Antecedentes Tecnológicos en el Precerámico. In *Las Culturas de América en la Epoca del Descubrimiento: La Cultura Taína*, edited by Comisión del Qunto Centenario, pp. 11-16. Turner Libros, Spain.
1986 The Lithic Remains. In *Monserrate Restudied: The 1978 C.E.A.P.R.C. Field Season at Luquillo Beach: Excavation Overview, Lithic, Malacological and Physical Anthropological Remains*, edited by P.G. Roe, pp. 47-53. Submitted to Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan. Copies available on from the Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan, Puerto Rico.
1988 *Precolumbian Flaked Stone Assemblages in the West Indies*. Ph D. dissertation, Department of Anthropology, University of Tennessee, Knoxville. University Microfilms, Ann Arbor.
1991 How Sophisticated Was the Primitive?: Preceramic Source Materials, Lithic Reduction Processes, Cultural Contexts and Archaeological Inferences. *Proceedings of the 14th International Congress for Caribbean Archaeology*, 57-169.
1996 Nuestra percepción de los grupos preagrícolas en el Caribe. *Caribe Arqueológico* 1:8-11.

Parry, William J. and Richard L. Kelly
1987 Expedient Core Technology and Sedentism. In *The Organization of Core Technology*, edited by J.K. Johnson and C.A. Morrow, pp. 285-304. Westview Press, Boulder.

Pauketat, Timothy R.
2001 Practice and History in Archaeology. *Anthropological Theory* 1(1):73-98.
2003 Resettled Farmers and the Making of a Missisipian polity. *American Antiquity* 68:39-66.

Paulsen, Allison C.
1974 The Thorny Oyster and the Voice of God: Spondylus and Strombus in Andean Prehistory. *American Antiquity* 39(4):597-607.

Perera, Miguel A.
1979 *Arqueología y arqueometría de las placas líticas aladas del occidente de Venezuela*. Universidad Central de Venezuela, División de Publicaciones, Caracas.

Pérez, Carlos
2007 Nuevas aportaciones del Valle de Turabo. Paper presented at the VII Encuentro de Investigadores de Arqueología y Etnohistoria, San Juan, Puerto Rico.

Perry, Linda
2005 Reassessing the Traditional Interpretation of "Manioc" Artifacts in the Orinoco Valley of Venezuela. *Latin American Antiquity* 16(4):409-426.

Petersen, James B.
1997 Taino, Island Carib, and Prehistoric Amerindian Economies in the West Indies: Tropical Forest Adaptations to Island Environments. In *The Indigenous People of the Caribbean*, edited by S. Wilson, pp. 118-130. University Press of Florida: Gainesville.

Petersen, James B., Corinne L. Hoffman and L. Antonio Curet
2004 Time and Culture: Chronology and Taxonomy in the Eastern Caribbean and the Guianas. In *Late Ceramic Age Societies in the Eastern Caribbean*, edited by A. Delpuech and C. L. Hofman, pp. 17-32. BAR International Series 1273, London.

Petersen, James B. and David Watters
1999 Is La Hueca Style Pottery Present at Trants? In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by C. L. Hofman and M, L.P. Hoogland, pp.299-302. Faculty of Archaeology, Leiden University, The Netherlands.

Pfaffenberger, Bryan
1988 Fetishised Objects and Humanized Nature: Towards an Anthropology of Technology. *Man* 23(2): 236-252.

Phillips, P. And G. R. Willey
1953 Method and Theory in American Archaeology: an Operational Basis for Culture - Historical Integration. *American Anthropologist* 55(5):615-633.

Pichardo, Felipe
1945 *Caverna, costa y meseta*. Impresora Marticorena: La Habana.

Piperno, Dolores
1998 Tropical Paleoethnobotany through Microfossil Analysis. *Journal of World Prehistory* 12(4):393-449.

Piperno, Dolores R. and Irene Holst
1998 The Presence of Starch Grains on Prehistoric Stone Tools from the Humid Neotropics: Indications of Early Tuber Use and Agriculture in Panamá. *Journal of Archaeological Science* 25:765-776.

Piperno, Dolores and Deborah Pearsall
1998 The Origins of Agriculture in the Lowland Neotropics. Academic Press: San Diego.

Pohl, Mary D., Kevin O. Pope, John G. Jones, John S. Jacob, Dolores R. Piperno, Susan D. de France, David L. Lentz, John A. Gifford, Marie E. Danforth, and J. Kathryn Josserrand
1996 Early Agriculture in the Maya Lowlands. *Latin American Antiquity* 7:355-372.

Polanyi, Karl
1968 *Primitive, Archaic, and Modern Economies*. Anchor Books: New York.

Pons de Alegría, Mela
1983 Las figuritas de barro de la Cultura Saladoide de Puerto Rico. In *Proceedings of the Ninth International Congress for the Study of the Pre-Columbian Cultures of the Lesser Antilles*, pp. 121-129, Montreal.

Prentiss, William C., M. Lenert, Thomas A. Foor, Nathan B. Goodale, and T. Schlegel
2003 Calibrated Radiocarbon Dating at Keatley Creek: The Chronology of Occupation at a Complex Hunter-Gatherer Site. *American Antiquity* 68(4):719-735.

Rainey, Froelich G.
1933 Puerto Rican Archaeology. Unpublished Ph.D. Dissertation, Department of Anthropology, Yale University, New Haven.
1940 Porto Rican Archaeology. *Scientific survey of Porto Rico and the Virgin Islands*. New York Academy of Science, vol. XVIII – Part 1.

Ramos, Marlene
2002 Informe de Investigación Arqueológica Fase II, Parcela Lilly-Caribe, Inc, Carolina, Puerto Rico. Report on file at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.
2006 Informe de Investigación Arqueológica Fase III, Punta Guayanés, Yabucoa, Puerto Rico. Report on file at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.
2007 Informe de Investigacion Arqueologica Fase III, Parcela RC-1A-Punta Candelero, Humacao, Puerto Rico. Report on file at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.

Ranere, Anthony J.
1975 Tool Making and Tool Use Among the Preceramic Peoples of Panama. In *Lithic Technology: Making and Using Stone Tools*, edited by E. Swanson, pp.173-209. Mouton Publishers: Paris.

Ranere, Anthony J. and Richard G. Cooke
1996 Stone Tools and Cultural Boundaries in Prehistoric Panama. En *Paths to Central American Prehistory*, editado por Frederick W. Lange, pp. 49-77. University Press of Colorado: Niwot.

Raymond, J. Scott
1998 Begginings of Sedentism in the Lowlands of Northwestern South America. In *Recent Advances in the Archaeology of the Northern Andes, in Memory of Gerardo Reichel-Dolmatoff*, edited by A. Oyuela Caycedo and J. S. Raymond, pp. 10-19. The Institute of Archaeology, Monograph 30, University of California, Los Angeles.

Renfrew, Colin
1986 Introduction: Peer Polity Interaction and Socio-Political Change. In *Peer Polity Interaction and Socio-Political Change*, edited by C. Renfrew and J. Cherry, pp. 1-18. Cambridge University Press: Cambridge.

Reyna Pérez, Pedro
2007 Primeros habitantes de Puerto Rico. *El Nuevo Día*, *Suplemento Especial*: *Historia Ilustrada de Puerto Rico*, 30 January 2007.

Rhindos, D. R.
1984 *The Origins of Agriculture: An Evolutionary Perspective*. Academic Press: Orlando.

Righter, Elizabeth
1997 The Ceramics, Art, and Material Culture of the Early Caramic Period in the Caribbean Islands. In *The Indigenous People of the Caribbean*, edited by S. M. Wilson, pp. 70-79. Universiy Press of Florida, Gainesville.

Riley, Thomas J., Richard Edging y Jack Rossen
1990 Cultigens in Prehistoric Eastern North America: Changing Paradigms. *Current Anthropology*, 31 (5): 525-541.

Rivera, Virginia
2000 Estudio preliminar de la distribución espacial en la comunidad aborigen del sitio Lujan 1, Vieques, Puerto Rico. Paper presented at *Semana de la Arqueología*, Oficina Estatal de Conservación Histórica, San Juan, Puerto Rico.

Rivera Fontán, Juan
1998 Proyecto arqueológico Bo. Quemado, Mayagüez (Batey del Delfín del Yagüez). In *Ocho trabajos de investigación arqueológica en Puerto Rico*, edited by J. Rivera Fontán, pp. 53-64. Publicación ocasional de la División de Arqueológica, Instituto de Cultura Puertorriqueña, San Juan.

Robiou Lamarche, Sebastian
1993 La navegación indígena Antillana. *Boletin del Museo del Hombre Dominicano* 25:69-115.
2003 *Taínos y Caribes: Las culturas aborígenes antillanas*. Editorial Punto y Coma: San Juan.

Rodríguez, Marisol and Carlos Ayes
1997 El Pulguero, Puerto Rico. Hallazgo de Cerámica en el Periodo Arcaico. Paper presented at the XVI International Congress for Caribbean Archaeology, Bahamas.

Rodríguez López, Miguel
1983 Prehistoria de Collores. Unpublished Masters Thesis, Estudios Puertorriquenos, Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan.
1987 Informe Arqueológico Fase II. Yacimiento Punta Candelero, Palmas del Mar, Humacao. Ms. on file at the Instituto de Cultura Puertorriqueña, San Juan, Puerto Rico.
1989 The Zoned-Incised Crosshatched (ZIC) Ware of Early Precolumbian Ceramic Age Sites in Puerto Rico and Vieques Island. In *Early Ceramic Population Lifeways and Adaptative Strategies in the Caribbean*, edited by P. E. Siegel. BAR International Series 506, pp. 249-266. British Archaeological Reports, Oxford.
1990 Arqueología del Río Loiza. In *Proceedings of the Congress of the International Association for Caribbean Archaeology*, pp. 287-294, San Juan.
1991 Excavaciones en Punta Candelero, Puerto Rico: Informe preliminar. *Proceedings of the 13th International Congress for Caribbean Archaeology*, 605-627.1992

1992 Diversidad Cultural Tardía en la Prehistoria del Este de Puerto Rico. Paper presented at the 57th Meetings of the Society for American Archaeology, Pittsburg.
1993 Early Trade Networks in the Caribbean. *Proceedings of the 14th International Congress for Caribbean Archaeology*, 306-314.
1997 Religious Beliefs of the Saladoid People. In *The Indigenous People of the Caribbean*, edited by S. M. Wilson, pp. 80-87. Universiy Press of Florida, Gainesville.
2003 *Arqueología de los "sin burenes" en Puerto Rico.* Paper presented at the 20th International Congress for Caribbean Archaeology, Santo Domingo.
2004 *Excavaciones en el yacimiento Arcaico de Maruca, Ponce, Puerto Rico: Informe Final*. Copies available at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.

Rodríguez López, Miguel and Virginia Rivera
1991 Puerto Rico and the Caribbean Pre-Saladoid "Crosshatch Connection". *Proceedings of the 11th International Congress for Caribbean Archaeology*, 45-52.

Rodríguez Ramos, Reniel
2001a Lithic Reduction Trajectories at La Hueca and Punta Candelero Sites, Puerto Rico: A Preliminary Report. In *Proceedings of the XVIII International Congress for Caribbean Archaeology, Grenada, West Indies,* Vol. 1, edited by Gerard Richard, pp. 251-261. Guadeloupe, West Indies.
2001b *Análisis tecnológico de la lítica de Salto Arriba, Utuado, Puerto Rico*. Submitted to CSA Architects and Engineers. Report on file at the Puerto Rico State Historic Preservation Office, San Juan, Puerto Rico.
2002a Dinámicas de intercambio en el Puerto Rico prehispánico. *Caribe Arqueológico* 2:16-22.
2002b Una perspectiva diacrónica de la explotación de pedernal en Puerto Rico. *Boletín del Museo del Hombre Dominicano* 32:167-192.
2003a A Reconstruction of Paso del Indio's Alluvial Stratigraphy. Report on file at the Paso del Indio Laboratory, Canóvanas, Puerto Rico.
2003b La continuidad tecnológica del Arcaico al Post-Saladoide de Puerto Rico: Un vistazo desde la litica de Paso del Indio. Paper presented at the XXth International Congress of Caribbean Archaeology, Dominican Republic.
2005a The Crab-Shell Dichotomy Revisited: The Lithics Speak Out. In *Ancient Borinquen: Archaeology and Ethnohistory of Native Puerto Rico*, edited by Siegel, Peter, pp. 1-54. University of Alabama Press: Tuscaloosa.
2005b The Function of the Edge-Ground Cobble Put to the Test: An Initial Assessment. *Journal of Caribbean Archaeology* 5:1-22.
2005c Comentario al artículo de Jaime Pagán Jiménez et al. "La temprana introducción de plantas domésticas, silvestres y cultivos en las Antillas precolombinas". *Diálogo Antropológico* 3(10):43-47.
2006 Hacia un enfoque tecnológico de la lítica en el Caribe: Los casos de la Mina y Martineau, Vieques, Puerto Rico. *Caribe Arqueológico* 10:35-48.
2008 From the Guanahatabey to the "Archaic" of Puerto Rico: the Non-Evident Evidence. *Ethnohistory*, in press.

Rodríguez Ramos, Reniel and L. Antonio Curet
2006 *El Gran Caribe.* Paper presented at the Simposio para la exploración de las relaciones históricas entre los pueblos indígenas de la Baja América Central y el norte de Suramérica, Universidad Nacional de Costa Rica, San José.

Rodríguez Ramos, Reniel, Elvis Babilonia, L. Antonio Curet, and Jorge Ulloa
2008a The Pre-Arawak Pottery Horizon in the Antilles: A New Approximation. *Latin American Antiquity*, in press.

Rodríguez Ramos, Reniel and Jaime Pagán Jiménez
2006 Interacciones multivectoriales en el Circum-Caribe precolonial: Un vistazo desde las Antillas. *Caribbean Studies* 34(2):103-143.
2007 Las Antillas en el contexto del circun-Caribe: Medio siglo más tarde. Submitted on January, 2006 to *Proceedings of the XXI International Congress for Caribbean Archaeology*, edited by Basil Reid. Trinidad-Tobago, in press.

Rodríguez Ramos, Reniel, Eduardo Questell, and Jeffrey B. Walker
2007 La explotación de pedernal en el noroeste de Puerto Rico: Fuentes, técnicas e implicaciones. In *Actas del VI Encuentro de Investigadores del Instituto de Cultura Puertorriqueña*, Publicación Ocasional de la División de Arqueología del Instituto de Cultura Puertorriqueña, San Juan, Puerto Rico, in press.

Rodríguez Ramos, Reniel, Joshua M. Torres and José R. Oliver
2008b Rethinking Time in Caribbean Archaeology. In *Island Shores, Distant Pasts: Archaeological and Biological Approaches to the Pre-Columbian Settlement of the Caribbean*, edited by Scott Fitzpatrick and Ann Ross. University of Florida Press: Gainesville, in press.

Roe, Peter G.
1985 A Preliminary Report on the 1980 and 1982 Field Seasons at Hacienda Grande (12PSj 7-5): Overview of Site History, Mapping, and Excavations. *Proceedings of the 10th International Congress for Caribbean Archaeology*, 151-180.
1989 A Grammatical Analysis of Cedrosan Saladoid Vessel Form Categories and Surface Decoration: Aesthetic and Technical Styles in Early Antillean Ceramics. In *Early Ceramic Population Lifeways and Adaptive Strategies in the Caribbean*, edited by P. E. Siegel, pp. 267-382. British Archaeological Reports International Series, No. 506, Oxford.
1995 Eternal Companions: Amerindian Dogs from Tierra Firme to the Antilles. In *Proceedings of the XV International Congress for Caribbean Archaeology*, pp. 155-172. San Juan.
1999a Cóndores andinos…buitres reyes de la selva. *El Vocero* 9 January:E26.
1999b Un centro de joyas precolombinas en Vieques. *El Vocero* 12 December:E26.
2005 Rivers of Stone, Rivers within Stone: Rock Art in Ancient Puerto Rico. In *Ancient Borinquen: Archaeology and Ethnohistory of Native Puerto Rico*, edited by P. E. Siegel, pp. 285-352. University of Alabama Press: Tuscaloosa.

Roe, Peter G., Agamemnon G. Pantel and M. B. Hamilton
1990 Monserrate Restudied: The 1978 Centro Field Season at Luquillo Beach: Excavation Overview, Lithics and Physical Anthropological Remains. *Proceedings of the 11th Congress of the International Association for Caribbean Archaeology*, 338-369.

Rogers, Daniel
1990 *Objects of Change: The Archaeology and History of Arikara Contact with Europeans*. Smithsonian Institution Press: Washington D.C.

Romano, Arturo
1982 Deformación cefálica intencional (síntesis). In *Primer simposio de correlaciones antropológicas andino-mesoamericanas*, edited by J. G. Marcos and P. Norton, pp. 259-264. Escuela Superior Politécnica del Litoral (Espol), Guayaquil.

Roosevelt, Anna C. and Peter E. Siegel
2007 Irving Rouse (1913-2006). *American Anthropologist* 109(1): 235-237.

Rose, Richard
1987 Lucayan Lifeways at the Time of Columbus. In *Proceedings of the First San Salvador Conference Columbus and his World*, edited by D. J. Grace. CCFL Field Station: San Salvador.

Roseberry, William
1989 *Anthropologies and Histories: Essays in Culture, History, and Political Economy*. Rutgers University Press: New Brunswick.

Ross, Anne H.
2004 Cranial Evidence of Pre-Contact Multiple Population Expansions in the Caribbean. *Caribbean Journal of Science* 40(3):291-298.

Rouse, Irving
1939 *Prehistory in Haiti: a Study in Method*. Yale University Publications in Anthropology, No. 21. Yale University Press: New Haven..
1940 Some evidence concerning the origins of West Indian pottery making. *American Anthropologist* 42(1):49-80.
1951 Areas and periods of culture in the Greater Antilles. *Southwestern Journal of Anthropology* 7(3): 248-265.
1952 *Scientific Survey of Puerto Rico and the Virgin Islands. Volume XVIII, Parts 3 and 4*. The New York Academy of Sciences, New York.
1953 The Circum-Caribbean Theory, An Archaeological Test. *American Anthropologist* 55(2): 188-200.
1956 Settlement Patterns in the Caribbean Area. In *Prehistoric Settlement Patterns in the New World*, edited by Willey, Gordon R., pp. 165-172. Viking Foundation Publications in Anthropology, No. 23, New York.
1960a The Classification of Artifacts in Archaeology. *American Antiquity* 25:313-23.

1960b Development of Culture in the Northern Andes, Amazonia, and the Caribbean Area. Paper presented in the Symposium "From 15,000 B.C. to the Thresholds of Urban Civilization-A World-Wide Consideration of the Cultural Alternatives," Burg Wartenstein, Austria.

1960c The Entry of Man into the West Indies. In *Papers in Caribbean Anthropology*, edited by S. W. Mintz. Yale University Publications in Anthropology, No. 61, New Haven.

1961 The Bailey Collection of Stone Artifacts from Puerto Rico. In *Essays in Pre-Columbian Art and Archaeology*, S. K. Lothrop et. al., pp. 342-355.

1962 The Intermediate Area, Amazonia, and the Caribbean Area. In *Courses toward Urban Life*, edited by R.J. Braidwood and G. R. Willey, pp. 34-59. Viking Fund Publications in Anthropology 32. Wenner-Gren Foundation for Anthropological Research, Inc., New York.

1964 Prehistory of the West Indies. *Science* 144 (3618): 499-513.

1966 Mesoamerica and the Eastern Caribbean. In *Archaeological Frontiers and External Connections*, Handbook of South American Indians, pp. 234-242. Univesity of Texas Press, Ltd.: London.

1982 Ceramic and Religious Development in the Greater Antilles. *Journal of New World Archaeology*, 5(2): 45-55.

1986 *Migrations in Prehistory*. Yale University Press, New Haven.

1989 Peoples and cultures of the Saladoid frontier in the Greater Antilles. In *Early Ceramic Population Lifeways and Adaptive Strategies in the Caribbean*, edited by Peter Siegel, pp. 383-404. BAR International Series, No. 506, Oxford.

1990 Social, Linguistic and Stylistic Plurality in the West Indies. *Proceedings of the 11th International Congress for Caribbean Archaeology*, 56-64.

1992 The Tainos: Rise and Decline of the People who Greeted Columbus. Yale University Press: New Haven.

1999 Foreword. In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by C. L. Hofman and M. L.P. Hoogland, pp. 87-104. Faculty of Archaeology, Leiden University, The Netherlands..

Roth, William E.

1924 An Introductory Study of the Arts, Crafts, and Customs of the Guiana Indians. In *38th Annual Report of the Bureau of American Ethnology*, pp. 23-745. Smithsonian Institution, Washington D.C.

Rouse, Irving and Ricardo E. Alegría

1990 *Excavations at María de la Cruz Cave and Hacienda Grande Village Site, Loiza, Puerto Rico*. Yale University Publications in Anthropology, No. 80. Yale University Press: New Haven.

Rouse, Irving and Loius Allaire

1978 Caribbean. In *Chronologies of the New World*, edited by Taylor, R. E. and C. W. Meighan, pp. 432-481. Academic Press: New York.

Sáenz Samper, Juanita and Roberto Lleras Pérez
1999 Las relaciones prehispánicas entre los territorios de Costa Rica y Colombia. In *Oro y Jade: Emblemas de Poder en Costa Rica*, pp. 67-88. Museo del Oro, Bogotá.

Sanders, Suzanne, Ellen Saint Onge, R. Christopher Goodwin, Dave D. Davis, and Christian Davenport
2001 Archaeological Survey and Evaluation of Selected Sites at NSGA Sabana Seca, Sabana Seca, Puerto Rico, Volume 5. Report on file at the State Historic Preservation Office, San Juan, Puerto Rico.

Sanoja, Mario and Iraida Vargas
1999 Early Modes of Life in the Indigenous Populations of Northern Venezuela. In *Archaeology in Latin America*, edited by Politis, Gustavo and Benjamin Alberti, pp. 148-166. Routledge: London.

Sarah, Timothy R., Jose J. Ortiz, and Lee A. Newsom
2003 Recent Paleoenvironmental Investigations on Vieques Island, Puerto Rico. Paper presented at the XXIIth International Congress for Caribbean Archaeology, Dominican Republic.

Sassaman, Kenneth E.
1993 *Early Pottery in the Southeast: Tradition and Innovation in Cooking Technology*. University of Alabama Press: Tuscaloosa.
2004a Structure and Practice in the Archaic Southeast. In *North American Archaeology*, edited by T. Pauketat, pp. 79-107. Blackwell Publishing: London.
2004b Complex Hunter-Gatherers in Evolution and History: A North American Perspective. *Journal of Archaeological Research* 12(3):227-280.
2005 Poverty Point as Structure, Event, Process. *Journal of Archaeological Method and Theory* 12(4):335-364.

Saunders, Nicholas J.
2003 "Catching the Light:" Technologies of Power and Enchantment in Pre-Columbian Goldworking. In *Gold and Power in Ancient Costa Rica, Panama, and Colombia*, edited by J. Quilter and J. W. Hoopes, pp. 15-48. Dumbarton Oaks, Trustees for Harvard University, Washington, D.C.

Scheinsohn, Vivian
2003 Hunter-Gatherer Archaeology in South America. *Annual Review of Anthropology* 32:339-361.

Schortman, Edward and Patricia Urban
1998 Culture Contact Structure and Process. In *Studies in Culture Contact: Interaction, Culture Change, and Archaeology*, edited by J. G. Cusick, pp. 102-125. Center for Archaeological Investigations, Occasional Paper No. 25, Southern Illinois University, Carbondale.

Schwartz, Marion
1997 *A History of Dogs in the Early Americas*. Yale University Press: New Haven.

Sears, William H.
1977 Seaborne Contacts between Early Cultures in Lower Southeastern United States and Middle through South America. En *The Sea in the Pre-Columbian World*, E.P. Benson (ed.), pp. 1-16, Dumbarton Oaks Research Library and Collections, Trustees for Harvard University, Washington D.C.

Shafer, Harry J.
1973 *Lithic Technology at the George C. Davis Site, Cherokee Conty, Texas*. Unpublished Ph.D. dissertation, Department of Anthropology, University of Texas at Austin, Austin.

Siegel, Peter E.
1989 Site Structure, Demography, and Social Complexity in the Early Ceramic Age of the Caribbean. In *Early Ceramic Population Lifeways and Adaptive Strategies in the Caribbean*, edited by P.E. Siegel, pp. 193-245. BAR International Series 506. British Archaeological Reports, Oxford.
1991 Migration Research in Saladoid Archaeology: A Review. *The Florida Anthropologist* 44(1):79-91.
1992 *Ideology, Power, and Social Complexity in Prehistoric Puerto Rico.* Ph.D. dissertation, State University of New York, Binghamton. University Microfilms, Ann Arbor.
1996 Ideology and Culture Change in Puerto Rico: A View from the Community. *Journal of Field Archaeology* 23(3):313-333.
2004 What Happened after AD 600 in Puerto Rico? Corporate Groups, Population Restructuring, and Post-Saladoid Social Changes. In *Late Ceramic Age Societies in the Eastern Caribbean*, edited by A. Delpuech and C. L. Hofman, pp. 87-100. BAR International Series 1273, London.
2005 Preface. In *Ancient Borinquen: Archaeology and Ethnohistory of Native Puerto Rico*, edited by P. E. Siegel, pp. xv-xix. University of Alabama Press: Tuscaloosa.

Siegel, Peter E. and Kenneth P. Severin
1993 The First Documented Prehistoric Gold-Copper Alloy Artifact from the West Indies. *Journal of Archaeological Science* 20:67-69.

Siegel, Peter E. and J.W. Joseph
1993 Archaeological Data Recovery at El Palmar de las Animas (Site VB-27) and the Concrete Well Site (Site VB-32), Río Cibuco Flood Control Project, Municipio de Vega Baja, Puerto Rico. Copies available at the Puerto Rico State Historic Preservation Office, San Juan, Puerto Rico.

Siegel, Peter E., John G. Jones, Deborah M. Pearsall, and Daniel P. Wagner
2005 Environmental and Cultural Correlates in the West Indies: A View from Puerto Rico. In *Ancient Borinquen: Archaeology and Ethnohistory of Native Puerto Rico*, edited by P. Siegel, pp. 88-121. University of Alabama Press: Tuscaloosa.

Silliman, Stephen
2001 Agency, Practical Politics, and the Archaeology of Culture Contact. *Journal of Social Archaeology* 1:184-203.
2004 Social and Physical Landscapes of Contact. In *North American Archaeology*, edited by T. Pauketat, pp. 272-296. Blackwell Publishing: London.
2005 Culture Contact or Colonialism? Challenges in the Archaeology of Native North America. *American Antiquity* 70(1):55-74.

Smith, Andrew B.
1998 Keeping People on the Periphery: The Ideology of Social Hierarchies between Hunters and Herders. *Journal of Anthropological Archaeology* 17:201-215.

Smith, Anita
1995 The Need for Lapita: Exploring Change in the Late Holocene Pacific Archaeological Record. *World Archaeology* 26(3):366-379.

Snarskis, Michael J.
1984 Central America: The Lower Caribbean. In *The Archaeology of Lower Central America*, edited by F. W. Lange and D. Z. Stone, pp. 195-232. University of New Mexico Press: Albuquerque.
2003 From Jade to Gold in Costa Rica: How, Why, and When. En *Gold and Power in Ancient Costa Rica, Panama, and Colombia*, edited by Jeffrey Quilter and John W. Hoopes, pp. 159-204. Dumbarton Oaks, Trustees for Harvard University, Washington, D.C.

Soto, Zulay
1993 Jades in the Jade Museum, Instituto Nacional de Seguros, San José, Costa Rica. In *Precolumbian Jade: New Geological and Cultural Interpretations*, edited by Frederick W. Lange, pp. 68-72. University of Utah Press: Salt Lake City.

Stahl, Peter W.
2003 The Zooarchaeological Record from Formative Ecuador. In *The Archaeology of Formative Ecuador*, edited by J. S. Raymond and R. L. Burger, pp. 175-212. Dumbarton Oaks, Trustees for Harvard University, Washington D.C.

Staller, John E.
2001 Reassessing the Development and Chronological Relationships of the Formative of Coastal Ecuador. *Journal of World Prehistory* 15(2):193-256.

Steadman, Dave W., G. K. Pregill, and S. L. Olson
1984 Fossil Vertebrates from Antigua, Lesser Antilles: Evidence for Late Holocene Human-Caused Extinctions in the West Indies. *Proceedings of the National Academy of Sciences* 81:4448-4451.

Stevenson Day, Jane
1993 The Media of Ritual. In *Precolumbian Jade: New Geological and Cultural Interpretations*, edited by Frederick W. Lange, pp. 289-306. University of Utah Press: Salt Lake City.

Steward, Julian
1948 The Circum-Caribbean Tribes: An Introduction. In *The Circum-Caribbean Tribes, Handbook of South American Indians*, Vol. 4, Bulletin of the Bureau of American Ethnology, No. 143, edited by J. H. Steward, pp. 1-41. Smithsonian Institute: Washington D.C.

Stirling, Matthew W. y Marion Stirling
1997 *Investigaciones arqueológicas en Costa Rica*. Imprenta Nacional: San José.

Stokes, Anne V.
1998 *A Biogeographic Survey of Prehistoric Human Diet in the West Indies Using Stable Isotopes*. Unpublished PhD Dissertation, University of Florida, Gainesville.

Stone, Doris
1982 La presencia hipotética de las culturas Arauaca y Tairona en Panamá y Costa Rica. In *Primer simposio de correlaciones antropológicas andino-mesoamericanas*, edited by J. G. Marcos and P. Norton, pp. 329-339. Escuela Superior Politécnica del Litoral (Espol), Guayaquil.
1993 Jade and Jade Objects in Precolumbian Costa Rica. In *Precolumbian Jade: New Geological and Cultural Interpretations*, edited by Frederick W. Lange, pp. 141-148. University of Utah Press: Salt Lake City.

Stuiver, M., B. J. Reimer and J. W. Reimer
2005 CALIB 5.0 (www. Program and documentation)

Sued Badillo, Jalil
1979a La industria lapidaria pretaína en las Antillas. *Revista Interamericana* 8(3):429-462.
1979b *La mujer indígena y su sociedad*. Editorial Antillana: San Juan.
1992 Facing up to Caribbean History. *American Antiquity* 57(4):599-607.

Tabío, Ernesto E.
1995 *Introducción a la arqueología de las antillas*. Editorial de Ciencias Sociales: La Habana.

Terrell, John E.
1998 30,000 Years of Culture Contact in the Southwest Pacific. In *Studies in Culture Contact: Interaction, Culture Change and Archaeology*, edited by J. G. Cusick, pp. 191-219. Occasional Paper No. 25, Center for Archaeological Investigations, Southern Illinois University, Carbondale.
2004 Island Models of Reticulate Evolution: The "Ancient Lagoons" Hypothesis. In *Voyages of Discovery: The Archaeology of Islands*, edited by S. M. Fitzpatrick, pp. 203-223. Praeger: London.

Terrell, John E., Kevin M. Kelly, and Paul Rainbird
2001 Foregone Conclusions? In Search of "Papuans" and "Austronesians." *Current Anthropology* 42(1):97-124.

Torrence, Robin and John Grattan
2002 The Archaeology of Disasters: Past and Future Trends. In *Natural Disasters and Culture Change*, edited by R. Torrence and J. Grattan, pp. 1-18. Routledge: London.

Torres, Joshua M.
2001 Settlement Patterns and Political Geography of the Saladoid and Ostionoid Peoples of South-central Puerto Rico: An Exploration of Prehistoric Social Complexity on a Regional Level. Unpublished Master's Thesis, Department of Anthropology, University of Colorado at Denver.
2005 Deconstructing the Polity: Socio-Political Landscapes of the Ceramic Age Peoples of South Central Puerto Rico. In *Ancient Borinquen: Archaeology and Ethnohistory of Native Puerto Rico*, edited by P. E. Siegel, pp. 202-229. University of Alabama Press: Tuscaloosa.

Tronolone, Carmine A., Michael A. Cinquino, and Charles E. Vandrei
1984 Cultural Resource Reconnaissance Survey for the Vieques Naval Reservation. Copies available at the Puerto Rico State Historic Preservation Office, San Juan.

Tykot, Robert H. And John E. Staller
2002 The Importance of Early Maize Agriculture in Coastal Ecuador: New Data from La Emerenciana. *Current Anthropology* 43(4):666-677.

Ulloa, Jorge and Roberto Valcárcel
2002 *Cerámica temprana en el centro del oriente de Cuba*. Viewgraph: Santo Domingo.

Valadez Azúa, Raúl
1995 *El perro mexicano*. Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México.

Valcárcel Rojas, R.
2002 *Banes precolombino, la ocupación agricultora*. Ediciones Holguín: Holguín.

Vargas Arenas, Iraida.
1979 *La tradición Saladoide del oriente de Venezuela. La fase Cuartel*. Academia Nacional de la Historia, Serie Estudios, Monografias y Ensayos No. 5, Caracas.

Vega, Jesús E.
1981 Excavation of a Submerged, Sub-Taino Site in Puerto Rico. Unpublished Masters Thesis, Department of Anthropology, Florida Atlantic University, Florida.
1990 The Archaeology of Coastal Change. Unpublished Ph.D. dissertation, Department of Anthropology, University of Florida, Gainesville.

1995 *Culturas en azul: naufragios, tesoros y arqueología en aguas de Puerto Rico*. Instituto de Arqueología y Oceanografía y Oficina Estatal de Preservación Histórica: San Juan.

Veloz Maggiolo, Marcio
1972 *Arqueología prehistórica de Santo Domingo.* McGraw Hill:Singapore.
1980 *Las sociedades Arcaicas de Santo Domingo*. Museo del Hombre Dominicano, Serie Investigaciones Antropológicas No. 16, Fundación Garcia Arévalo, Santo Domingo.
1984 Para una definición de la cultura Taina. In *Las Culturas de América en la Epoca del Descubrimiento: La Cultura Taína*, edited by Comisión del Qunto Centenario, pp. 17-23. Turner Libros, Spain.
1993 *Panorama histórico del Caribe precolombino*. Edición del Banco de la Republica Dominicana: Santo Domingo.
2001 Los agricultores tempranos en la isla de Santo Domingo. In *Culturas Aborígenes del Caribe*, edited by Ramón H. Seiffe, pp. 199-201. Publicaciones del Banco Central de la República Dominicana: Santo Domingo.

Veloz Maggiolo, Marcio and Carlos A. Angulo Valdés
1982 La aparición de un ídolo de tres puntas en la tradición Malambo (Colombia). *Boletín del Museo del Hombre Dominicano* 10: 15-20.

Veloz Maggiolo, Marcio, Juan González, Edgar J. Maiz and Eduardo Questell
1975 *Cayo Cofresí: Un sitio precerámico de Puerto Rico*. Ediciones Taller: Santo Domingo.

Veloz Maggiolo, Marcio and Elpidio Ortega
1996 Punta Cana y el origen de la agricultura en la isla de Santo Domingo. In *Ponencias del Primer Seminario de Arqueología del Caribe*, edited by Marcio Veloz and Caba, Angel, pp. 5-11. Museo Regional Altos de Chavón: La Romana.

Veloz Maggiolo, Marcio, Elpidio Ortega and Angel Caba
1981 *Los Modos de Vida Mellacoides y sus Posibles Orígenes*. Editora Taller: Santo Domingo.

Veloz Maggiolo, Marcio and Agamemnom G. Pantel
1988 El modo de vida de los recolectores en la arqueología del Caribe (Parte 1). *Boletín de Antropología Americana* 18:149-167.

Versteeg, Aaad H. and K. Schindel
1992 *The Archaeology of St. Eustatius: The Golden Rock Site*. Publications of the Foundation for Scientific Research in the Caribbean Region, No. 131. Amsterdam.

Vescelius, Gary and Linda Robinson
1979 Exotic Items in Archaeological Collections from St. Croix: Prehistoric Imports and their Implications. Paper presented to the 8th International Congress for the Study of Pre-Columbian Cultures of the Lesser Antilles, St. Kitts and Nevis.

Vidal, Antonio
2003 La región geohistórica del Caribe. *RMC* 15:7-37.

Wadley, Lyn
1996 Changes in Social Relations of Precolonial Hunter Gatherers after Agropastoralist Contact: An Example from Magaliesberg, South Africa. *Journal of Anthropological Archaeology* 15:205-217.

Wagner, Erika and Carlos Schubert
1972 Pre-Hispanic Workshop of Serpentinite Artifacts, Venezuelan Andes, and Possible Raw Material Source. *Science* 175(4024):888-890.

Walker, Jeffrey B.
1980 *Analysis and Replication of the Lithic Artifacts from the Sugar Factory Pier Site, St. Kitts, West Indies*. Unpublished Master's Thesis, Department of Anthropology, Washington State University, Pullman.
1985a A Preliminary Report on the Lithic and Osteological Remains from the 1980, 1981 and 1982 Field Seasons al Hacienda Grande (12 PSj 7-5). *Proceedings of the 10th Congress of the International Association for Caribbean Archaeology, 181-224.*
1985b Analysis of the Lithic Artifacts from El Bronze Archaeological Site, Puerto Rico. Appendix G. In *Archaeological Data Recovery at El Bronze, Puerto Rico, Final Report, Phase 2*, edited by L.S. Robinson, E. Lundberg and J.B. Walker. Archaeological Services, Inc., Florida. Submitted to the U.S. Army Corps of Engineers, Jacksonville District. Copies available from the State Office of Historic Conservation, San Juan, Puerto Rico.
1993 Stone Collars, Elbow Stones and Three-pointers and the Nature of Taíno Ritual and Myth. Unpublished Ph.D. Dissertation, Washington State University, Pullman.
1997 Analysis of the Lithic Artifacts from the Stage II Testing of the Finca Valencia Site, Arecibo, and the La Trocha Site, Vega Baja, Puerto Rico. Submitted to the Instituto de Cultura Puertorriqueña, San Juan. Copies available on the Instituto de Cultura Puertorriqueña, San Juan, Puerto Rico.
2000 Analysis of the Lithic Artifacts from the Phase III Excavations of the La Trocha Site, Vega Baja, Puerto Rico. Report on file at the Puerto Rico State Historic Preservation Office, San Juan.
2005 The Paso del Indio Site, Vega Baja, Puerto Rico: A Progress Report. In *Ancient Borinquen: Archaeology and Ethnohistory of Native Puerto Rico*, edited by P. Siegel, pp. 55-87. University of Alabama Press: Tuscaloosa.

Walker, Jeffrey B., Eduardo Questell and Reniel Rodríguez Ramos
2001 *Fuentes de lítica en el noroeste de Puerto Rico*. Survey and Planning Monograph, State Historic Preservation Office, San Juan, Puerto Rico.

Watson, Patty Jo
1995 Archaeology, Anthropology, and the Culture Concept. *American Anthropologist* 97(4):683-694.

Watters, David R.
1997 Maritime Trade in Prehistoric Eastern Caribbean. In *Indigenous People of the Caribbean*, edited by S. Wilson, pp. 88-89. University Press of Florida, Gainesville.

Watters, David R. and Irving Rouse
1989 Environmental Diversity and Maritime Adaptations in the Caribbean Area. In *Early Ceramic Lifeways and Adaptive Strategies in the Caribbean*, edited by P. E. Siegel, pp. 129-144. BAR International Series No. 506, Oxford.

Whallon, Robert
2005 Social Networks and Information: Non-"Utilitarian" Mobililty among Hunter-Gatherers. *Journal of Anthropological Archaeology* 25:250-270.

Whitehead, Neil L.
1996 The Mazaruni Dragon: Golden Metals and Elite Exchanges in the Caribbean, Orinoco, and Amazon. In *Caciques, Intercambio y Poder: Interacción Regional en el Area Intermedia de las Américas*. Universidad de los Andes, Bogotá.

Whittaker, John C.
1994 *Flintknapping: Making and Understanding Stone Tools*. University of Texas Press: Austin.

Wiessner, Polly
2002 The Vines of Complexity: Egalitarian Structures and the Institutionalization of Inequality among the Enga. *Current Anthropology* 43(2).

Wilbert, Johannes
1977 Navigators of the Winter Sun. In *The Sea and the Precolumbian World*, edited by E. Benson, pp. 17-46. Dumbarton Oaks Research Library and Collections, Trustees of Harvard University, Washington D.C.

Willey, Gordon R.
1971 *An Introduction to American Archaeology*. Prentice-Hall: New Jersey.
1976 The Caribbean Preceramic and Related Matters in Summary Perspective. In *Proceedings of the First Puerto Rican Symposium in Archaeology*, edited by L. Robinson, pp. 1-8. Fundación Arqueológica, Antropológica e Histórica de Puerto Rico, San Juan.
1980 Precolumbian Taino Art in Historical and Sociocultural Perspective.In *La Antropologia Americanista en la Actulaidad: Homenaje a Raphael Girard*, Tomo 1, pp. 113-128. Editores Mexicanos Unidos: Ciudad México.

Willey, Gordon R. and Philip Phillips
1958 *Method and Theory in American Archaeology*. University of Chicago Press: Chicago.

Willey, Gordon R. and Jeremy Sabloff
1974 *A History of American Archaeology*. Freeman and Sons, San Francisco.

Wilson, Samuel M.
1991 Current Research. *American Antiquity* 56(1):143-160.
1993 The Cultural Mosaic of the Prehistoric Caribbean. *Proceedings of the British Academy* 81:37-66.
1997 Introduction to the Study of the Indigenous People of the Caribbean. In *Indigenous People of the Caribbean*, edited by S. M. Wilson, pp. 1-8. University Press of Florida: Gainesville.
1999 Cultural pluralism and the emergence of complex society in the Greater Antilles. Paper presented at the XVIIIth International Congress for Caribbean Archaeology, Grenada.
2007a Stone Pavements, Roads, and Enclosures in Central America and the Caribbean. In *Proceedings of the XXIIIth Congress of the International Association for Caribbean Archaeology*, edited by B. Reid. Trinidad, in press.
2007b *The Archaeology of the Caribbean*. Cambridge University Press: Cambridge, in press.

Wilson, Samuel, Harry B. Iceland, and Thomas R. Hester
1998 Preceramic Connections Between Yucatan and the Caribbean. *Latin American Antiquity* 9(4): 342-352.

Wing, Elizabeth S.
1990 Apendix. Animal Remains from the Hacienda Grande Site. In *Excavations at Maria de la Cruz Cave and Hacienda Grande Village Site, Loiza, Puerto Rico*, by Irving Rouse and Ricardo E. Alegría, pp. 87-101. Yale University Publications in Anthropology, No. 80, New Haven.
1997 Guinea Pig (*Cavia porcellus*) Remains from Finca Valencia (NSC-1), Northwest Puerto Rico. Report on file at the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, San Juan.

Wissler, Clark
1916 Correlations between Archaeological and Culture Areas in the American Continents, In *Holmes Aniversary Volume* 481-490. Washington.

Wolf, Eric
1984 Culture: Panacea or a Problem? *American Antiquity* 49(2):393-400.

Woodburn, James
1982 Egalitarian Societies. *Man* 17:431-451.
1988 African Hunter-Gatherer Social Organization: Is It Best Understood as a Product of Encapsulation? In *Hunters and Gatherers, Vol. 1: History, Evolution, and Social Change*, edited by Ingold T., D. Riches and J. Woodburn, pp. 31-64. Berg: New York.

Woods, Charles A.
1990 The Fossil and Recent Land Mammals of the West Indies: An Analysis of the Origin, Evolution, and Extinction of an Insular Fauna. *Atti deit Convegni Lince* 85:641-680.

Yesner, David R.
1980 Maritime Hunter-Gatherers: Ecology and Prehistory. *Current Anthropology* 21:727-750.

Zucchi, Alberta
1984 Nueva evidencia sobre la penetración de grupos cerámicos a las Antillas Mayores. In *Relaciones prehispánicas de Venezuela*, edited by E. Wagner, pp. 35-50. Acta Científica Venezolana, Caracas.
1988 El Orinoco Medio: Su importancia para explicar la relación entre el juego de la pelota de los Otomoaco, de las Antillas y de Mesoamérica. *Boletín de la Academia Nacional de la Historia* 72(279):443-477.

Zvelebil, Merek
2006 Mobility, Contact, and Exchange in the Baltic Sea Basin 6000-2000 BC. *Journal of Anthropological Archaeology* 25:178-192.

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